

BEFORE THE  
OHIO ENVIRONMENTAL PROTECTION AGENCY

IN THE MATTER OF:

THE SCOTTS  
COMPANY, LLC

and

MARYSVILLE ESTATES, L.L.C

RESPONDENTS,

FOR THE SITE KNOWN AS

RAY LEWIS LANDFILL

DIRECTOR'S FINAL

FINDINGS AND ORDERS

FOR INTERIM ACTION

AND COST RECOVERY

I certify this to be a true and accurate copy of the  
official documents as filed in the records of the Ohio  
Environmental Protection Agency.

By: Donna Cassider Date: 4-26-18

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## **PREAMBLE**

It is agreed to by the Parties hereto as follows:

### **I. JURISDICTION**

1. These Director's Final Findings and Orders ("Orders") are issued to The Scotts Company LLC ("Scotts") and Marysville Estates, L.L.C ("Marysville Estates"), as Respondents, pursuant to the authority vested in the Director of Ohio EPA under Ohio Revised Code ("ORC") §§ 3734.13, 3734.20, 6111.03, and 3745.01, and CERCLA, 42 U.S.C. § 9601 et seq.

### **II. PARTIES BOUND**

2. These Orders shall apply to and be binding upon Respondents and their successors in interest liable under Ohio law as described herein.

3. No change in ownership or corporate status of the Respondents including, but not limited to, any transfer of assets or real or personal property shall in any way alter Respondents' obligations under these Orders.

4. Respondents shall provide a copy of these Orders to all contractors and consultants retained to conduct any portion of the Work performed pursuant to these Orders, within fourteen (14) days of the effective date of these Orders or upon date of retention. Respondents shall ensure that all contractors and consultants retained to perform the Work pursuant to these Orders also comply with the applicable provisions of these Orders.

### **III. DEFINITIONS**

5. Unless otherwise expressly provided herein, all terms used in these Orders or in any appendices shall have the same meaning as defined in ORC Chapters 3734 and 6111, CERCLA, and the rules promulgated thereunder. Whenever the terms listed below are used in these Orders or in any appendices, attached hereto and incorporated herein, the following definitions shall apply:

- a. "CERCLA" means the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq.
- b. "Contaminant" and "Contamination" means (1) any "hazardous waste" under ORC § 3734.01(J); (2) any "industrial waste" under ORC § 6111.01(C); (3) any

"solid wastes" under ORC § 3734.01(E); (4) any "hazardous substance" under CERCLA, 42 U.S.C. § 9601(14); and (5) any "other wastes" under ORC § 6111.01(D), including any release of one or more of the same. The Contaminants at the Site include, but are not limited to, pesticides (including chlordane, dieldrin, heptachlor and heptachlor epoxide), herbicides (including MCPA), asbestos, and volatile organic compounds (including benzene and vinyl chloride).

- c. "Day" means a calendar day unless expressly stated to be a business day. "Business day" shall mean a day other than a Saturday, Sunday, or state holiday. In computing any period of time under these Orders, where the last day would fall on a Saturday, Sunday, or state holiday, the period shall run until the close of the next business day.
- d. "Interim Action" ("IA") means those actions taken at the Site to ensure the protection of public health and safety and the environment through Work activities to be performed by Respondents pursuant to an Interim Action Work Plan that are intended as a complete resolution to address the objectives identified in paragraph 7 herein.
- e. "Interim Action Work Plan" ("IA Work Plan") means the document submitted by Respondents pursuant to the Performance of The Work by Respondents Section of these Orders, and approved by Ohio EPA pursuant to the Review of Submissions Section of these Orders.
- f. "NCP" means the National Oil and Hazardous Substances Pollution Contingency Plan, codified at 40 C.F.R. Part 300 (1990), as amended.
- g. "Ohio EPA" means the Ohio Environmental Protection Agency and its designated representatives.
- h. "Orders" means these Director's Final Findings and Orders and all appendices hereto.
- i. "Paragraph" means a portion of these Orders identified by an Arabic numeral, or an uppercase or lowercase letter.
- j. "Parties" means Respondents and the Ohio EPA.
- k. "Respondents" means Scotts and Marysville Estates, collectively.
- l. "Response Costs" means all lawful costs including, but not limited to, payroll costs, contractor costs, travel costs, direct costs, overhead costs, legal and enforcement related costs, oversight costs, laboratory costs, and the costs of

reviewing or developing plans, reports, and other items pursuant to these Orders, verifying the Work, or otherwise implementing or enforcing these Orders.

- m. "Section" means a portion of these Orders identified by a roman numeral.
- n. "Site" includes the Ray Lewis Landfill (aka the Marysville Trailer Sales Landfill) which occupies the approximate 3.867-acre Union County Parcel # 3900050260020, and the 1.092-acre Union County Parcel #2900050260010, east of Cypress Drive and west of the Ray Lewis Landfill where the treatment, storage, and/or disposal of hazardous waste, the open dumping of solid wastes, the release of hazardous substances, and/or the discharge to waters of the state of industrial waste or other wastes have occurred, including any other area where such hazardous wastes, solid wastes, hazardous substances, industrial wastes, and/or other wastes have migrated, threaten to migrate, or have come to be located.
- o. "Work" means all activities Respondents are required to perform under the Performance of The Work by Respondents and Additional Work Sections of these Orders.

#### **IV. FINDINGS**

6. The Director of Ohio EPA has determined the following findings. Respondents do not admit any of Ohio EPA's factual or legal findings and nothing in these Orders shall be considered as an admission by Respondents of any matter of fact or law. Respondents specifically deny ever disposing, or arranging for the disposal, of waste materials at the Site.

- a. Marysville Estates purchased the Site in 1996;
- b. Based on evidence from historical aerial photographs and documentation in Ohio EPA files, the landfill operated from the mid- to late-1960s.
- c. Approximately one-half acre of the south end of the Ray Lewis Landfill is fenced and formerly used as a storage yard for vehicles, boats, and equipment by Marysville Estates and residents of Marysville Estates mobile home community. The remainder of the landfill is vegetated with trees, heavy brush, and a small mowed grass area. Surface debris is present in places in the wooded area. The landfill is fenced along the north, east and south property lines. In November 2016, Marysville Estates installed a fence along the east side of Cypress Drive, thereby completely fencing in the Site.

- d. A Union County Sanitary Inspection Form dated October 4, 1968 that was completed for the "Ray Lewis Dump" included several items marked as violations of the then applicable sections of the Ohio Sanitary Code (HE-24-04 to HE 24-09), including sections related to ground water protection, open dumping, site access and daily cover. Additional items marked with question marks included leachate runoff, daily cover and hazardous substances.
- e. On December 16, 1968, the Ohio Department of Health issued a letter to Mr. Ray Lewis of the Marysville Trailer Court outlining deficiencies noted during a December 9, 1968 inspection conducted on behalf of the Union County Health Department. The letter noted there was little attempt to compact and cover the waste. The letter also stated that the Solid Waste Act stipulates that all dumps and landfills be licensed by January 1, 1969 and that no open dumping or burning will be permitted after July 1, 1969.
- f. On December 31, 1968, Harold ("Ray") Lewis of Marysville Trailer Sales, Inc. submitted an application for a license to operate a solid waste disposal site to the Union County District Board of Health. Under "Geographic Area to be Served," the applicant marked "Industry and demolition of buildings." The applicant agreed to operate the waste disposal site in compliance with ORC §§ 3734.01 to 3734.11, inclusive and the Ohio Sanitary Code HE-24-01 to HE-24-12.
- g. On December 4, 1969, the Union County Health Department issued a letter to Mr. Lewis stating that under ORC § 3734.09, a license to operate the Marysville Trailer Sales Landfill as a solid waste disposal site would not be issued for 1970 because open burning and dumping was being practiced and no operational plan had been submitted. The letter further stated that continued operation without a license would make him liable to prosecution as provided under ORC § 3734.99. Landfill operations ceased shortly thereafter as there is no evidence that waste continued to be accepted after denial of the permit.
- h. Turn-Key Environmental Consultants, Inc., on behalf of Ohio EPA, completed a Phase I Environmental Site Assessment of the Ray Lewis Landfill and affiliated properties in May 2013.
- i. Ohio EPA conducted Phase II site assessment activities at the Site from November 2013 through January 2014. Four soil borings were installed and completed as monitoring wells. Soil samples were collected from two of the four soil borings and six surface sample locations. Pesticides, including chlordane and heptachlor exceeding U.S. EPA regional screening levels ("RSLs") for residential soil were detected in soil samples from the landfill. Chlordane was a commonly used pesticide from 1948 to 1988 in both agricultural and consumer use. Visual evidence of the presence of vermiculite was also noted in several soil samples and soil cores; Ohio EPA suspected the noted vermiculite to contain asbestos. Several of the soil samples were submitted for laboratory analysis for

asbestos. The results confirmed the presence of asbestos in one surface soil sample and one soil boring sample.

- j. Ground water samples were collected from the four monitoring wells (MW-01 - MW-04) at the landfill by Ohio EPA in January 2014 using low-flow sampling methods. Samples were collected after stabilization of field parameters with no field filtration in accordance with Ohio EPA sampling protocols. Ground water samples collected from two of the four monitoring wells (MW-01 and MW-02) had concentrations of several chemicals exceeding U.S. EPA RSLs for tap water including chlordane in two wells and MCPA in one well. Concentrations of benzene exceeded the U.S. EPA maximum contaminant level ("MCL") for a public water supply system in two wells. The ground water sample from one monitoring well had a concentration of vinyl chloride exceeding the current U.S. EPA MCL. The ground water sample from one monitoring well had a concentration of arsenic exceeding the current U.S. EPA MCL. Groundwater at the Site is not used for drinking water.
- k. Ohio EPA collected 11 surface soil samples in the backs of the mobile home lots and the small community park on the east side of Cypress Drive during August 2015 to determine the edge of waste of the adjacent landfill. Chlordane, dieldrin, heptachlor and heptachlor epoxide were detected in several soil samples exceeding U.S. EPA RSLs for residential soil. Heptachlor concentrations in two soil samples and heptachlor epoxide concentrations in four soil samples also exceeded the current Ohio EPA Voluntary Action Program ("VAP") direct contact standard for residential soil. Vermiculite was observed in several of the surface soil samples. One soil sample with vermiculite was subsequently submitted for laboratory analysis which identified the presence of asbestos.
- l. In July 2015, Ohio EPA installed one additional monitoring well at the landfill and collected three ground water screening samples for VOC analysis with a hydraulic push drilling rig. In August 2015, Ohio EPA sampled the one recently installed and four existing monitoring wells for VOCs to determine the extent of benzene Contamination in ground water beneath the landfill. The benzene concentration in ground water samples from three of the monitoring wells and one hydraulic push boring location exceeded the current U.S. EPA MCL. One monitoring well also had a concentration of vinyl chloride exceeding the U.S. EPA MCL.
- m. Marysville Estates retained Lawhon & Associates to collect shallow soil samples at the front of mobile home lots on the east and west sides of Cypress Drive, the north side of Holly Drive, the north side of Birch Drive and from the small community park during December 2015 to determine the approximate extent of Contamination in soil. Chlordane was detected in several samples on the east and west sides of Cypress Drive. Chlordane was detected exceeding the



residential RSL in three soil samples on the east side of Cypress Drive and two soil samples on the west side of Cypress Drive. One soil sample on the east side of Cypress Drive also had a chlordane concentration exceeding the current VAP direct contact standard for residential soil. No soil samples on the west side of Cypress Drive had a chlordane concentration exceeding the current VAP direct contact standard for residential soil. Some soil samples collected from the mobile home lots on the east side of Cypress Drive contained vermiculite and asbestos; none on the western side of Cypress contained vermiculite or asbestos.

- n. Scotts (formerly O.M. Scott & Sons) formerly processed raw vermiculite ore concentrate at its Marysville, Ohio facility. Some of the raw vermiculite ore concentrate that Scotts used in its manufacturing process was contaminated with trace levels of asbestos.
- o. According to the *RCRA Facility Investigation Report for The Scotts Company, Marysville*, dated February 16, 2001, pesticides, including chlordane and heptachlor are known to be present in closed landfills and disposal areas on the Scotts Marysville facility campus.
- p. The Site is a hazardous waste facility, solid waste facility or other location where hazardous waste was treated, stored, or disposed or came to be located.
- q. Ohio EPA has preliminarily identified site-specific remedial action objectives ("RAOs") for use in performing the IA for the Site. The site-specific RAOs are to (1) prevent direct exposure to contaminated soil above acceptable risks; (2) minimize infiltration and resulting Contaminant leaching to ground water; (3) treat or eliminate toxic and/or highly mobile concentrations of Contaminants (hot spots); (4) return the soil to its expected beneficial uses wherever practicable within a reasonable time frame; and (5) mitigate or abate immediate threats to, and/or other situations or factors that may pose a threat to, public health, safety, and/or the environment attributable to the Site.
- r. In issuing these Orders, the Director has given consideration to, and based his determination on, evidence relating to the technical feasibility and economic reasonableness of complying with these Orders, the anticipated remedial benefit resulting from compliance with these Orders, and their relation to the benefits to the people of the state to be derived from such compliance.
- s. The actions to be taken pursuant to these Orders are reasonable and necessary to protect the public health or safety or the environment as provided in ORC § 3734.20.
- t. Because of their quantity, concentration, physical or chemical characteristics, Contaminants found at the Site, as identified herein, are "hazardous waste" as defined under ORC § 3734.01(J).

- u. Contaminants found at the Site, as identified herein, are “industrial waste” or “other wastes” as defined under ORC §§ 6111.01(C) and (D).
- v. Asbestos present at the Site is a “solid waste” as defined under ORC § 3734.01(E).
- w. The ground waters at the Site are “waters of the state” as defined in ORC § 6111.01(H).
- x. Ohio EPA has incurred Response Costs and continues to incur Response Costs associated with this Site.
- y. Respondents are each a “person” as defined under ORC §§ 3734.01(G) and 6111.01(I).
- z. Conditions at the Site “constitute a substantial threat to public health or safety or are causing or contributing or threatening to cause or contribute to air or water pollution or soil contamination” as provided in ORC § 3734.20(B).
- aa. The migration and threatened migration of Contaminants to ground water at or from the Site constitutes a discharge to “waters of the state,” as the term is defined in ORC § 6111.01(H).
- bb. The Work required pursuant to these Orders will contribute to the prohibition or abatement of the discharge of Contaminants to waters of the State.
- cc. The actions to be taken pursuant to these Orders are reasonable and necessary to protect the public health or safety or the environment as provided in ORC § 3734.20.
- dd. Respondent Scotts has been responsive and cooperative during the investigation and remediation of the Site.
- ee. Respondent Marysville Estates has been responsive and cooperative during the investigation and remediation of the Site.

## **V. GENERAL PROVISIONS**

### **7. Objectives of the Parties**

The objectives of the Parties in entering into these Orders are to protect public health and safety and the environment from the disposal, discharge, or release of

Contaminants through performance of an IA required under these Orders by Respondents to:

- a. Investigate the nature and extent of releases of Contaminants at the Site;
- b. Assess risk to human health and the environment;
- c. Collect sufficient data to support decisions regarding an interim action for the Site;
- d. Develop and evaluate potential alternatives for any area within the Site requiring interim action(s); and
- e. Implement the chosen interim action alternative(s) by performing the Work in order to ensure the protection of public health and safety and the environment.

#### 8. Commitment of Respondents

Respondents agree to perform the Work in accordance with these Orders including but not limited to the guidance documents listed in Appendix A to these Orders, and all standards, specifications, and schedules as approved by Ohio EPA pursuant to these Orders. Respondents agree to reimburse Ohio EPA for future Response Costs per the Reimbursement of Costs Section of these Orders. Respondents also agree to perform all other obligations designated in these Orders.

#### 9. Compliance With Law

- a. All activities undertaken by Respondents pursuant to these Orders shall be performed in accordance with the requirements of all applicable federal, state and local laws and regulations, and in a manner consistent with the NCP.
- b. Ohio EPA expects that activities conducted in accordance with, or pursuant to, these Orders, if approved by Ohio EPA, would be considered necessary and consistent with the NCP.
- c. Where any portion of the Work requires a permit, license or other authorization from Ohio EPA or any other state, federal or local government agency, Respondents shall submit applications in a timely manner and take all other actions necessary to obtain such permit, license, or other authorization. These Orders are not, and shall not be construed to be, a permit, license or other authorization issued pursuant to any statute or regulation.



## **VI. PERFORMANCE OF THE WORK BY RESPONDENTS**

### **10. Supervising Contractor**

All Work performed pursuant to these Orders shall be under the direction and supervision of a contractor with expertise in hazardous waste site investigation and remediation. Prior to the initiation of the Work, the Respondent responsible for a particular Work task, as described below, shall notify Ohio EPA in writing of the name of the supervising contractor and any subcontractor to be used in performing the Work under these Orders.

### **11. Performance of Interim Action Activities by Respondents**

Within fourteen (14) days of the Effective Date of these Orders, unless otherwise agreed to by the Parties, Respondents shall submit a schedule in accordance with the following guidelines for the tasks not yet approved:

- a. Cox-Colvin & Associates Inc. (Cox-Colvin) submitted an IA Sampling Plan on May 19, 2016, and it was approved by Ohio EPA on May 20, 2016.
- b. Cox-Colvin submitted the IA Sampling Report on October 31, 2016. The Report was approved by Ohio EPA on December 21, 2016.
- c. Submission of IA Work Plan. Within sixty (60) days of Ohio EPA approval of the IA Sampling Report, unless otherwise agreed to by the Parties, Respondents shall submit the IA Work Plan to Ohio EPA for approval. This IA Work Plan shall include a schedule, one or more recommended IAs (e.g., soil removal) to address identified areas that pose an unacceptable risk, and any design documents that may be necessary to implement the recommended IA(s).

Cox-Colvin submitted a draft IA Work Plan on February 24, 2016, and a final IA Work Plan on July 10, 2017. Ohio EPA approved the final IA Work Plan on August 10, 2017

- d. Implementation of IA Work Plan. Respondents shall implement the IA Work Plan as approved in accordance with the schedule submitted pursuant to Paragraph 11. As owner of the Site, Respondent Marysville Estates shall make all necessary arrangements to allow for timely implementation of the IA Work Plan at the Site including, but not limited to, disconnecting all underground utilities at the Site and obtaining any permits or other governmental authorizations necessary to complete the work described in the IA Work Plan. The failure of Respondent Marysville Estates to prepare the Site in a manner necessary for the timely implementation of the IA Work Plan shall not be deemed a violation of these Orders by Respondent Scotts. Respondents shall submit all plans,

reports, schedules, or other deliverables required under the approved IA Work Plan, in accordance with the approved schedule, for review and approval pursuant to the Review of Submissions Section of these Orders. Respondents shall provide for restoration (e.g., backfilling with clean top soil, seeding, laying straw, etc.), as may be necessary, of affected portions of the Site.

- e. Submission of Construction Completion Report. Within thirty (30) days of completion of the Work described in the IA Work Plan, unless otherwise agreed, Respondents shall submit the Construction Completion Report to Ohio EPA for approval. The Construction Completion Report shall include a summary of the IA Work and a certification that the Work was performed in accordance with the IA Work Plan and any design documents.
- f. Criteria for Document Development. The Work Plans and Reports to be completed pursuant to Paragraph 11 of these Orders, and any necessary supporting documents, shall be developed in conformance with the guidance documents listed in Appendix A of these Orders, as appropriate to the Work. The Work Plans shall include proposed schedules for the completion date for each task. If Ohio EPA determines that any additional or revised guidance documents affect the Work to be performed pursuant to Paragraph 11 of these Orders, Ohio EPA will notify Respondents, and the Work Plans, Reports and any other documents, if affected by such additional or revised guidance documents, shall be modified by Respondents accordingly.
- g. Handling of Inconsistencies. Should Respondents identify any inconsistency between any of the laws and regulations and guidance documents that they are required to follow by these Orders, Respondents shall notify Ohio EPA in writing of each inconsistency and the effect of the inconsistencies upon the Work to be performed. Respondents shall also recommend, along with a supportable rationale justifying each recommendation, the requirement Respondents believes should be followed. Respondents shall implement the affected Work as directed in writing by Ohio EPA and pursuant to applicable law.
- h. Review by Ohio EPA and Implementation by Respondents. Ohio EPA will review the Work Plans and Reports to be submitted pursuant to Paragraph 11 of these Orders in accordance with the procedures set forth in the Review of Submissions Section of these Orders.
- i. Explosive Gas Monitoring Plan. Within thirty (30) days after Ohio EPA's approval of the Construction Completion Report, Marysville Estates shall submit an Explosive Gas Monitoring Plan as an attachment to the Operation and Maintenance Plan to Ohio EPA for approval, with courtesy copy to Scotts. The Explosive Gas Monitoring Plan shall set forth the procedures and schedule for conducting annual monitoring of the two new explosive gas probes installed at the Site. Semi-annual monitoring shall be conducted for five (5) years. Upon

approval of the Explosive Gas Monitoring Plan, Respondent Marysville Estates shall implement said plan. Respondent Marysville Estates shall submit all plans, reports, or other deliverables required under the approved Explosive Gas Monitoring Plan, in accordance with the approved schedule set forth therein, for Ohio EPA's review and approval pursuant to the Review of Submissions Section of these Orders.

- j. Ground Water Monitoring Plan. Within thirty (30) days after Ohio EPA's approval of the Construction Completion Report, Marysville Estates shall submit a Ground Water Monitoring Plan as an attachment to the Operation and Maintenance Plan to Ohio EPA for approval, with courtesy copy to Scotts. The Ground Water Monitoring Plan shall set forth the procedures and schedule for conducting annual monitoring of the four newly installed ground Water monitor wells and the five remaining existing ground water monitor wells identified in the IA Work Plan. Annual monitoring shall be conducted for five (5) years. Upon approval of the Ground Water Monitoring Plan, Respondent Marysville Estates shall implement said plan. Respondent Marysville Estates shall submit all plans, reports, or other deliverables required under the approved Ground Water Monitoring Plan, in accordance with the approved schedule set forth therein, for Ohio EPA's review and approval pursuant to the Review of Submissions Section of these Orders.
- k. Operation and Maintenance Plan. Within thirty (30) days after Ohio EPA's approval of the Construction Completion Report, Respondent Marysville Estates shall submit the O&M Plan, including a schedule for implementation, in accordance with the approved IA Work Plan to Ohio EPA for approval, with courtesy copy to Scotts. Ohio EPA will review the O&M Plan pursuant to the procedures set forth in the Review of Submissions Section of these Orders. Upon approval of the O&M Plan by Ohio EPA, Respondent Marysville Estates shall implement the O&M Plan. Respondent Marysville Estates shall submit all plans, reports, or other deliverables required under the approved O&M Plan, in accordance with the approved O&M schedule set forth therein, for Ohio EPA's review and approval pursuant to the Review of Submissions Section of these Orders.
- l. Environmental Covenant. Within thirty (30) days after the approval of the Construction Completion Report, Respondent Marysville Estates shall prepare and record with the Union County Recorder's Office an Environmental Covenant for the property that is part of the Site owned by the Respondent Marysville Estates. The Environmental Covenant shall be consistent with the template contained in Appendix C, shall be signed by Respondent Marysville Estates, shall include Respondent Scotts as a Holder of the Environmental Covenant as that term is defined in R.C. 5301.80(F), and shall be approved and signed by Ohio EPA. The Environmental Covenant shall be recorded in the deed or official records of the County Recorder of Union County, Ohio pursuant to R.C. 5301.82.

The terms and conditions of the Environmental Covenant are incorporated into these Orders and shall be binding solely upon Respondent Marysville Estates. Thereafter, if Respondent Marysville Estates conveys any interest in the property included in the Site, each deed, title, or other instrument shall contain a notice stating that the property is subject to these Orders and shall reference any monitoring, treatment, or containment systems present on the property as a result of these Orders. Respondent Marysville Estates shall ensure that no portion of the Site will be used in any manner that would adversely affect the integrity of any containment or monitoring systems at the Site. Respondent Marysville Estates shall submit, on an annual basis, written documentation verifying that any containment or monitoring systems are in place and operational.

- m. *Proof of Filing Environmental Covenant.* Within thirty (30) days after filing with the Union County Recorder the executed Environmental Covenant, Respondent Marysville Estates shall certify to Ohio EPA, with courtesy copy to Scotts, that the Environmental Covenant has been filed for recording, and include with the certification a file and date-stamped copy of the recorded Environmental Covenant. If the Environmental Covenant is violated or breached by Respondent Marysville Estates, the Respondent Marysville Estates shall be in violation of these Orders.

## **VII. ADDITIONAL WORK**

12. Ohio EPA or Respondents may, during the implementation of the work described in the IA Work Plan and prior to Ohio EPA approval of the Construction Completion Report, determine that in addition to the tasks defined in the approved IA Work Plan, additional Work may be necessary to accomplish the Objectives of the Parties as provided in the General Provisions Section of these Orders. Additional Work may also include, pursuant to ORC § 3734.20 or other applicable law, the implementation of interim actions to address substantial threats to public health or safety or the environment should such threats be identified during the conduct of the IA.

13. Within thirty (30) days of receipt of written notice from Ohio EPA that additional Work is necessary, unless otherwise specified in writing by Ohio EPA, Respondents shall submit a proposed addendum to the IA Work Plan (IA Work Plan Addendum), which contains (a) a work plan for the implementation of the additional Work, (b) any revisions to the Supporting Documents and other IA deliverable, as appropriate, (c) a schedule for the performance of the additional Work, and (d) revisions to other schedules impacted by the additional Work, if any. If Respondents dispute the necessity of additional Work, Respondents shall initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders within fourteen (14) days after receipt of Ohio EPA's notification of the need for additional Work. The IA Work Plan Addendum shall conform to the standards and requirements set forth in the

documents attached to these Orders as Appendix A. Upon approval of the IA Work Plan Addendum by Ohio EPA pursuant to the Review of Submissions Section of these Orders, Respondents shall implement the approved IA Work Plan Addendum in accordance with the schedules contained therein.

14. If Respondents determine that additional Work is necessary, Respondents shall submit a proposal to Ohio EPA to explain what the additional Work is, why the additional Work is necessary, and what impact, if any, the additional Work will have on the IA Work Plan and schedule. If Ohio EPA disputes the necessity of additional Work, Respondents shall initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders within fourteen (14) days after receipt of Ohio EPA's notification of dispute regarding additional Work. If Ohio EPA concurs with the request to perform additional Work, Respondents shall submit an IA Work Plan Addendum, as described above in Paragraph 13, for the performance of additional Work. The IA Work Plan Addendum shall conform to the standards and requirements set forth in the documents attached to these Orders as Appendix A. Upon approval of the IA Work Plan Addendum by Ohio EPA pursuant to the Review of Submissions Section of these Orders, Respondents shall implement the approved IA Work Plan Addendum in accordance with the schedules contained therein. Additional Work does not include any activity performed in response to an emergency at the Site for which Respondents submit to Ohio EPA written notice of the performed activity.

### **VIII. SAMPLING AND DATA AVAILABILITY**

15. Unless otherwise agreed to by the Site Coordinators, Respondents shall notify Ohio EPA not less than fifteen (15) days in advance of all sample collection activity. Upon request, Respondents shall allow split and/or duplicate samples to be taken by Ohio EPA or its designated contractor. Ohio EPA shall also have the right to take any additional samples it deems necessary. Ohio EPA shall make a reasonable effort to notify Respondents prior to collecting such additional samples. If notice cannot be given, Ohio EPA will attempt to collect enough sample material to allow for split sampling by Respondents. Subsequent transfer, handling and laboratory analysis of the split samples will be the responsibility of the Respondents.

16. Within seven (7) days of Respondents' receipt of a request by Ohio EPA, Respondents shall submit to Ohio EPA copies of the results of all sampling and/or tests or other data, including raw data and original laboratory reports, generated by or on behalf of Respondents with respect to the Site and/or the implementation of these Orders. Submissions shall be submitted as an electronic copy or as another format otherwise approved by Ohio EPA. Respondents may submit to Ohio EPA any interpretive reports and written explanations concerning the raw data and original laboratory reports. Such interpretive reports and written explanations shall not be submitted in lieu of original laboratory reports and raw data. Should Respondents



subsequently discover an error in any report or raw data, Respondents shall promptly notify Ohio EPA of such discovery and provide the correct information.

## **IX. ACCESS**

17. Upon reasonable notice, Ohio EPA and its contractors shall have access at all reasonable times to the Site and any other property to which access is required for the implementation of these Orders, to the extent access to the property is controlled by Respondents. Access under these Orders shall be for the purposes of conducting any activity related to these Orders including but not limited to the following:

- a. Monitoring the Work;
- b. Conducting sampling;
- c. Inspecting and copying records, operating logs, contracts, and other documents related to the implementation of these Orders;
- d. Conducting investigations and tests related to the implementation of these Orders; and
- e. Verifying any data and/or other information submitted to Ohio EPA.

18. To the extent that any portion of the Site or any other property to which access is required for the implementation of these Orders is owned or controlled by persons other than Respondents, Respondents shall use reasonable efforts to secure from such persons access for Respondents and Ohio EPA and its contractors as necessary to effectuate these Orders. Copies of each access agreement obtained by Respondents shall be provided to Ohio EPA upon execution of the access agreement. If any access required to implement these Orders is not obtained within 30 days after Ohio EPA's approval of any Work Plan, Respondents shall notify Ohio EPA in writing within 7 additional days of both the steps Respondents have taken to attempt to obtain access and the failure to obtain access agreements. Ohio EPA may, as it deems appropriate, assist Respondents in obtaining access. As used in this section, "reasonable efforts" means the efforts used to achieve the goal in a timely manner.

19. Prior to termination of these Orders pursuant to the Termination Section, the State of Ohio retains all of its access rights and authorities, including enforcement authorities related thereto, under any applicable statute or regulation including but not limited to ORC §§ 3734.20 and 6111.05.

## **X. DESIGNATED SITE COORDINATORS**

20. Within fourteen (14) days of the effective date of these Orders, each Respondent shall notify Ohio EPA, in writing, of the name, address, telephone number, and email address of its designated Site Coordinator and Alternate Site Coordinator. The failure to comply with this paragraph by one Respondent shall not be deemed a failure to comply by the other Respondent.

21. As used in these Orders, the term "Site Coordinator" refers interchangeably to the Site Coordinator and the Alternate Site Coordinator designated for a named party. If any designated Site Coordinator is changed, the identity of the successor will be given to the other Parties at least seven (7) days before the changes occur, unless impracticable, but in no event later than the actual day the change is made.

22. To the maximum extent practicable, except as specifically provided in these Orders, communications between Respondents and Ohio EPA concerning the implementation of these Orders shall be made between the Site Coordinators. Respondents' Site Coordinators shall be available at reasonable times for communication with Ohio EPA regarding the implementation of these Orders for the duration of these Orders. Each Site Coordinator shall be responsible for ensuring that all communications from the other Parties are appropriately disseminated and processed. Respondents' Site Coordinators or designees shall be present on the Site or on call during all hours of Work at the Site.

23. Without limitation of any authority conferred on Ohio EPA by statute or regulation, Ohio EPA's Site Coordinator's authority includes but is not limited to the following:

- a. Overseeing the type, quantity, and location of samples to be collected by Respondents pursuant to an approved Work Plan;
- b. Collecting samples related to the implementation of these Orders;
- c. Observing, taking photographs, or otherwise recording information related to the implementation of these Orders, including the use of any mechanical or photographic device;
- d. Directing that the Work stop whenever Ohio EPA's Site Coordinator determines that the activities at the Site may create or exacerbate a threat to public health or safety, or threaten to cause or contribute to air or water pollution or soil Contamination;
- e. Conducting investigations and tests related to the implementation of these Orders;

- f. Inspecting and copying records, operating logs, contracts, and/or other documents related to the implementation of these Orders; and
- g. Assessing Respondents' compliance with these Orders.

## **XI. PROGRESS REPORTS AND NOTICE**

24. Unless otherwise directed by Ohio EPA, Respondents shall submit a written progress report to the Ohio EPA by the tenth (10) day of every month until Ohio EPA approves the Construction Completion Report. Monthly reports may not be used to propose modifications to approved plans; Respondents shall submit such requests to Ohio EPA in a separate written correspondence.

25. Progress reports and work plans (one electronic copy only) shall be sent by e-mail. All other documents (one electronic and one hard copy) required to be submitted pursuant to these Orders to Ohio EPA shall be sent to the following agency address(es):

Raymond R. Moreno  
Site Coordinator  
Ohio EPA  
Division of Environmental Response and Revitalization  
Central District Office  
50 W. Town St, Suite 700  
P.O. Box 1049  
Columbus, Ohio 43216-1049

Email address: [Raymond.Moreno@epa.ohio.gov](mailto:Raymond.Moreno@epa.ohio.gov)

All written (including electronic) correspondence to Respondents shall be directed to:

Marysville Estates, LLC  
c/o Rob Shouhayib  
The Choice Group  
2265 Livernois, Suite 500  
Troy, Michigan 48083  
Email address: [rshouhayib@choiceproperties.com](mailto:rshouhayib@choiceproperties.com)

With a copy to:  
Todd Schebor  
Dykema  
39577 Woodward Ave, Suite 300  
Bloomfield Hills, Michigan 48304  
Email address: [tschebor@dykema.com](mailto:tschebor@dykema.com)



Scotts Company LLC  
Brian Winter  
11411 Scottslawn Rd  
Marysville, Ohio 43041  
Email address: [brian.winter@scotts.com](mailto:brian.winter@scotts.com)

With copies to:

Christina Grasseschi  
11411 Scottslawn Rd  
Marysville, Ohio 43041  
Email address: [christina.grasseschi@scotts.com](mailto:christina.grasseschi@scotts.com)

Kristin Watt  
Vorys, Sater, Seymour and Pease LLP  
52 E Gay St  
PO Box 1008  
Columbus, Ohio 43216  
Email address: [klwatt@vorys.com](mailto:klwatt@vorys.com)

A Party may designate an alternative contact name or address upon written notification to the other Party and in accordance with the Designated Site Coordinators Section of these Orders, as applicable.

## **XII. REVIEW OF SUBMISSIONS**

26. Ohio EPA shall review any work plan, report, or other item required to be submitted pursuant to these Orders.

27. Upon review, Ohio EPA may in its sole lawful discretion (a) approve the submission in whole or in part; (b) approve the submission with specified conditions; (c) modify or, modify and approve, the submission; (d) disapprove the submission in whole or in part; or (e) any combination of the above. The results of Ohio EPA's review shall be provided to Respondents in writing and shall identify any conditions, modifications, and/or deficiencies. Excluded from Ohio EPA approvals pursuant to this Section are the health and safety plan ("HASp") and progress reports.

28. In the event that Ohio EPA approves an initial submission, Respondents shall proceed to take such action as required by Ohio EPA. In the event that Ohio EPA approves with condition or modification an initial submission, Respondents shall either (a) proceed to take such action as required by Ohio EPA or (b) initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders, within

fourteen (14) days of receipt of Ohio EPA's written response to Respondents' submission. Respondents shall proceed to take any action required by an unmodified or unconditioned portion of the submission, to the extent not contradictory to the actions subject to the Dispute Resolution Section, as those portions are considered approved.

29. In the event that Ohio EPA disapproves an initial submission in whole or in part, and notifies Respondents in writing of the deficiencies, Respondents shall within fourteen (14) days, or such longer period of time as specified by Ohio EPA in writing, correct the deficiencies and submit the revised submission to Ohio EPA for approval. The revised submission shall incorporate all of the changes, additions, and/or deletions specified by Ohio EPA in its notice of disapproval. Revised submissions shall be provided by Respondents in writing and shall demonstrate how and where each of Ohio EPA's comments was incorporated into the revised submission. To facilitate review of the revised submission, those portions of the document not affected by the Ohio EPA comments should remain unchanged. Any letter accompanying the submission should indicate, however, any indirect changes necessitated by Ohio EPA's comments.

30. To the extent that Respondents dispute any of Ohio EPA's changes, additions, and/or deletions to an initial submission, Respondents shall initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders, within fourteen (14) days after receipt of Ohio EPA's notice of disapproval or approval with conditions and modifications. Notwithstanding the disapproval, Respondents shall proceed to take any action required by a portion of the submission that is not specified as disapproved in the notice of disapproval and to the extent not contradictory to the actions subject to the Dispute Resolution Section, as those portions are considered approved.

31. In the event that Ohio EPA disapproves or modifies a revised submission, in whole or in part, and notifies Respondents in writing of the deficiencies or modifications, Respondents shall within fourteen (14) days, or such longer period of time as specified in writing by Ohio EPA, correct the deficiencies and incorporate all changes, additions, and/or deletions, and submit the revised submission to Ohio EPA for approval or initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders. If Respondents fail to submit a revised submission incorporating all changes, additions, modifications and/or deletions within fourteen (14) days, or such longer period of time as specified by Ohio EPA in writing, Respondents shall be considered in breach and/or violation of these Orders, unless Respondents initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders, within fourteen (14) days after receipt of Ohio EPA's notice of deficiencies or modifications. If Respondents are in breach and/or violation of these Orders, Ohio EPA retains the right to terminate these Orders, perform any additional investigation, conduct a complete or partial Remedial Investigation or Feasibility Study and/or enforce the terms of these Orders as provided in the Reservation of Rights Section of these Orders.

32. All work plans, reports, or other items required to be submitted to Ohio EPA under

these Orders shall, upon approval by Ohio EPA, be deemed to be incorporated in and made an enforceable part of these Orders. In the event that Ohio EPA approves a portion of a work plan, report, or other item, the approved portion shall be deemed to be incorporated in and made an enforceable part of these Orders to the extent not contradictory to the actions subject to the Dispute Resolution Section, as those portions are considered approved.

### **XIII. DISPUTE RESOLUTION**

33. The Site Coordinators shall, whenever possible, operate by consensus.

34. In the event of disapproval, or an approval with condition(s) or modification(s) by Ohio EPA of a submission by Respondents, or a disagreement regarding the Work performed under these Orders, Respondents' Site Coordinators shall notify Ohio EPA's Site Coordinator in writing that Respondents wish to invoke an informal dispute pursuant to this Section.

35. The Parties shall have ten (10) days from the date written notice of the informal dispute is received by Ohio EPA's Site Coordinator to negotiate in good faith to resolve the dispute. This informal dispute resolution period may be extended by agreement of the Site Coordinators for up to twenty (20) additional days, or as otherwise agreed.

36. In the event that the dispute is not resolved during the informal dispute resolution period, Respondents' Site Coordinators shall notify Ohio EPA's Site Coordinator in writing by the end of the informal dispute resolution period that Respondents wish to invoke a formal dispute pursuant to this Section. This notice shall include a brief description of the item(s) in dispute. Within twenty (20) days of receipt of the written notice invoking the formal dispute resolution procedure, the Site Coordinators shall exchange written positions, including technical rationale supporting their positions. The Site Coordinators shall have ten (10) days from the date they have exchanged written positions to negotiate in good faith to resolve the formal dispute. This formal dispute period may be extended by agreement of the Site Coordinators for up to twenty (20) additional days, or as otherwise agreed.

37. In the event the dispute is not resolved in the formal dispute resolution period, Respondents' Site Coordinators shall notify Ohio EPA's Site Coordinator in writing by the end of the formal dispute resolution period whether Respondents wish to submit final written positions to a DERR Chief for review and resolution. The Site Coordinators shall have ten (10) days from the end of the formal dispute resolution period to submit their written positions. The DERR Chief will resolve the dispute based upon and consistent with these Orders, the IA Work Plan, and other appropriate federal and state laws and regulations. The decision of the DERR Chief is considered final for the purposes of these Orders.

38. The pendency of a dispute under this Section shall extend only the time period for completion of the item(s) in dispute, except that upon mutual agreement of the Site Coordinators, any time period may be extended as is deemed appropriate under the circumstances. Such agreement shall not be unreasonably withheld by Ohio EPA. Elements of the Work not affected by the dispute shall be completed in accordance with the applicable schedules and time frames.

39. To the extent the Respondent Marysville Estates disputes the accuracy of Ohio EPA's request for reimbursement under Paragraph 45 or whether costs are inconsistent with the NCP, Respondent shall initiate the formal dispute provisions of the Dispute Resolution Section within fourteen (14) days after receipt of Ohio EPA's request for reimbursement of costs. Should Respondent Marysville Estates dispute a portion of the response costs set forth in an itemized statement, but not all the costs, Respondent shall timely pay the uncontested portion pursuant to the provisions of the Reimbursement of Costs Section.

#### **XIV. UNAVOIDABLE DELAYS**

40. Respondents shall cause all Work to be performed in accordance with applicable schedules and time frames set forth in these Orders or any approved work plan unless any such performance is prevented or delayed by an event that constitutes an unavoidable delay. For purposes of these Orders, an "unavoidable delay" shall mean an event beyond the control of Respondents that prevents or delays performance of any obligation required by these Orders and that could not be overcome by due diligence on the part of Respondents. Increased cost of compliance, among other circumstances, shall not be considered an event beyond the control of Respondents for the purposes of these Orders.

41. Respondents shall notify Ohio EPA in writing within ten (10) days after the occurrence of an event that Respondents contend is an unavoidable delay. Such written notification shall describe the anticipated length of the delay, the cause or causes of the delay, the measures taken and to be taken by Respondents to minimize the delay, and the timetable under which these measures will be implemented. Respondents shall have the burden of demonstrating that the event constitutes an unavoidable delay.

42. If Ohio EPA does not agree that the delay has been caused by an unavoidable delay, Ohio EPA will notify the Respondents in writing of that finding and of the noncompliance with these Orders. Upon such a finding, Respondents may initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders, within fourteen (14) days after receipt of Ohio EPA's notice. If Ohio EPA agrees that the delay is attributable to an unavoidable delay, Ohio EPA will notify Respondents in writing of the length of the extension for the performance of the obligations affected

by the unavoidable delay.

## **XV. REIMBURSEMENT OF COSTS**

43. Ohio EPA has incurred and continues to incur Response Costs in direct connection with the Site. Respondents shall reimburse Ohio EPA for all Response Costs incurred after the receipt of the Invitation to Negotiate these Orders dated March 3, 2016, and through the issuance of the Construction Completion Report, in the amount of twenty-nine thousand (\$29,000) dollars.

44. In lieu of payment to Ohio EPA for the incurred Response Costs, Respondents may fund a supplemental environmental project ("SEP") by funding an environmentally beneficial project within the City of Marysville at least equal to the amount of Response Costs as identified in Paragraph 43. Within thirty (30) days of the receipt of an invoice for the Response Costs, Respondents shall submit an outline of potential projects to DERR Chief, Ohio EPA, P.O. Box 1049, Columbus, Ohio 43216-1049. Upon approval of the SEP by Ohio EPA, Respondents shall implement the SEP within twelve (12) months.

45. For Response Costs incurred on or after the approval of the Construction Completion Report for Ohio EPA oversight, Ohio EPA will submit to Respondent Marysville Estates on an annual basis an itemized invoice of its Response Costs for the previous year; informational invoices will be provided upon request from Respondent(s). Within thirty (30) days of receipt of such itemized invoice, Respondent Marysville Estates shall either (a) dispute in part or in its entirety by initiating the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders, within fourteen (14) days after receipt of Ohio EPA's invoice, or (b) remit payment for all, or the undisputed part, of Ohio EPA's Response Costs for the previous year. In the event that Respondent Marysville Estates does not dispute the invoice or remit payment of Response Costs within sixty (60) days after receipt of such invoice, Respondent Marysville Estates shall remit payment for the unpaid balance and the interest accrued on the unpaid balance. Interest shall accrue beginning thirty (30) days from the date of the invoice until the date payment is remitted, and shall be calculated at the rate specified by ORC § 5703.47(B) or any subsequent rate adjustments.

46. Respondents shall remit payments to Ohio EPA pursuant to this Section as follows:

- a. Payment shall be made by bank check payable to "Treasurer, State of Ohio / Hazardous Waste Special Cleanup Account" and shall be forwarded to Office of Fiscal Administration, Attn: Revenues Section, Ohio EPA, Lazarus Government Center, P.O. Box 1049, Columbus, Ohio 43216-1049;



- b. A copy of the transmittal letter and check shall be sent to the Fiscal Officer, DERR, Ohio EPA, P.O. Box 1049, Columbus, Ohio 43216-1049, and to the Site Coordinator; and
- c. Each payment shall identify the name and address of the party making payment, the Site name, and Ohio EPA's revenue number identified on the associated invoice.

## **XVI. ACCESS TO INFORMATION**

47. Upon request, each Respondent shall provide to Ohio EPA within fourteen (14) days, copies of all final non-privileged documents and information produced under these Orders that are within their possession or control or that of their contractors or agents relating to events or conditions at the Site including, but not limited to, manifests, reports, correspondence, or other documents or information related to the Work. This provision shall not be a limitation on any request for information to each Respondent by Ohio EPA made under state or federal law for information relating to events or conditions at the Site. The failure to comply with this paragraph by one Respondent shall not be deemed a failure to comply by the other Respondent.

48. Respondents may assert a claim that documents or other information submitted to Ohio EPA pursuant to these Orders are confidential under the provisions of Ohio Administrative Code ("OAC") 3745-49.03 or ORC § 6111.05(A). If no such claim of confidentiality accompanies the documents or other information when submitted to Ohio EPA, such documents or other information may be made available to the public without notice to Respondents.

49. Respondents may assert that certain documents or other information are privileged under the attorney-client privilege or any other privilege recognized by state law. If Respondents make such an assertion, Respondents shall provide Ohio EPA with the following: (1) the title of the document or information; (2) the date of the document or information; (3) the name and title of the author of the document or information; (4) the name and title of each addressee and recipient; (5) a brief description of the contents of the document or information; and (6) the privilege being asserted by Respondents.

50. No claim of confidentiality shall be made with respect to any data, including but not limited to laboratory reports, and all sampling, analytical, and monitoring data.

51. Respondents shall each preserve for the duration of these Orders and for a minimum of six (6) years after termination of these Orders, all documents and other information within their possession or control, or within the possession or control of their contractors or agents, which in any way relate to the Work notwithstanding any document retention policy to the contrary. Respondents may preserve such documents by microfiche or other electronic or photographic device. At the conclusion of this

document retention period, each Respondent may destroy these documents and information, unless the Respondent has received a written request from Ohio EPA to deliver such non-privileged documents and other information to Ohio EPA. Respondents shall notify Ohio EPA at least sixty (60) days prior to the destruction of these documents or other information; and upon request, shall deliver such documents and other information to Ohio EPA. The failure to comply with this paragraph by one Respondent shall not be deemed a failure to comply by the other Respondent.

#### **XVII. MODIFICATIONS**

52. These Orders may be modified by agreement of the Parties. Modifications shall be in writing, signed by the authorized representative of each Respondent and by the Director, and shall be effective on the date entered in the Journal of the Director of Ohio EPA.

#### **XVIII. INDEMNITY**

53. To the extent that Ohio EPA is subject to liability as provided under ORC § 2744 and any other applicable law, Respondents agree to indemnify, save, and hold harmless Ohio EPA from any and all claims or causes of action arising from, or related to, the implementation of these Orders or to events or conditions at the Site, including any acts or omissions of Respondents, their officers, employees, receivers, trustees, agents, or assigns. Said indemnification shall not apply to acts or omissions of the Ohio EPA, its employees, agents or assigns at, on, upon, or related to the Site if said acts are negligent, performed outside the scope of employment or official responsibilities, or performed with malicious purpose, in bad faith, or in a wanton or reckless manner. Ohio EPA shall not be considered a party to and shall not be held liable under any contract entered into by Respondents in carrying out the activities pursuant to these Orders. Ohio EPA agrees to provide notice to Respondents within thirty (30) days after receipt of any claim that may be the subject of indemnity as provided in this Section, and to cooperate with Respondents in the defense of any such claim or action against Ohio EPA.

#### **XIX. CONTRIBUTION AND AGREEMENT NOT TO REFER**

54. With respect to matters addressed in these Orders, the Parties hereto agree that these Orders constitute an administrative settlement for purposes of CERCLA sections 113(f)(2) and 113 (f)(3)(B), 42 U.S.C. § 9613(f)(2) and § 9613(f)(3)(B), pursuant to which Respondents have resolved their liability to the State, and that Respondents are entitled to contribution protection and contribution rights as of the effective date of these Orders as to any liable persons who are not parties to these Orders, as provided by

CERCLA section 113(f)(2) and (f)(3)(B), 42 U.S.C. § 9613(f)(2) and (f)(3)(B), provided that such Respondent complies with these Orders. The "matters addressed" in these Orders are all investigative and remedial actions taken or to be taken and all response costs incurred or to be incurred by Ohio EPA or any other person with respect to the Site, including without limitation the Work and Response Costs under these Orders. The failure to comply with these Orders by one Respondent shall not negate the protections afforded in this paragraph with respect to the other Respondent.

55. During the implementation of these Orders, and provided Respondents are in compliance with these Orders, Ohio EPA agrees not to refer Respondents to the Ohio Attorney General's Office for enforcement, or take administrative enforcement action against Respondents, or their successors in interest, including subsequent owners of the Site, liable under Ohio law for Work required under these Orders at the Site. Upon termination of these Orders pursuant to the Termination Section, Ohio EPA agrees to not refer Respondents to the Ohio Attorney General's Office for enforcement and releases Respondents and their successors in interest, including subsequent owners of the Site, from all civil liability to the State of Ohio to perform additional investigational and remedial activities for the release of hazardous substances, identified and addressed under this Order, at or from the Site. The agreement provided under this paragraph applies to the Respondents' liability to the State under state law including ORC chapters 3734 and 6111.

## **XX. OTHER CLAIMS**

56. Nothing in these Orders shall constitute or be construed as a release from any claim, cause of action, or demand in law or equity against any person, firm, partnership, or corporation not a Party to these Orders, for any liability arising from, or related to, events or conditions at the Site.

## **XXI. RESERVATION OF RIGHTS**

57. Ohio EPA reserves the right to seek legal and/or equitable relief to enforce the terms and conditions of these Orders, including penalties against Respondents for noncompliance with these Orders. Except as provided herein, Respondents reserve any rights they may have to raise any claim or legal or equitable defense in any action brought by Ohio EPA to enforce the terms and conditions of these Orders.

58. Ohio EPA reserves the right to terminate these Orders and/or perform all or any portion of the Work or any other measures in the event that the requirements of these Orders are not substantially complied with within the time frames required by these Orders.

59. Ohio EPA reserves the right to take any action, including but not limited to any



enforcement action, action to recover costs, or action to recover damages to natural resources, pursuant to any available legal authority as a result of past, present, or future violations of state or federal laws or regulations or the common law, and/or as a result of events or conditions arising from, or related to, the Site. Upon termination pursuant to the Termination Section of these Orders, Respondents shall have resolved their liability to Ohio EPA only for the Work performed pursuant to these Orders.

## **XXII. TERMINATION**

60. Each Respondent's obligations under these Orders shall terminate upon approval in writing of said Respondent's written certification to Ohio EPA that all Work required to be performed by Respondent under these Orders including payment of Response Costs has been completed. The Respondent's certification shall contain the following attestation: "I certify that the information contained in or accompanying this certification is true, accurate, and complete to the best of my knowledge." This certification shall be submitted by each Respondent, as applicable, to Ohio EPA and shall be signed by a responsible official of each Respondent. The termination of a Respondent's obligations under these Orders shall not terminate the Respondent's rights or obligations under the Reservation of Rights, Contribution and Agreement not to Refer, Access to Information, Indemnity, and Other Claims Sections of these Orders.

## **XXIII. WAIVER AND AGREEMENT**

61. In order to resolve disputed claims, without admission of fact, violation, or liability, Respondents consent to the issuance of these Orders, and agree to comply with these Orders.

62. Respondents hereby waive the right to appeal the issuance, terms and conditions, and service of these Orders and Respondents hereby waive any and all rights that they may have to seek administrative or judicial review of the issuance, terms and conditions and service of these Orders either in law or equity.

63. Notwithstanding the limitations herein on Respondents' right to appeal or seek administrative or judicial review, Ohio EPA and Respondents agree if these Orders are appealed by any other party to the Environmental Review Appeals Commission, or any court, Respondents retain the right to intervene and participate in such appeal. In such event, Respondents shall continue to comply with these Orders notwithstanding such appeal and intervention unless these Orders are stayed, vacated, or modified.

#### **XXIV. EFFECTIVE DATE**

64. The effective date of these Orders shall be the date these Orders are entered in the Journal of the Director of Ohio EPA.

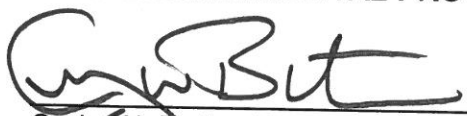
#### **XXV. SIGNATORY AUTHORITY**

65. Each undersigned representative of a Party to these Orders certifies that he or she is fully authorized to enter into these Orders and to legally bind such Party to these Orders.

*[Remainder of page intentionally left blank. Signature pages following this page]*

IT IS SO ORDERED AND AGREED:

OHIO ENVIRONMENTAL PROTECTION AGENCY

A handwritten signature in dark ink, appearing to read "Craig W. Butler", written over a horizontal line.

Craig W. Butler, Director  
Ohio Environmental Protection Agency

4/25/18  
Date

IT IS SO AGREED:

The Scotts Company LLC

BY:

  
Signature

4-20-2018  
Date

SCOTT A. NOVAK - VICE PRESIDENT - QETAS  
Printed Name & Title

IT IS SO AGREED:

Marysville Estates, LLC

BY:

Signature

Date

4-19-18

Printed Name & Title

Kamal Shankhaya - Manager

**General Guidance Document and Reference List to  
Support Remedial Response Program  
Statements of Work and Orders**

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**Purpose and Use**

This document provides an evolving “working list” of primary guidance documents and references which may be added as needed to the core guidance lists established for RI/FS and RD/RA statements of work (SOW) and orders. This general list of guidance and references is periodically updated by Ohio EPA. *It is not to be used as an attachment to Remedial Response orders.* Ohio EPA recognizes that some remedial response sites may have conditions or circumstances that are not fully addressed by the documents in this working list of general guidance documents and references. Accordingly, Remedial Response orders should be supported as necessary by current guidance, professional publications, research and U.S. EPA and Ohio EPA policy directives. For sites where activities are conducted in response to an administrative or judicial order, *the list of selected reference documents* will be attached to the order as an appendix and will govern the work conducted. Ohio EPA reserves the right to modify this list as needed to fully and appropriately address site conditions.

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**Ohio EPA DERR Remedial Response Program  
General Guidance and Reference List for SOWs and Orders**

**Analytical Methods & U.S. EPA Contract Laboratory Program**

U.S. EPA & Other Guidance

[\*SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods\*](#); Hazardous Waste Test Methods / SW-846 ([webpage](#))

[\*Standard Methods for the Examination of Water and Waste Water\*](#), American Public Health Association, 22<sup>nd</sup> Edition and updates ([webpage](#)) ; [\*updated table of standard methods approved under the Clean Water Act\*](#), and [\*updated table of standard methods approved under the Safe Drinking Water Act\*](#)

[\*U.S. EPA Drinking Water Analytical Methods\*](#), U.S. EPA webpage

[\*U.S. EPA Superfund Analytical Services / Contract Laboratory Program\*](#), U.S. EPA webpage

[\*Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air\*](#), 2<sup>nd</sup> Edition, U.S. EPA, EPA/625/R-96/010b, January 1999, and [\*Ambient Monitoring Technology Information Center, Air Toxics – Monitoring Methods\*](#)

[\*Introduction to the Contract Laboratory Program\*](#), U.S. EPA, EPA 540-R-07-02, January 2007

[\*Contract Laboratory Program Guidance for Field Samplers\*](#), U.S. EPA, EPA-540-R-014-013, October 2014

**Applicable or Relevant and Appropriate Requirements (ARARs)**

Ohio EPA Guidance

[\*Ohio EPA Rules and Laws\*](#), webpage (as applicable for ARARs)

[\*ARARs Table, Ohio EPA DERR Remedial Response Program\*](#) (provides a generic list of ARARs that is updated periodically and subject to change)

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[Wetlands](#), U.S. EPA webpage (includes information on Clean Water Act Section 404 regulations and federal, state and local government programs)

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July 10, 2017



Sent Via Email

Mr. Raymond Moreno  
Site Coordinator  
Ohio Environmental Protection Agency  
Division of Environmental Response and Revitalization  
50 W. Town Street, Suite 700  
PO Box 1049  
Columbus, Ohio 43215

**RE: Response to Comments on the Draft Interim Action Work Plan, Former Ray Lewis Landfill, 506 N. Main Street, Marysville, Ohio**

Dear Mr. Moreno:

Cox-Colvin & Associates, Inc., (Cox-Colvin) is pleased to provide these responses to the Ohio EPA's comments on the draft Interim Action Work Plan for the Former Ray Lewis Landfill Property in Marysville, Ohio. In the discussion below, Ohio EPA comments are shown in bold and italics with Cox-Colvin's responses following in regular text. Numbers have been added to the list of comments to facilitate further discussion, if required. A copy of the Final Interim Action Work Plan, which has been updated to reflect the changes discussed below, is enclosed with this letter.

**Review of DRAFT 2/24/2017 Interim Action Work Plan**

- 1. Extend the excavation area shown on Figure 3-2 of the draft interim action work plan to the north and south property boundaries to include all of Section 1.***

Response:

The objective of the work to be completed in Section 1 of the Site is to remove all of the vermiculite containing soil within the top two feet. As such, all of the soil in Section 1 may be subject to soil excavation. Alternatively, additional investigation may be undertaken to better define the extent of vermiculite in Section 1 prior to starting excavation activities. Figure 3-2 has been revised to indicate that the soil in all of Section 1 may be subject to removal.

- 2. Provide specifications for the final soil cover/cap and vegetative cover. Cover soil should have a minimum clay content of 15 %. The cover soils should be placed in 8-inch lifts and compacted.***

Response:

The requirement that clay content of the soil cover over Section 2a will be 15% or greater has been added to the Interim Action Work Plan. The cover soils will be placed in six to eight inch lifts, and will be compacted. Backfilling and soil compaction requirements are included in Appendix C, Specification 7, of the Interim Action Work Plan.

**3. *Maintain a minimum of 5% slope in the fill area in Section 2a (Fill Area).***

Response:

The work plan has been revised to state that the fill area in Section 2a will be constructed with a minimum 5% slope.

**4. *Maintain a minimum of approximately 2% slope in Section 2b (Excavation Area) to ensure positive drainage and no standing water.***

Response:

The work plan has been revised to state that the fill area in Section 2b will be constructed with a minimum 2% slope.

**5. *Provide proposed final surface water drainage details.***

Response:

Final land surface contours and surface water drainage for the area have been discussed with the City of Marysville. A final grading plan will be developed when the waste has been consolidated in Section 2a and the topography of the consolidated waste has been determined. When it is completed, the final grading plan will be appended to the Interim Action Work Plan.

**6. *Provide a map of existing utilities.***

Response:

During May and June 2017, Lawhon & Associates contracted with a private utility location company to locate the underground utilities in Section 1 and the neighboring vicinity of the Marysville Estates Mobile Home Park. A figure showing the location of utilities produced from this study has been included as Appendix B of the Interim Action Work Plan.

**7. *Provide a plan for storm water runoff and erosion control during construction.***

Response:

A Construction Storm Water Pollution Prevention Plan (CSWPPP) for the Project has been developed. The Notice of Intent will be submitted electronically at least three weeks prior to the commencement of earth work.

**8. *Discuss access to the adjacent city of Marysville property (Marysville Landfill) to tie in landfill cover and to maintain or modify drainage along the boundary of the two landfills.***

Response:

The Respondents are in the process of finalizing an access agreement with the City of Marysville. The access agreement includes topics ranging from the management of fences and

security of the Site and City property, to abandonment and replacement of the City's explosive gas probes, and the final grading of the Site.

The final surface contours will allow for surface water to drain to the north, onto property owned by the City. When completed, the final grading plan will be appended to the Interim Action Work Plan.

**9. *Replace the existing explosive gas probes as necessary on the city property on the east or north sides of the Ray Lewis Landfill.***

Response:

The abandonment and subsequent replacement of the explosive gas monitoring stations has been discussed with the City of Marysville. The probes will be abandoned in accordance with the approved *Explosive Gas Monitoring Plan, City of Marysville, City of Marysville Landfill* (Malcolm Pirnie, 1996) prior to the beginning of earthwork. Following completion of the cover and filling operation at the Site, the explosive gas probes will be replaced.

**10. *Install 2 explosive gas probes on the west side of the Ray Lewis Landfill and provide a plan for annual monitoring.***

Response:

Two explosive gas probes will be installed on the west side of the former Ray Lewis Landfill (See Figure 3-4 of the Interim Action Work Plan). An explosive gas monitoring plan for the Site will be developed, submitted to Ohio EPA for approval, and implemented by Marysville Estates following completion of the scope of work in the Interim Action Work Plan and Ohio EPA's approval of the construction completion report.

**11. *Install, relocate and/or maintain perimeter monitor wells for 5 years of annual post-remediation monitoring on all four sides of the landfill. Monitoring wells should be located in the approximate locations of existing Monitoring Wells MW-03, MW-04, MW-08, MW-09. Install three new monitoring wells including, one monitoring well on the east property boundary and two monitoring wells on the west side of the landfill as shown on attached Figure 2-7. Provide a plan for annual ground water monitoring.***

Response:

Existing monitor wells MW-03, MW-06, MW-07, MW-08 and MW-09 will be kept for future groundwater monitoring. The remainder of the existing monitor wells will be properly abandoned/sealed. Four new groundwater monitor wells will be installed following completion of the filling and seeding operations at the Site. Two of the new wells will be installed along the western boundary of the FRLLF Site, and two will be installed along the eastern boundary of the Site; replacing MW-02 and MW-04 (See Figure 3-6 of the Interim Action Work Plan). A groundwater monitoring plan for the Site will be developed, submitted to Ohio EPA for approval, and implemented by Marysville Estates following completion of the scope of work in the Interim Action Work Plan and Ohio EPA's approval of the construction completion report.



***12. Provide a final elevation survey when remediation is complete.***

Response:

The final elevation survey map will be included in the construction completion report, which will be written and submitted following completion of the scope of work included in the Interim Action Work Plan.

***13. Update wetland and habitat assessment sections of the work plans as appropriate.***

Response:

The discussion regarding bat habitat in the Interim Action Work Plan has been updated. The wetland assessment section of the Interim Action Work plan has been updated following the Ohio EPA's approval for filling the isolated wetland.

***14. Include a health and safety plan (HASP) in the final work plan (Ohio EPA will verify that an HASP is included but does not review health and safety plans.)***

Response:

A health and safety plan has been included as Appendix D of the Interim Action Work Plan.

***15. Provide a draft operation and maintenance agreement and plan for the Ray Lewis Landfill and former residential lots.***

Response:

Following completion of the scope of work in the Interim Action Work Plan and Ohio EPA's approval of the construction completion report, Marysville Estates will develop a draft operation and maintenance (O&M) agreement and O&M plan for the former Ray Lewis Landfill Site. The draft O&M agreement and O&M plan will be provided to Ohio EPA's legal staff for review and comment.

***16. Provide a draft environmental covenant for the Ray Lewis Landfill and former residential lots.***

Response:

Following completion of the scope of work in the Interim Action Work Plan and Ohio EPA's approval of the construction completion report, Marysville Estates will develop a draft environmental covenant for the former Ray Lewis Landfill Site. The draft environmental covenant will be provided to Ohio EPA's legal staff for review and comment.

**17. Include a discussion that cap disturbance in Sections 2A or 2B will not be allowed after remediation without an OAC 3745-27-13 authorization**

Response:

Cover disturbance in all three sections of the former Ray Lewis Landfill Site will not be allowed after all remediation activities have been completed. Installation of the groundwater monitor wells and explosive gas probes in Section 1 and between the former Ray Lewis Landfill and the closed Marysville Landfill are required under the Director's Final Findings and Orders (DFFO), therefore, authorization for cap disturbance under Rule 3745-27-13 of the Ohio Administrative Code for that work will not be required. Following the completion of all requirements of the DFFO and approval of the construction completion report, subsequent disturbances of the cover in the former Ray Lewis Landfill Site will require approval of the Ohio EPA as required by Rule 3745-27-13 of the Ohio Administrative Code. Section 9.0 "Future Cover Disturbance" has been added to the Interim Action Work Plan. This information and requirement will also be included as part of the environmental covenant developed for the property.

If you have any questions or comments concerning items presented in this letter, please feel free to contact us at (614) 526-2040.

Respectfully Submitted,  
Cox-Colvin & Associates, Inc.



Steven C. Williamson, CPG  
Senior Scientist

Attachments

c: Christina Grasseschi, The Scotts Company  
Rob Shouhayib, The Choice Group  
Brian Winter, The Scotts Company  
Kristin Watt, Vorys, Sater, Seymour, and Pease  
Ryan Elliott, Vorys, Sater, Seymour, and Pease  
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Craig A. Cox, Cox-Colvin & Associates  
Leonard Powell, Ohio EPA, CDO

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**Interim Action Work Plan  
Former Ray Lewis Landfill Site  
506 N. Main Street  
Marysville, Ohio**

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July 10, 2017



Submitted by:

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7750 Corporate Blvd.  
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(614) 526-2040



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**Interim Action Work Plan  
Former Ray Lewis Landfill Site  
506 N. Main Street  
Marysville, Ohio**

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July 10, 2017

Submitted by:



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Nick M. Petruzzi, PE, CPG  
Senior Engineer



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Craig A. Cox, CPG  
Principal Scientist

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## **Appendices**

- A Fence Management Plan
- B Utilities Map
- C Specifications
- D Health and Safety Plan

## **I.0 Introduction**

This Interim Action Work Plan, prepared by Cox-Colvin & Associates, Inc. (Cox-Colvin) on behalf of The Scotts Company (Scotts) and Marysville Estates L.L.C., describes the necessary steps to conduct remediation of pesticide- and vermiculite-containing soil within and immediately adjacent to the Former Ray Lewis Landfill (FRLLF). Groundwater was investigated during the IA Sampling program, and except for trichloroethene (from an off-Site source) in the southeast corner of the Site, chemicals of concern are not migrating off-Site. As such, remediation of groundwater at the Site is unnecessary. The selected remedy is intended to be protective of human health and the environment under a future non-residential land use scenario.

### **I.1 Location of the Site**

The FRLLF is located at 506 North Main Street in Union County, Marysville, Ohio (Figure 1-1). According to a recent land survey, the landfill itself occupies approximately 3.88 acres of undeveloped land located on the north side of Holly Drive, east of Marysville Estates Mobile Home Park. Ohio EPA has defined the overall “Site” as the FRLLF, as well as nine uninhabited mobile home lots located on the east side of Cypress Drive which were formerly part of the Marysville Estates Mobile Home Park. As shown on Figure 1-2, the Site has been divided into three distinct sections, all of which are subject to this work plan. These three sections comprise approximately 5.1 acres and consist of the following:

- Section 1: Nine uninhabited mobile home lots which were formerly part of the Marysville Estates Mobile Home Park; approximately 1.2 acres in size
- Section 2a: Northern portion of the FRLLF consisting of a low, wooded area that did not receive the same amount or type of waste as did the southern portion; approximately 2.4 acres in size
- Section 2b: Southern portion of the FRLLF consisting of a mostly flat, open area that includes a grass cover and a fenced storage area; approximately 1.5 acres in size

Properties surrounding the Site consist of a closed municipal landfill and former waste water treatment plant to the east, which is owned by the City of Marysville (City). To the south is a portion of the Marysville Estates Mobile Home Park and a City maintenance garage. To the west is a portion of the Marysville Estates Mobile Home Park. To the north is a sawmill and property owned by the City.

## **2.0 Conceptual Site Model**

The conceptual site model (CSM) for the FRLLF Site comprises the environmental setting of the Site, the historical uses of the Site, and the results of the investigations. The following sections discuss each of the components of the CSM.

### **2.1 Environmental Setting**

The Site is located in the Central Ohio Clayey Till Plain region of the Till Plains section of the Central Lowlands physiographic province on ground moraine till between the Powell end moraine to the south, and the Broadway end moraine to the north (Brockman, 1998). Natural surface topography of the area is generally flat, with an approximate elevation of 975 feet above mean sea level (amsl). Ground elevation within the Site ranges from approximately 983 feet amsl in Section 1 to approximately 973 feet amsl in the lowest part of Section 2a.

#### **2.1.1 Local Geology**

The surficial geology in Union County consists of glacial till approximately 100 feet thick. The till consists generally of an unsorted mixture of silt, clay, sand, and gravel that contains lenses and stringers of sand and gravel. The uppermost bedrock underlying the till consists of Silurian limestone and dolomite of the Salina Group. Pre-glacial drainage eroded valleys into the bedrock surface, which were buried (filled) with sediments by subsequent glaciation. This buried valley, which contains thin layers of sand and gravel interbedded in thick layers of clay, underlies portions of the City of Marysville (Schmidt, 1978). A groundwater resources map of Union County indicates the Site is located between two of the lobes of the buried valley (Schmidt, 1978).

#### **2.1.2 Local Hydrogeology**

Groundwater in Union County is obtained from both bedrock and unconsolidated aquifers. The unconsolidated aquifers consist of the thin lenses of sand and gravel interbedded with glacial till as well as the buried valley. The sand and gravel lenses may be encountered as shallow as eight feet below ground surface (bgs). Typically, only the buried valley aquifer will produce sufficient yield for a private water supply. The top of the limestone bedrock underlies the glacial till at the Site at depths ranging from sixty to eighty feet bgs. This limestone aquifer is typically used for water supply in Union County. Farm and private water supplies yield approximately 10 to 15 gallons per minute; however, yields in excess of 1,000 gallons per minute have been developed.



### **2.1.3 Surface-Water Drainage**

The Powell and Broadway end moraines are topographically higher than the surrounding ground moraine, and serve as drainage divides between the Mill Creek drainage basin (where the Site is located), the Darby Creek drainage basin to the south, and the Blues Creek drainage to the north. Surface drainage at the Site is north and east towards a Mill Creek tributary. The Mill Creek tributary discharges to Mill Creek southeast of the Site. However, based on current topography, it appears that surface water drainage at the Site migrates to the lowest elevation within Section 2a, where it infiltrates or evaporates.

### **2.1.4 Wetlands**

A small portion of the FRLLF (Section 2a) has been determined to be a regulated isolated wetland (Figure 2-1). Lawhon & Associates wetlands ecologists performed a wetland study and delineation. The wetland report was submitted to the US Army Corps of Engineers (USACE) on March 7, 2017. On March 17, 2017, the USACE determined that this wetland is not a jurisdictional water of the United States. As such, the regulating agency is the Ohio Environmental Protection Agency (Ohio EPA), administered by the Division of Surface Water. In a letter dated May 24, 2017, the Ohio EPA's Mitigation Section authorized the filling of the wetland under the general permit for filling category 1 and category 2 isolated wetlands..

### **2.1.5 Endangered and Threatened Species Habitat**

The Indiana Brown Bat is an endangered species and the Northern Long-Eared Bat is a threatened species according to the Endangered Species Act. Both of these bats are native to Ohio. These bats nest in tree hollows and beneath peeling bark in various species, one of which is the eastern cottonwood. Several eastern cottonwoods were previously observed to be growing in Section 2a. Trees that may be used by the Indiana Brown Bat cannot be cut between April 1<sup>st</sup> and October 14<sup>th</sup> of any year unless a detailed survey is conducted that demonstrates that the endangered bats are not nesting, brooding, or living in a particular stand of trees (or in particular trees). Similarly, tree removal restrictions for the Northern Long-Eared Bat are those within 0.25 mile of a known hibernaculum, or within a 150-foot radius of a known occupied maternity roost tree from June 1 through July 31.

On March 8, 2017, Civil and Environmental Consultants, Inc. (CEC) completed a bat habitat assessment at the Site (attached) wherein two low-quality potential roost trees were identified to be present. One was a dead green ash with sloughing bark, and the other was a dead branch of a cottonwood tree. Based on the CEC report, telephone conversations with personnel at the US Fish and Wildlife Service, and the Ohio Department of Natural Resources, felling of these two trees prior to April 1, 2017 would be performed in accordance with all rules and guidelines regarding this issue. As such, tree felling and brush clearing at the site began on March 23, 2017. Tree felling was completed on March 29, 2017.

## **2.2 Site History**

Mr. Ray Lewis owned or was associated with properties adjacent to the WWTP and municipal landfill between approximately 1963 to approximately 1983. The FRLLF portion of the Site (i.e., Sections 2a and 2b) began as an excavation of earth materials from a former agricultural field. Section 1 is approximately one foot higher in elevation than Section 2b and is approximately eight feet higher than the lowest elevation than Section 2a.

Based on aerial photographs, following completion of the excavation, waste materials were disposed into the southern portion of the FRLLF until approximately 1969. Records from the Union County Health Department and the Ohio Department of Health indicate that the FRLLF was used as a dump site.

In 1969, the Union County Health Department denied the FRLLF a solid waste disposal license because of continuing open burning and that a required operational plan had not been submitted. Leading up to the license denial, the Union County General Health District performed an inspection, in which several items were noted as violations were alleged. It appears that following the denial of the landfilling permit, operations at the FRLLF ceased.

On March 3, 2016, the Director of the Ohio EPA issued a draft *Director's Findings and Orders for Interim Action and Cost Recovery for the Site Known as Ray Lewis Landfill* (Orders, Ohio EPA, 2016a). In response, an *Interim Action Sampling Work Plan* (Cox-Colvin, 2016a) was developed, approved by the Ohio EPA, and implemented. Following completion of the field work, the *Interim Action Sampling Report* (Cox-Colvin, 2016b) was submitted to the Ohio EPA in October 2016 and approved by Ohio EPA on December 21, 2016 (Ohio EPA, 2016c).

## **2.3 Results of Ohio EPA Investigations**

Investigations conducted by Ohio EPA from 2013 through 2015 and Marysville Estates in 2015 indicate that there are areas of the Site where some soil samples contain vermiculite and pesticides, notably chlordane, dieldrin, heptachlor and heptachlor epoxide. Heptachlor and heptachlor epoxide were detected in samples exceeding the Ohio EPA Voluntary Action Program (VAP) direct contact standards for residential soils. Some vermiculite containing soil samples were submitted for laboratory analysis for asbestos. Results confirmed the presence of asbestos in one surface soil sample and one soil boring sample.

In groundwater, some pesticides and VOCs were detected: 1,2,4-trimethylbenzene, benzene, naphthalene, and vinyl chloride were detected at concentrations exceeding their respective drinking water maximum contaminant levels (MCLs).

## **2.4 Summary of the 2016 Interim Action Investigation**

The scope of work and findings associated with the Interim Action investigation are summarized below. For additional detail, refer to the Cox-Colvin *Interim Action Sampling Work Plan, Former Ray Lewis Landfill Site* (2016a) and the *Interim Action Sampling Report, Former Ray Lewis Landfill Site* (2016b). The objective of the investigation was to determine the nature and extent of contamination in soil and groundwater to support the development of remedial alternatives. In addition to sampling for pesticides, Ohio EPA requested that some soil and groundwater samples also be analyzed for VOCs, SVOCs, RCRA metals, and cyanide. In addition, the presence and depth of vermiculite was noted. A total of 66 soil borings were drilled at the Site (Figure 2-2), and seven additional groundwater monitor wells were installed to supplement the five existing monitor wells (Figure 2-3). The investigation was conducted during June, July, and August of 2016. The following sections discuss the findings of the investigation.

The Ohio VAP commercial/industrial (0-2 ft point of compliance) and construction/excavation (0-10 ft point of compliance) generic direct contact standards for soil, and the generic unrestricted potable use standards (GUPUS) for groundwater were used in the evaluation of the analytical results. Although future residential use of the Site is not anticipated, the residential (0-10 ft) direct contact standards for soil were used for screening purposes in the evaluation of data.

The findings of the interim action sampling effort support the CSM, and provide additional detail regarding the geology, amount of fill material, extent of vermiculite in soil, and chemical quality of soil and groundwater.

### **2.4.1 Soil – Nine Uninhabited Mobile Home Lots (Section I)**

The results of the investigation indicate that some soils in Section 1 contain concentrations of chlordane, heptachlor, and/or heptachlor epoxide above the Ohio EPA Voluntary Action Program (VAP) generic direct contact standards for residential land use and/or commercial/industrial land use. Examples of the distribution of pesticides at the Site are provided as Figures 2-4, 2-5, and 2-6. Some chlordane concentrations also exceeded its VAP generic direct contact standard for construction and excavation activities, including two in the 4-6 ft interval (RLSB-14 and RLSB-21) and one in the 6-8 ft interval (RLSB-37).

### **2.4.2 Soil - Former Ray Lewis Landfill (Section 2a)**

The results of the investigation indicate that the majority of soil in Section 2a does not contain pesticides at concentrations above the VAP generic direct contact residential standard (Figures 2-4, 2-5, and 2-6). The exceptions are 1) chlordane at RLSB-44 at a concentration greater than the VAP residential standard, and 2) dieldrin at RLSB-35 at a concentration greater than the commercial/industrial standard.

### **2.4.3 Soil - Former Ray Lewis Landfill (Section 2b)**

The results of the investigation indicate that soil at several locations in Section 2b contain chlordane and heptachlor at concentrations that exceed the VAP generic direct contact residential standard and commercial/industrial standard (Figures 2-4, 2-5, and 2-6). In addition, the detected concentrations of chlordane in soil borings RLSB-48, RLSB-49, and RLSB-60 (collected in the 6-8 ft depth interval) exceed the VAP generic direct contact standard for construction and excavation activities.

### **2.4.4 Vermiculite in Soil**

The scope of the investigation regarding the presence of vermiculite in soil was based on the results of the Ohio EPA and Lawhon soil sampling that was conducted in Marysville Estates and the FRLLF. Shallow soil in Marysville Estates was sampled during these earlier investigations. Vermiculite was detected in some soil samples on the east side of Cypress Drive. Vermiculite was not observed on the west side of Cypress Drive. Based on these results, most of the sampling was on the east side of Cypress Drive, however, two borings were installed on the west side of Cypress Drive to confirm that vermiculite was not present there.

The results of the IA Sampling Investigation indicate that overall, the presence of vermiculite at the Site ranges from not being observed to greater than 50% in some areas of Section 2b. As discussed above, vermiculite was not observed in the borings drilled on the west side of Cypress Drive (RLSB-18 and RLSB-24). Figures 2-4, 2-5, and 2-6 shows the relative concentration of chlordane, heptachlor, and heptachlor epoxide, respectively, in soil, as well as the estimated percentage and the thickness of vermiculite in soil at the Site. These figures illustrate the direct correlation between the occurrence of vermiculite and pesticides above applicable standards in the soil. As a result, remedial activities that remove the vermiculite will also remediate other constituents of concern.

### **2.4.5 Groundwater - Former Ray Lewis Landfill**

Depths to groundwater ranged from 6.26 feet to 8.5 feet below ground surface (bgs) for the flush mount monitor wells (MW-01 through MW-05), and 4.45 feet to 14.83 feet bgs for the wells with stick up completions (MW-06 through MW-12). Based on the groundwater elevations calculated from the June 21, 2016 sampling event, groundwater flows from the southwest portion of the Site to the east, northeast and north. Figure 2-7 shows the potentiometric surface and groundwater flow directions at the Site using the June 21, 2016 data.

Concentrations of several contaminants of concern (COCs) in MW-01, MW-02, MW-05, and MW-09 exceeded the VAP GUPUS. These COCs include arsenic, benzene, 4-chloroaniline, atrazine, 1,2,4-trimethylbenzene, naphthalene, and trichloroethene (TCE). Benzene was detected in groundwater collected from MW-01, MW-02 and MW-05 at

concentrations of 16 µg/L, 20 µg/L, and 210 µg/L, respectively, which are greater than its GUPUS of 5 µg/L. TCE was detected in groundwater collected from MW-08 and MW-09 at concentrations of 11 µg/L and 13 µg/L, respectively, which are greater than its GUPUS of 5 µg/L. Atrazine was detected in groundwater collected from MW-01, and 4-chloroaniline was detected in groundwater collected from MW-01, MW-02, and MW-05. No organic compounds were detected at concentrations greater than their respective GUPUS standards in the perimeter monitor wells MW-03, MW-04, MW-10, MW-11, and MW-12.

During the June 2016 groundwater sampling event, chlordane was detected in unfiltered groundwater samples from MW-01, MW-02 and MW-09 at concentrations greater than the VAP GUPUS. Because chlordane is insoluble in water, filtered and unfiltered groundwater was sampled. The results of a groundwater resampling event for MW-01, MW-02 and MW-09 conducted on August 31, 2016 indicated that the chlordane was not detected in the filtered groundwater samples collected. As such, it was determined that the chlordane detected in groundwater during the June 2016 sampling event was due to chlordane being attached to soil particles suspended in the water sample. Figure 2-8 shows the exceedances of contaminants in groundwater detected in June and August 2016.

The groundwater results from the downgradient wells indicate that the COCs (e.g., benzene) are not migrating off-Site. As discussed above, groundwater from monitor wells MW-08 and MW-09 (in the southeast corner of the Site) contained TCE at concentrations greater than the VAP GUPUS. The source of the TCE is not known, but due to known groundwater flow directions it is likely from an off-Site source, as TCE has not been known to be used in the mobile home park. Because the groundwater flow direction in the southeastern portion of the Site is to the east, any dissolved TCE dissolved in groundwater will continue to migrate beneath the former wastewater treatment plant and closed Marysville Landfill. As such, there are not any immediately downgradient receptors to the off-Site source of TCE (or any other contaminants in groundwater in the southern portion of the FRLLF).

## **3.0 Selection and Implementation of the Remedy**

A wide range of remedial options were considered for the Site based on information gained from the Interim Action investigation conducted in 2016. Based on the results of the IA investigation at the Site, Scotts and Marysville Estates have selected a remedy that will be protective of human health and the environment under a non-residential use scenario. The selected remedy consists of the following components:

- Site preparation
- Clearing, grubbing, and surveying
- Excavation of soil
- Consolidation of excavated soil and clean fill placement
- Grading and site restoration
- Explosive gas probe abandonment and replacement
- Groundwater monitor well abandonment and installation
- Establishment of institutional controls

Implementation of the above remedy components is discussed in the subsections below. Following implementation of the remedy, an environmental covenant will be established that will identify use restrictions and require ongoing inspections and maintenance (see Section 3.8).

### **3.1 Site Preparation**

Underground utilities within the Site will be located, marked, and abandoned. Overhead utilities will be de-energized and abandoned if possible. In accordance with the Fence Management Plan (Appendix A), the existing fence will be modified by moving the gate to the southern portion of Section 1 where it abuts Holly Drive. The western and northern portions of existing fence in Section 2b will be removed. Sections of fence to be removed and relocated are shown on Figure 3-1. A map showing underground utilities is included in Appendix B.

Monitoring wells will be abandoned in accordance with *Sealing Boreholes and Decommissioned Monitoring Wells* (Ohio EPA, 2016b). Soil cuttings from abandonment activities will be placed in Section 2a. Storm water controls will be installed as identified in a construction storm water pollution prevention plan. A notice of intent will be submitted to the Ohio EPA at least twenty-one days prior to beginning excavation work. A decontamination pad will be constructed in Section 1 (discussed further in Section 4.0). An on-site weather station will be installed to monitor wind speed and direction, relative humidity, and temperature.

## **3.2 Clearing, Grubbing, and Surveying**

In order to prepare the Site for excavation and consolidation of material, trees and shrubs were removed. Internal fences from the former RV storage area will be removed from Section 2b. Clearing and grubbing activities were performed in such a way that soil disturbance was minimized. Remaining woody vegetation (e.g., that remaining in the internal fence in Section 2b) will be shredded and transported off site to a permitted composting facility during fence removal activities. Internal fencing that is removed and cannot be used will be transported to a permitted scrap recycler. Additional removal actions (e.g., root balls, underground utilities, sidewalks, and mobile home piers) will be performed as part of excavation activities (Section 3.3).

Following the completion of clearing and grubbing, a detailed topographic survey of the Site will be performed. During the survey, temporary elevation benchmark(s) will be set. The survey data will be collected with a resolution of one-tenth (0.10 ft) of a foot for x and y coordinates and for elevation. A contour map will be generated from the survey data. The benchmark(s) and contour map will be used to guide implementation of the remedy.

## **3.3 Excavation of Soil**

To the extent necessary, root balls and other subsurface vegetation will be removed throughout the Site. Soil will be removed from root balls as described in Section 4, below. As necessary, the root balls and vegetation will be shredded and transported off site to a permitted composting facility (see details below).

Concrete within Sections 1 and 2b will be removed and stockpiled for subsequent transport to either a permitted construction and demolition debris landfill or concrete recycler. Alternatively, the concrete may be moved to Section 2a for consolidation with excavated soil. If shallow utilities are encountered, they will be removed and stockpiled for subsequent transport to either a permitted construction and demolition debris landfill or recycler. Prior to transporting concrete or underground utility materials offsite, they will be decontaminated to remove adhered soil (discussed further in Section 4.0).

Excavation of soil within Section 1 will be performed to a depth of at least two feet and will be confirmed by surveying. The horizontal extent of excavation within Section 1 will be guided by the visual presence of vermiculite. By using the presence of vermiculite as a guide, the soils containing constituents above the VAP commercial/industrial standards within this interval will also be excavated. It should be noted that vermiculite in the northern portion of Section 1 may slightly extend west of the defined Site. Access from the adjacent property owner will need to be obtained in order to follow, excavate, and remove (or sample) the soil as necessary. Soil throughout Section 2b will be excavated to a depth of at least two feet. The depth will be confirmed by surveying. Figure 3-2 provides the anticipated horizontal extent of the excavations within Section 1 and 2b. Excavated soil



will be stockpiled within Sections 1 and 2b as necessary, and subsequently transferred to Section 2a for consolidation. Confirmation soil sampling will not be necessary based on the above approach for vertical and horizontal extent of excavation.

### **3.4 Consolidation of Excavated Soil and Clean Fill Placement**

Stockpiled soil that is excavated from Section 1 and 2b will be transferred and consolidated within Section 2a. The lowest elevations of Section 2a will be the first to receive the soil. Soil will be placed within Section 2a in lifts that will achieve a compaction thickness of approximately six inches. During placement and compaction, it may be necessary to grade areas with naturally higher elevation. Compaction will be performed to specifications that are considered acceptable to Scotts and Marysville Estates (Appendix C). The finished elevation(s) of the consolidated compacted soil will be confirmed by surveying. As with the initial survey, the survey data will be collected with a resolution of one-tenth (0.10 ft) of a foot for x and y coordinates and for elevation. A contour map will be generated from the survey data.

Borrow material for backfilling excavations within Sections 1 and 2b will be obtained from an acceptable off site location. Prior to removing the borrow material and transporting to Sections 1 and 2b, it will be adequately characterized. Borrow samples will be analyzed for VOCs, PAHs, pesticides, herbicides, RCRA metals, and cyanide. Borrow samples will also be analyzed for various geotechnical parameters. Borrow material used for the two-foot thick cover over the consolidated waste will be of low permeability, consisting of a minimum of 15% clay, and will not contain more than ten percent gravel and cobbles.

Borrow that is transported to Sections 1, 2a, and 2b will be placed in lifts that will achieve a compaction thickness of approximately six inches. Compaction will be performed to specifications that are considered acceptable to Scotts and Marysville Estates (Appendix C). The post-compaction thickness of borrow will vary throughout Sections 1, 2a, and 2b based on the final grading design, but will be a minimum of two feet.

### **3.5 Grading and Site Restoration**

Following the placement and compaction of borrow within Sections 1, 2a, and 2b, it will be necessary to grade the entire site to achieve proper drainage. To the extent possible, grading of the compacted borrow will be performed such that a gradual transition to the surrounding undisturbed grade is achieved. Surveying will be performed to document final grading and to ensure a minimum of two feet of compacted soil cover is in place. As with earlier surveys, the survey data will be collected with a resolution of one-tenth (0.10 ft) of a foot for x and y coordinates and elevation. A contour map will be generated from the survey data. The cover in Section 2a will be constructed such that it has a minimum grade of 5% to allow surface water to properly drain. The clean fill material in Sections 1 and 2b will have a minimum grade of 2%, also so that surface water will properly drain. A final

grading plan is being developed in cooperation with the City of Marysville Engineer's office. A copy of the final grading plan will be appended to this document.

Throughout implementation of the remedy, it may be necessary to construct temporary roads within Sections 1, 2a, and/or 2b to minimize track out and facilitate decontamination activities. If gravel from temporary road construction is present at the surface during final grading, it may be necessary to remove a portion of the gravel.

Topsoil will be obtained from an acceptable off site source. Characterization of the topsoil prior to placement will not be required if it can be demonstrated that the previous use of the property should not have had an adverse effect on the chemical quality of the soil. If Scotts and Marysville Estates deem it to be necessary, collection of soil samples and chemical analysis will be performed. A sufficient coating of topsoil will be applied, graded, and seeded over all disturbed areas of the Site. Seeding will consist of grasses or other plant life deemed suitable by Scotts and Marysville Estates. Following adequate establishment of vegetative growth to prevent soil erosion, storm water controls will be removed. Figure 3-3 shows a conceptual contour map of the Site following completion of remedial activities. Portions of fencing may also be removed at the discretion of Scotts and Marysville Estates.

### **3.6 Explosive Gas Probe Abandonment and Installation**

Remedial activities at the Site require: (1) the abandonment and replacement of two explosive gas probes that are part of the approved explosive gas monitoring plan for the closed Marysville Landfill; and (2) the installation of two explosive gas probes along the western perimeter of the Site. The locations of the two gas probes to be abandoned are shown on Figure 3-4.

#### **3.6.1 Replacement of Existing Marysville Landfill Gas Probes**

The abandonment and replacement of the existing explosive gas probes at the Marysville Landfill will be performed in accordance with the approved explosive gas monitoring plan for the Marysville Landfill. As such, the existing probes will be properly abandoned by removal of the PVC screen and riser; the resultant hole will be filled with bentonite.

The replacement probes will be constructed to monitor the same pathway and zone, and will be in the same vicinity of the probes that they are replacing. The materials and construction of the replacement probes will be in accordance with the approved explosive gas monitoring plan for the Marysville Landfill. The replacement probes will be designated with an "R" in the identification of the gas probe (i.e., GP-4 will become GP-4R).

### **3.6.2 Installation of FRLLF Gas Probes**

Because of disturbances to the waste materials at the Site, two explosive gas probes will be installed in Section 1 of the Site (see Figure 3-4) in a manner consistent with the typical gas monitoring probe detail included as Figure 3-5. Each proposed gas monitoring probe will be drilled to a depth equal to the depth of waste nearest to the probe (approximately 10 feet below grade). Boreholes will be drilled with 4.25-inch inside diameter (ID) hollow stem augers, resulting in an 8.25-inch diameter hole (minimum). Explosive gas monitor probes will be constructed with a 2-inch ID schedule 40 PVC solid riser pipe and screen.

The new probes will be constructed with five feet of manufactured 0.010-inch slotted screen to allow gas to collect within the probe. The flush threaded solid riser pipe will extend from the screened sections to approximately 3 feet above ground surface and will be fitted with PVC stop-cock type valves that will be closed between gas sampling events. The fittings on the stop-cocks will facilitate the connection between the probe and the gas sampling instruments. The screened section of the probe will extend from approximately 3 feet below the ground surface to the bottom of the borehole. Coarse sand (e.g., Ohio #5) will be backfilled into the borehole annulus from the total depth of the boring to approximately 3 feet below the ground surface. A concrete/bentonite seal will be placed in the upper 3 feet of the monitoring probe annulus. The probe will be completed with either a steel protective casing, concrete pad and lock or a flush mount manhole (See Figure 3-5), depending on the location.

The drilling and construction of the new gas monitoring probes will be performed under the supervision of a qualified geologist. In addition to supervising the installation, the geologist will also document the installation of the probes. Documentation of the new probes will include boring logs, installation details, and construction details that will be submitted to the Ohio EPA upon completion of the construction of the new gas monitoring probes.

### **3.7 Groundwater Monitor Well Abandonment and Installation**

Because of the re-grading necessary in the northeast portion of the Site, monitor well MW-03 will be properly abandoned and replaced near the location of current MW-03 with the identification of MW-03R. MW-02 will also be properly abandoned and replaced along the fence line directly east of existing MW-02 with the new identification of MW-13. In addition, two new groundwater monitor wells, MW-14 and MW-15, will be installed on the west side of the Site. Efforts will be made to preserve the integrity of the existing monitor wells in Section 2b (i.e., MW-06, MW-07, MW-08, and MW-09) during excavation and backfilling activities. If the integrity of any well is compromised, such well(s) will also be properly abandoned and replaced. Figure 3-6 shows the approximate locations of the resulting monitoring well network at the Site.

The groundwater monitor wells will be installed using hollow-stem auger drilling methods. The wells will be constructed of 2-inch inside diameter PVC screens and riser pipes. During construction of each well, a sand pack consisting of #5 sand will be emplaced around the well screen to a depth of approximately two feet above the top of the screen. Bentonite pellets will be placed above the sand pack, and will be hydrated. The remaining annulus between the riser pipe and the soil will be filled with bentonite or bentonite-cement grout. The wells will be completed with PVC stick ups and steel protective casings. No earlier than 24 hours after completion, the wells will be developed to remove fines and sediments from drilling and well construction. The top of casing and ground surface elevations (to 0.01 foot), and x and y coordinates (to 0.1 foot) for each new well will be determined by an Ohio licensed land surveyor.

### **3.8 Establishment of Institutional Controls**

Following completion of the scope of work in this Interim Action Work Plan and upon Ohio EPA approval of the construction completion report, an Environmental Covenant will be established between Marysville Estates and Ohio EPA. The Environmental Covenant will be developed by counsel for Marysville Estates with comment and revision provided by Ohio EPA legal staff. The general restrictions/requirements of the Environmental Covenant are envisioned to include the following:

- **Activity/Land Use Restriction** – Land use at the Site will be limited to commercial and/or industrial use.
- **Groundwater Restriction** – The use groundwater underlying the Site for potable and domestic use will be prohibited. Authorized uses for groundwater will be monitoring, remediation, and dewatering (for utility work, if necessary).
- **Risk Mitigation Plan** – A risk mitigation plan (RMP) will be prepared and implemented by Marysville Estates to protect construction and excavation works at the Site if excavations extend to a depth below the clean borrow.
- **Inspection and Maintenance** – An Operation and Maintenance (O&M) Agreement and an O&M Plan will be prepared and implemented by Marysville Estates. These documents will be used to establish an ongoing inspection, maintenance, monitoring and reporting schedule for the Site. The proper implementation of the O&M Plan will ensure that at least two feet of clean cover remains over the Site, that the vegetative cover (or future alternate cover) is well established and that woody plants are not growing on the cover, and that the surface remains in good condition (i.e., no erosion). The O&M requirements will also pertain to the perimeter fences at the Site (if present).

## **4.0 Decontamination**

During Site preparation activities, three work areas will be established: a clean area, a decontamination (decon) area, and an exclusion or “dirty” area (Figure 4-1). The decon area will be used to perform activities to ensure that contaminants such as pesticides and vermiculite will not be transported off site. As such, all equipment, vehicles, and materials that have come into contact with impacted Site soils will undergo a decontamination procedure prior to leaving the Site. To ensure adequate space is available within the decon area, it may be necessary to perform and complete excavation and backfill activities to expand the decon area.

An equipment and vehicle decon pad will be constructed within the decon area for use with tires, tracks, buckets, blades, etc. The decon procedure will consist of the following:

- Remove gross contamination/soil with a wire brush, shovel, or similar tool to the extent possible within the “dirty” area prior to entering the decon pad
- Within the decon pad, use water to rinse the surface that is being decontaminated by pouring with a bucket or pressure sprayer.

A personnel decontamination area/pad will also be constructed within the decon area and will be used for cleaning boots and collection of boot covers, gloves, and other disposable personal protective equipment (PPE). It is anticipated that the majority of disposable PPE will be removed and placed directly into a trash bag. However, if the PPE is intended to be re-used, the following decon procedure will be used:

- Remove gross contamination/soil with a brush or similar tool to the extent possible within the “dirty” area prior to entering the decon pad
- Within the decon pad, wash with a cleaning solution and brush (if necessary)
- Rinse with water by pouring with a bucket or pressure sprayer

As previously indicated, root balls may be removed and transported off site to a permitted composting facility. If this occurs, as much soil as possible will be removed from the root ball using equipment and/or hand tools within the area from where it was excavated. If the root ball is removed from a general vicinity that contains vermiculite or has constituents detected above VAP residential standards, the root ball will be placed in the equipment and vehicle decon pad where a pressure sprayer and water will be used to remove residual soil to the extent possible. Following adequate decontamination, the root ball will be shredded (if necessary) and/or transported off site. Decontamination of concrete and underground utilities that are removed from the Site will also be performed, if necessary.

## **5.0 Air Emissions**

Fugitive emissions of dust have the potential to be generated during implementation of the remedy (primarily during excavation, consolidation, backfill/compaction, and grading). Procedures and equipment will be in place to both minimize and mitigate fugitive emissions. Site-dedicated equipment will be used to periodically apply water to disturbed areas if it is determined that sufficient moisture content is not naturally present. The construction entrance/exit and access roads (e.g., Holly Drive) will also be watered as necessary. If periodic road watering is not sufficient to minimize the generation of fugitive dust from truck traffic, a street sweeper may be used. Regardless of soil moisture content, if wind speeds exceed 15 knots (approximately 17 mph), earth disturbing activities will temporarily cease.

## **6.0 Waste Management**

Waste generation during implementation of the remedy is anticipated to be somewhat limited due to the consolidation efforts. As discussed previously, root balls and vegetation will be shredded (if necessary) and transported off site to a permitted composting facility. Concrete will either be transported to a permitted construction and demolition debris landfill or concrete recycler. Alternatively, the concrete may be moved to Section 2a for consolidation with excavated soil. Materials associated with shallow utilities and fencing will either be transported to a permitted construction and demolition debris landfill or recycler. Prior to transporting concrete or underground utility materials offsite, they will be decontaminated to remove any adhered soil.

Gross contamination/soil that is removed on-Site and outside of the decon pads will be placed within Section 2a with the other consolidated soil. Gross contamination/soil within the decon pads will be contained and placed within Section 2a. Decon/wash water will be used for dust control. Following completion of the final cover, wash water that accumulates within the decon pads will be pumped into drums/tanks and characterized for appropriate offsite disposal. The wastewater may be discharged to the City sanitary sewer following approval of the characterization results by the City. Disposable PPE will be placed into trash bags and transferred to a solid waste dumpster.



## **7.0 Health and Safety**

Applicable Occupational Safety and Health Administration (OSHA) requirements and Scotts, Cox-Colvin, and contractor health and safety policies will be followed by all personnel directly involved with implementation of the remedy, including Ohio EPA personnel and visitors. A project-specific health & safety plan (HASP) has been prepared (Appendix D). The site-specific HASP was prepared in accordance with EPA, OSHA, and National Institute of Safety and Health (NIOSH) guidelines and requirements. The HASP includes the following information:

- Project organization and coordination
- Chemical hazards
- Physical hazards
- Environmental monitoring methods
- Appropriate levels of personal protective equipment based on the nature of hazards to be encountered
- Contingency plans to deal with emergencies and accidental exposures
- An emergency contact list
- Fugitive dust management
- Work areas subject to the remedy-related health and safety requirements
- Personnel decontamination procedures and methods, and proper disposal or decontamination of PPE used during remedial activities

During construction activities, portable toilets will be available for use. Two portable toilets will be located inside the locked fence in the clean zone near the exit from the Site.

## **8.0 Schedule, Permitting, and Reporting**

Following Ohio EPA approval of this work plan, an anticipated implementation schedule will be provided to Ohio EPA. Identification, solicitation, and selection of contractor(s) will be necessary, which will be a determining factor as to when remedy implementation will begin. Seasonal weather conditions and obtaining necessary permits will also play a critical role in scheduling. A construction general storm water permit will need to be obtained prior to starting earth-disturbing activities (i.e., excavation). A construction storm water pollution protection plan (CSWPPP) has been prepared in accordance with the requirements of the storm water permit. If discharge of decontamination wastewater to the City sanitary sewers is performed, testing of the water, and authorization will be obtained from the City prior to discharge.

Ohio EPA will be provided with a minimum five working day notice prior to beginning excavation activities. An Interim Measure Construction Completion Report will be prepared and submitted to Ohio EPA within 60 days of completing activities (i.e., following completion of grading and site restoration). A drawing that shows final grades and surface water flow directions will be provided as part of the Construction Completion report. The establishment of an environmental covenant may follow a different schedule, which cannot be determined at this time.

## **9.0 Future Cover Disturbance**

Cover disturbance in all three sections of the Site will not be allowed after remediation activities have been completed except as provided under OAC 3745-27-13. Installation of the groundwater monitor wells and explosive gas probes in Section 1 and between the FRLLF portion of the Site and the closed Marysville Landfill, as addressed in this Work Plan, are required under the Director's Orders. Therefore, authorization for cover disturbance under Rule 3745-27-13 of the Ohio Administrative Code (OAC) will not be required. Following the completion of all requirements of the Orders and Ohio EPA approval of the construction completion report, subsequent disturbances of the cover at the Site will require approval of the Director as required by Rule 3745-27-13.

## **10.0 References**

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# Figures

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DATE: 02/18/2016

DWG NAME: Contaminants Soil PCBs

Legend

- Section 1, Marysville Estates
- Section 2a
- Section 2b

Source of Aerial Photograph: OGRIP, 2013.



Sections of the FRLLF Site,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

Figure  
1-2





DATE: 02/18/2016

DWG NAME: Sitemap



Area of Wetland (0.0325 Acre)



Sample Point

Wetland boundary from Lawhon & Associates, Inc., March, 2017.

### Legend



Approximate Boundary of Former Ray Lewis Landfill Site



Location of the Wetland at the Site,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

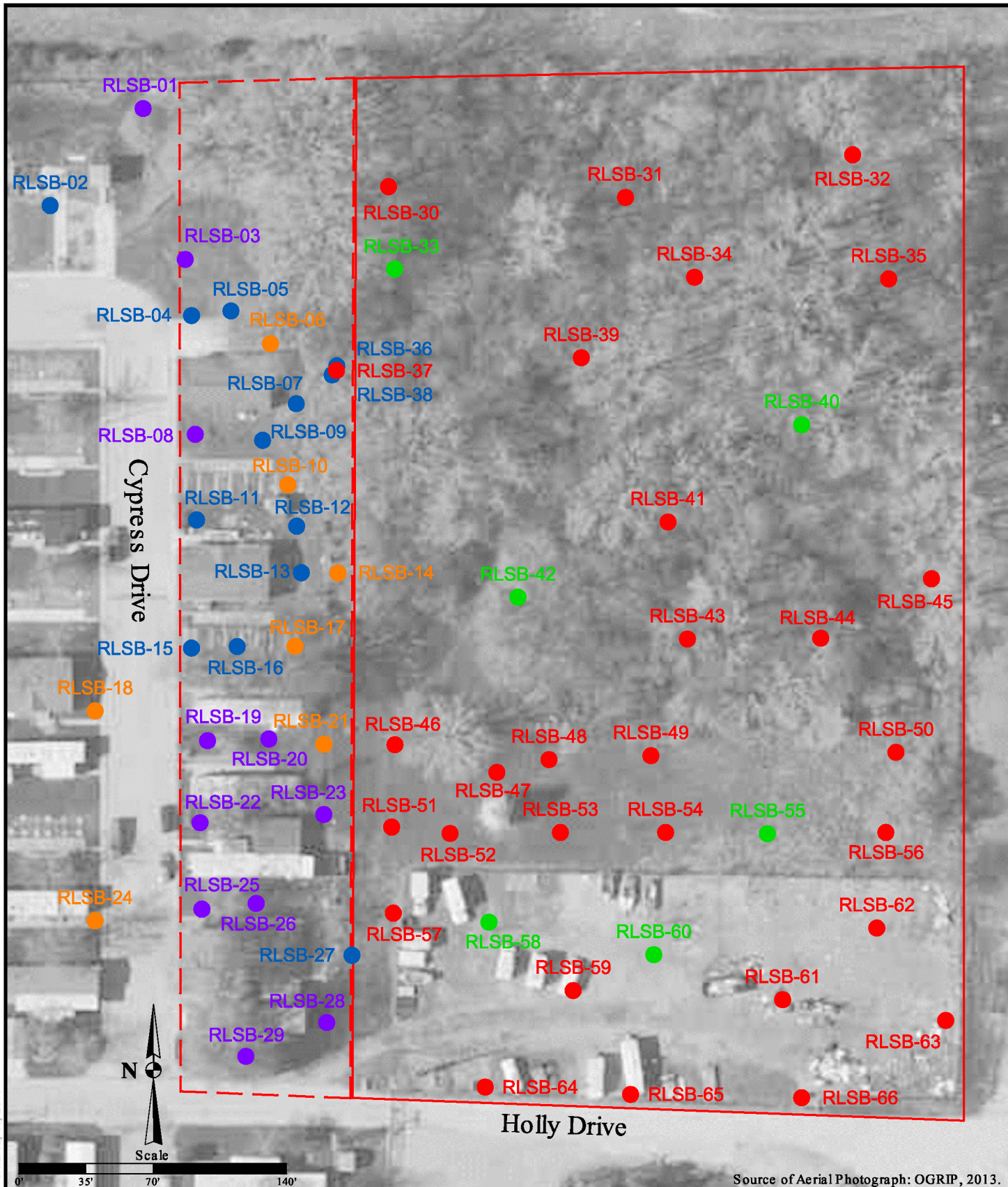
Figure

2-1



DATE: 02/18/2018

DWG NAME: Sitemap



**Legend**

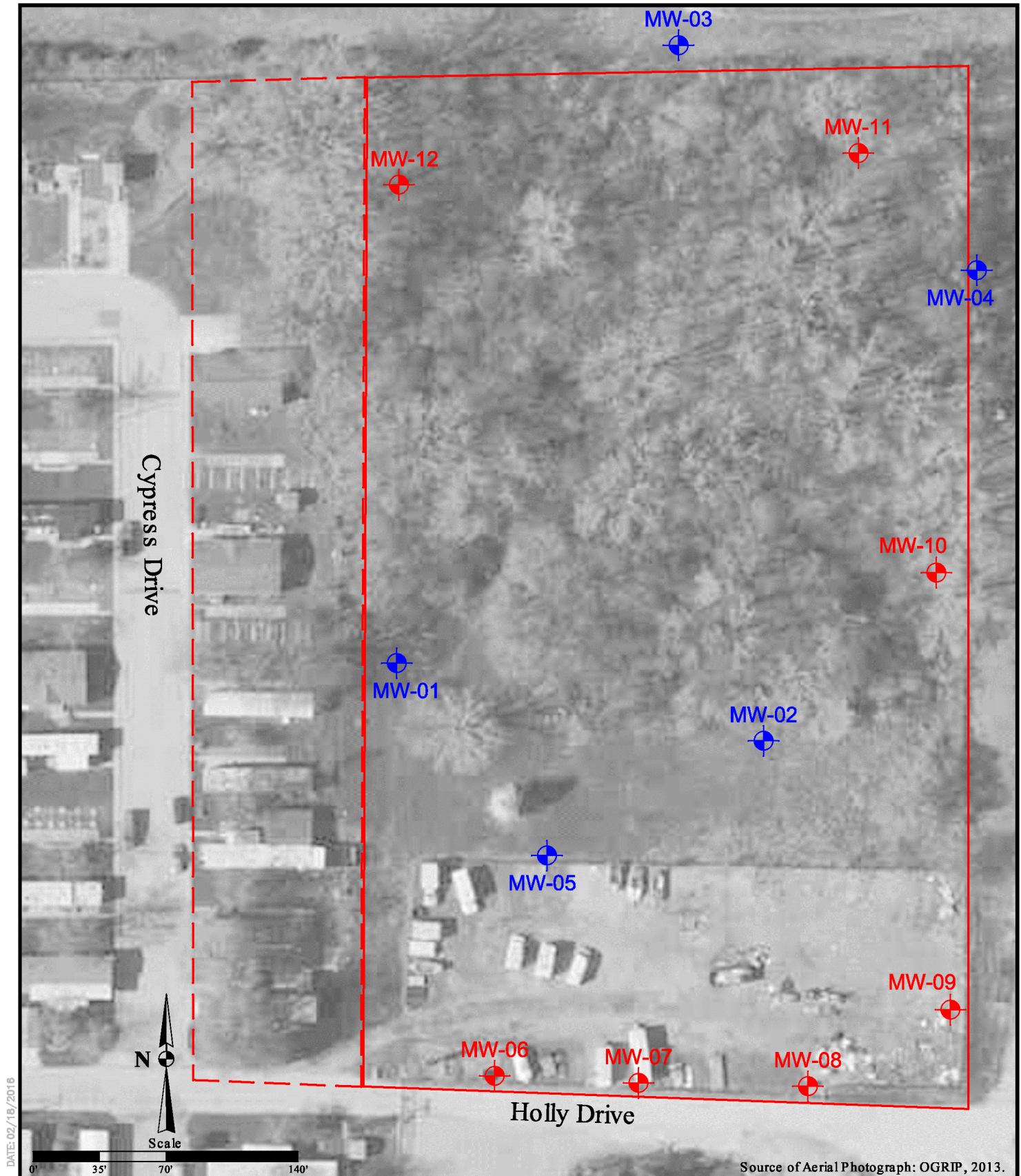
- IA Boring 0-4 Feet (Visual Inspection)
- IA Boring 0-4 Feet (2 Samples)
- IA Boring 4-12 Feet (2 Samples)
- IA Boring >12 Feet (2 to 3 Samples)
- IA Boring >12 Feet (Additional Analytes)
- Approximate Boundary of Former Ray Lewis Landfill Site
- - - Approximate Boundary of Marysville Estates Portion of Site



Soil Boring Location Map,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

Figure  
2-2





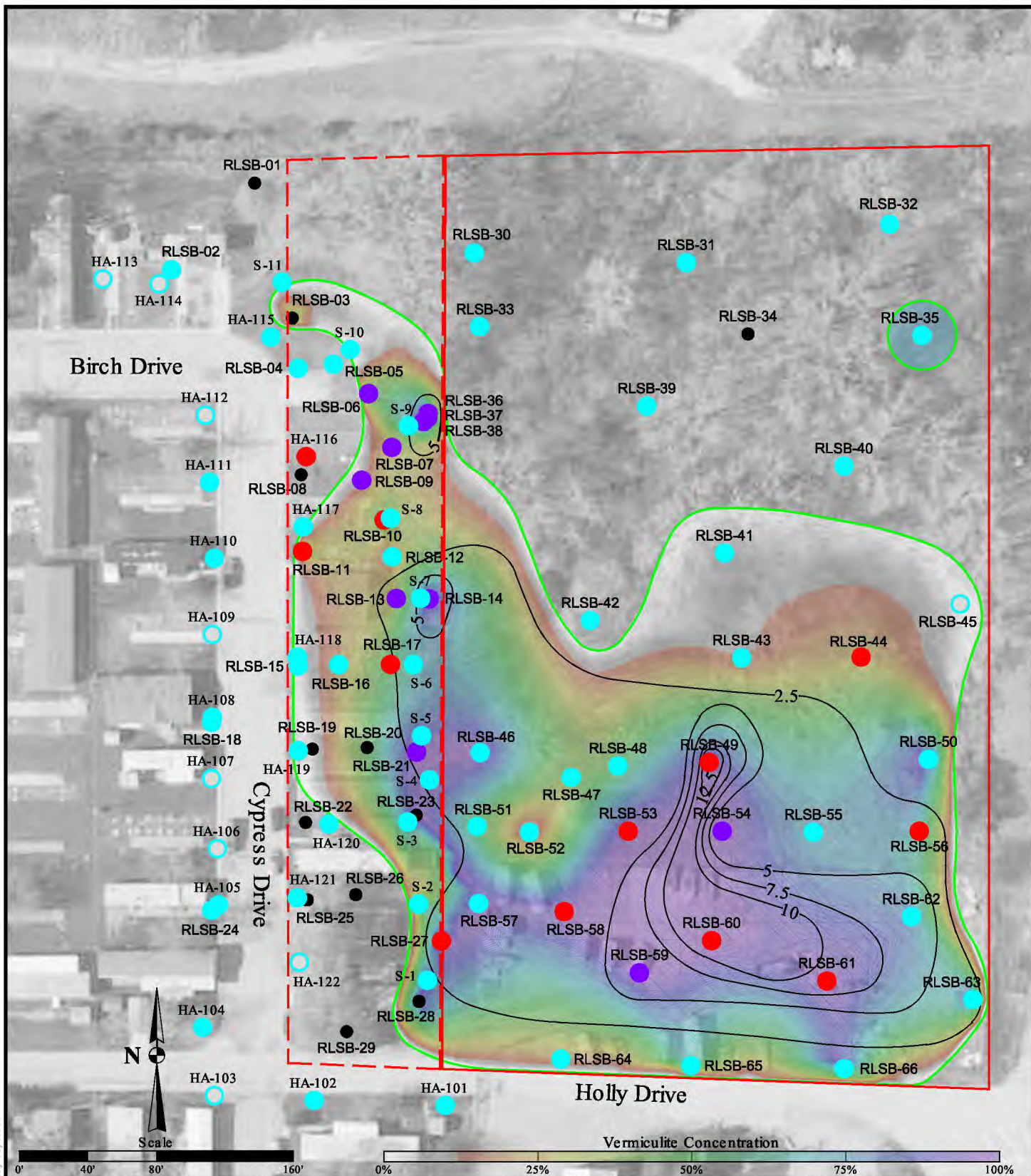
DATE: 02/18/2018

DWG NAME: Sitemap



Monitor Well Location Map,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

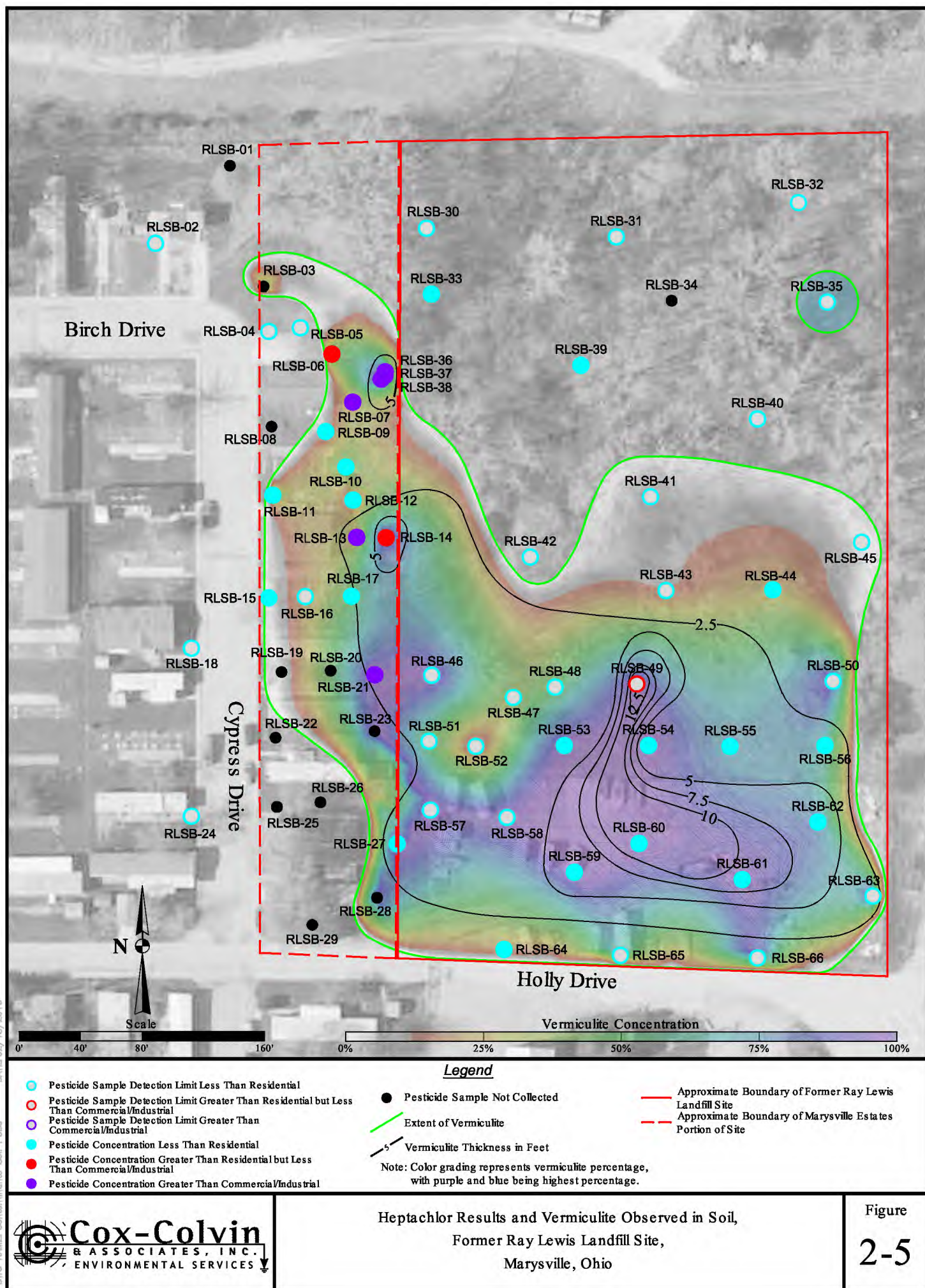




### Legend

- Pesticide Sample Detection Limit Less Than Residential
  - Pesticide Concentration Less Than Residential
  - Pesticide Concentration Greater Than Residential but Less Than Commercial/Industrial
  - Pesticide Concentration Greater Than Commercial/Industrial
  - Pesticide Sample Not Collected
  - Extent of Vermiculite
  - Vermiculite Thickness in Feet
  - Approximate Boundary of Former Ray Lewis Landfill Site
  - Approximate Boundary of Marysville Estates Portion of Site
- Note: Color grading represents vermiculite percentage, with purple and blue being highest percentage.







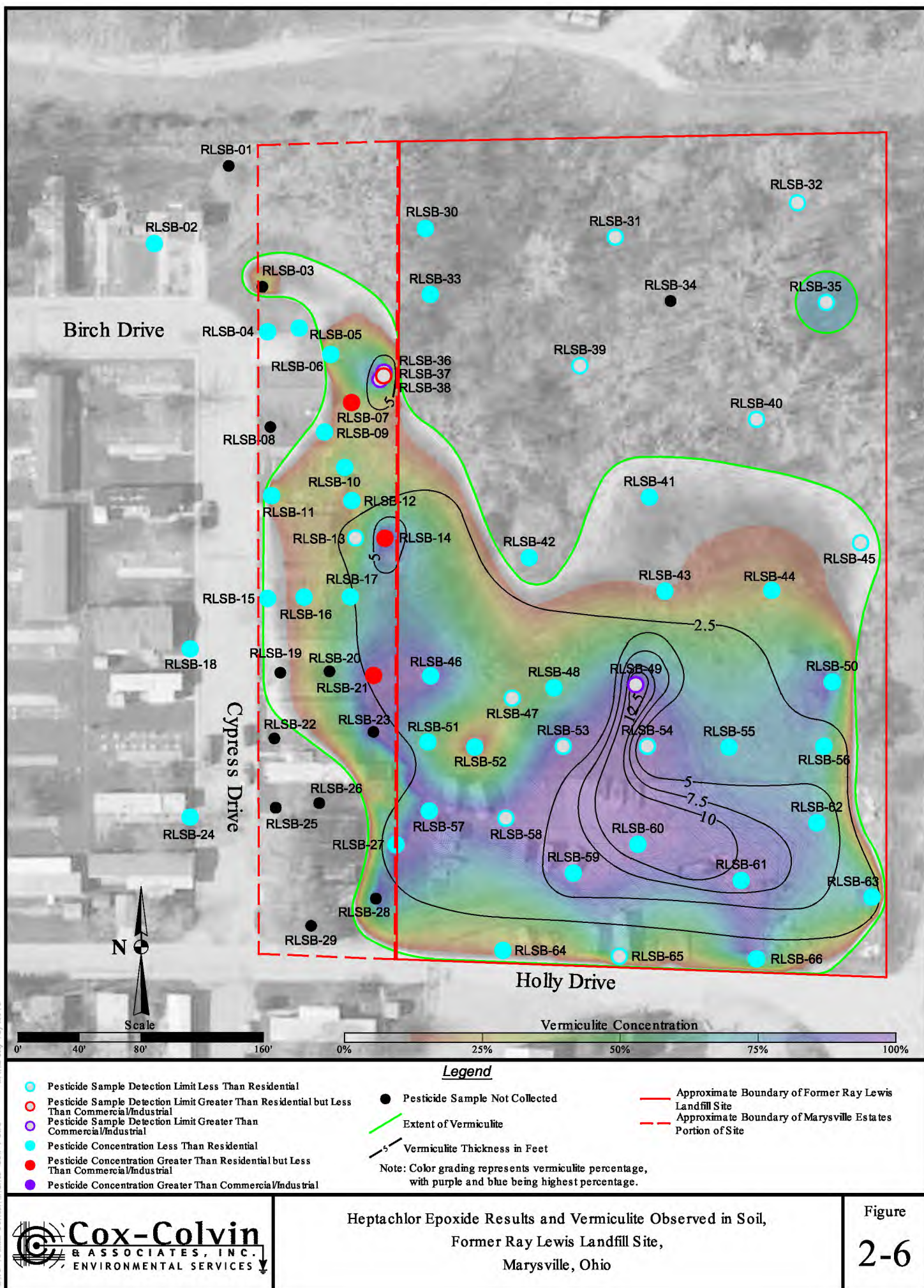


Figure  
2-6



DATE: 02/18/2018

DWG NAME: Water Levels 08212018



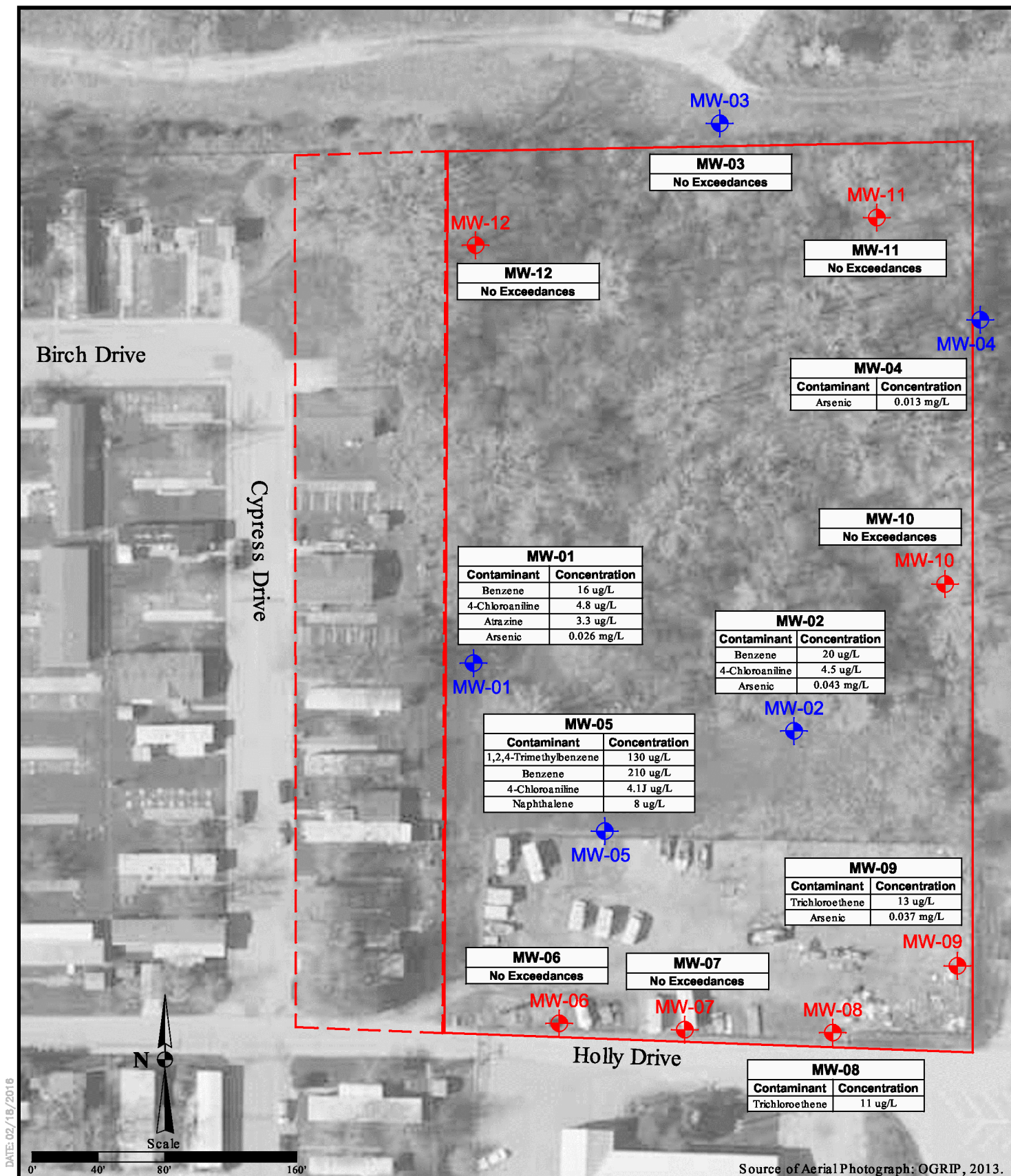
Source of Aerial Photograph: OGRIP, 2013.

<p>Ohio EPA Monitor Well</p>	<p>Water Level Contour (Feet msl)</p>	<p>Approximate Boundary of Former Ray Lewis Landfill Site</p>
<p>Monitor Well (Cox-Colvin, June, 2016)</p>	<p>Water Level Elevation, June 21, 2016 (Feet amsl)</p>	<p>Approximate Boundary of Marysville Estates Portion of Site</p>
	<p>Groundwater Flow Direction</p>	



Potentiometric Surface Map, June 21, 2016,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio





Source of Aerial Photograph: OGRIP, 2013.

#### Legend

- Ohio EPA Monitor Well
- Monitor Well (Cox-Colvin, June, 2016)
- Approximate Boundary of Former Ray Lewis Landfill Site
- Approximate Boundary of Marysville Estates Portion of Site



DATE: 02/18/2016

DWG NAME: Contaminants Soil PCBs



Legend

- Existing Fence
- Existing Fence to be Removed
- Fence to be Added
- Fence to be Removed and Replaced
- Temporary Construction Fence

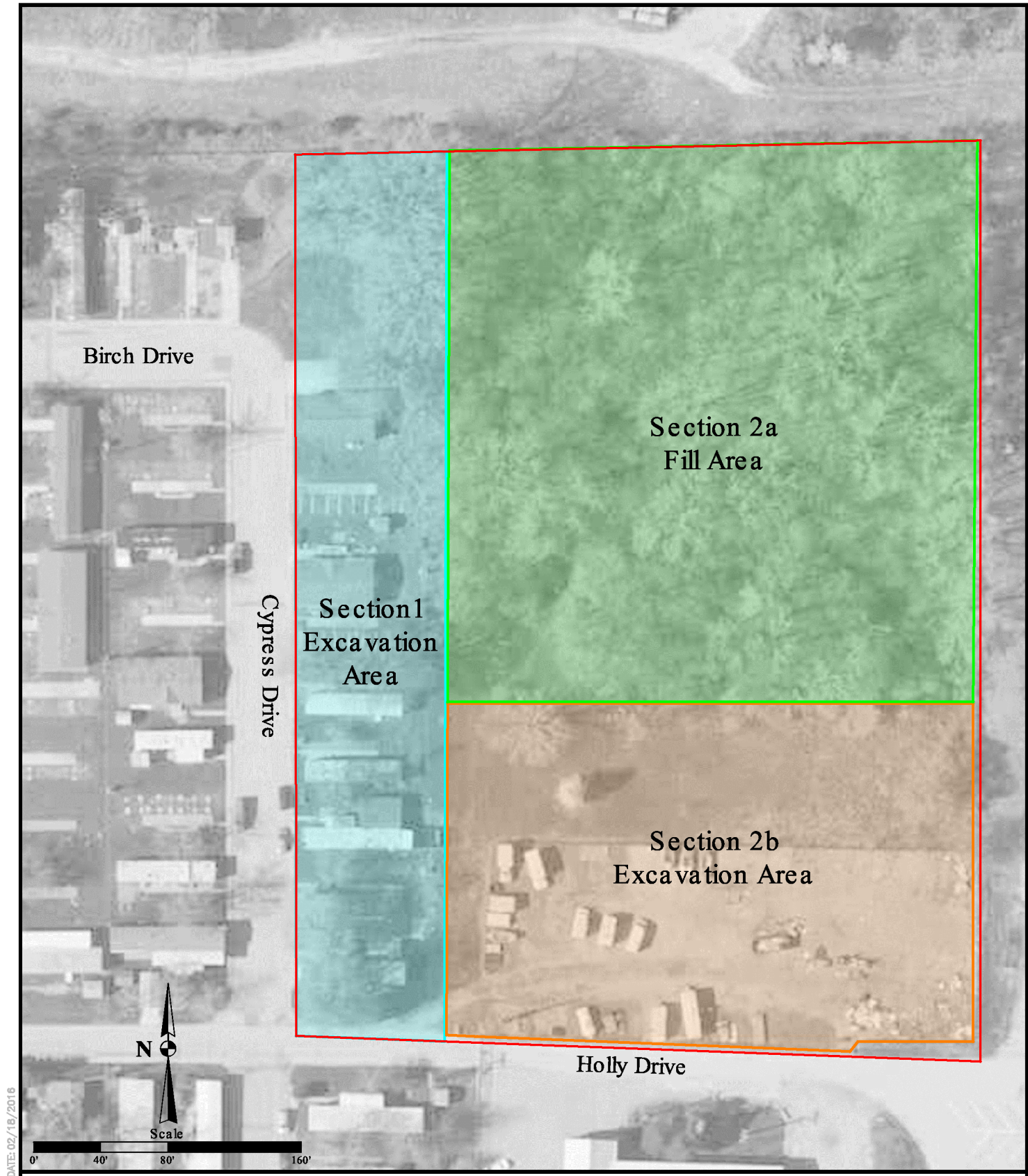
Source of Aerial Photograph: OGRIP, 2013.



Fences During Remediation,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

Figure  
3-1





DATE: 02/18/2016  
DWG NAME: Contaminants Soil PCBs

Legend

- Potential Excavation Area, Section 1
- Northern Fill Area, Section 2a
- Southern Excavation Area, Section 2b

Approximate Boundary of Former Ray Lewis Landfill Site

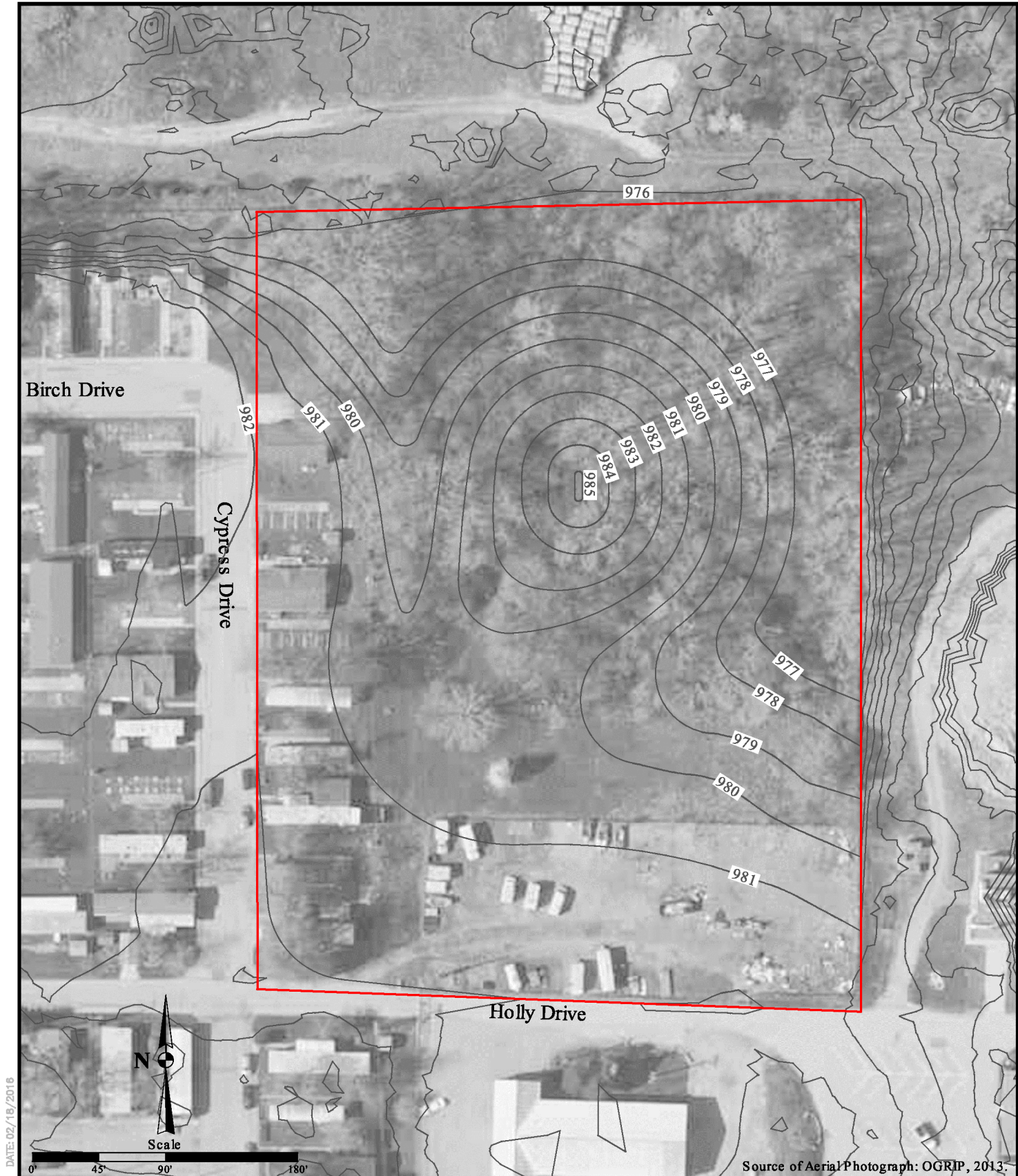
Source of Aerial Photograph: OGRIP, 2013.



Site Layout Showing Excavation and Fill Areas,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

Figure  
**3-2**





DATE: 02/18/2018

DWG NAME: Sitemap

### Legend

— Surface Contour

— Approximate Boundary of Former Ray Lewis Landfill Site

Note: Estimated soil cover contours were generated using AutoCAD Civil 3D grading module to determine future surface contours after placing clean soil (two feet in thickness) over excavated material from Section 1 and Section 2b. Estimated elevations may vary  $\pm$  two feet or more.



Preliminary Drawing of Final Grading at the Site,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

Figure  
3-3





Legend

- Replacement Explosive Gas Station
- Proposed Marysville Estates Explosive Gas Probe

DATE: 02/18/2018

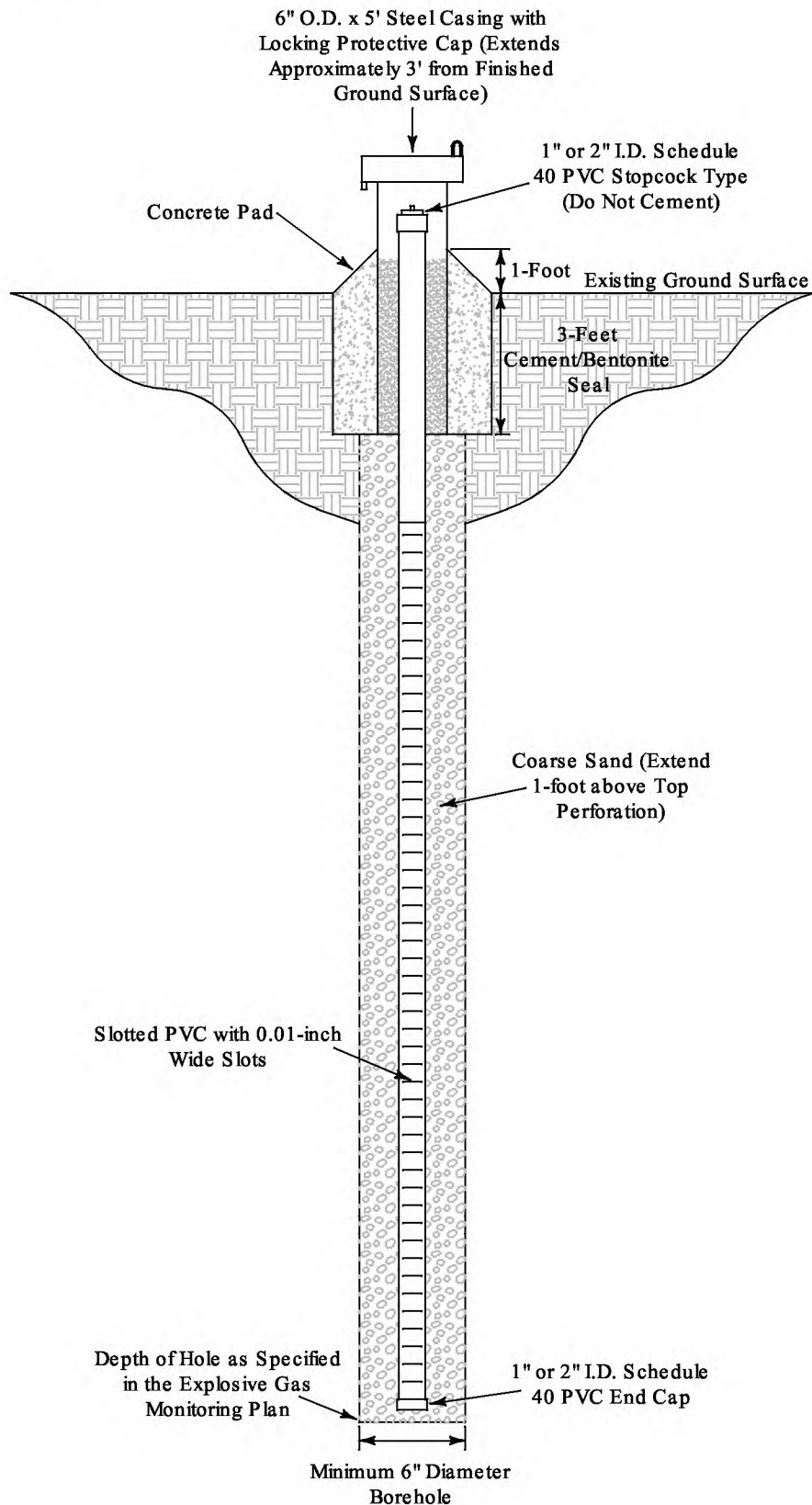
DWG NAME: Sitemap



Proposed Explosive Gas Probe Location Map,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

Figure  
**3-4**

Note: An optional flush mount protective cover may be installed.



DATE: 04/05/2017

DWG NAME: Gas Probe Detail





#### Legend

- Ohio EPA Monitor Well
- Monitor Well (Cox-Colvin, June, 2016)
- Proposed Monitor Well (Cox-Colvin, 2017)

DWG NAME: Sitemap



Monitor Well Location Map,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

Figure

3-6





- Section 1, Marysville Estates
- Section 2a
- Section 2b

- Fence
- Egress/Gate

- Legend**
- Office Trailer
  - Approximate Location of the Tire Wash/Decon Pad
  - Weather Station

- Clean Area
- Decon Area
- Work Area

Source of Aerial Photograph: OGRIP, 2013.

# Appendix A

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Fence Management Plan

Appendix A



Sent Via Email

To: Ryan D. Elliott  
cc: Craig A. Cox, Nick Petruzzi  
From: Steve Williamson  
Subject: Fences During Construction at the Former Ray Lewis Landfill, Marysville, Ohio  
Date: May 30, 2017

In accordance with your request, we have prepared this memo regarding the removal and replacement of fences at the Former Ray Lewis Landfill (FRLLF) during the anticipated remedial activities.

## **Background**

The FRLLF is located at 506 North Main Street in Union County, Marysville, Ohio (Figure 1-1). According to a recent land survey, the landfill itself occupies approximately 3.88 acres of undeveloped land located on the north side of Holly Drive, east of the mobile home park previously owned by Marysville Estates. Ohio EPA has defined the overall "Site" as the FRLLF, as well as nine uninhabited mobile home lots located on the east side of Cypress Drive which were formerly part of the mobile home park. As shown on Figure 1-2, the Site has been divided into three distinct sections, all of which are subject to the interim action work plan conditionally approved by the Ohio EPA on March 24, 2017. These three sections comprise approximately 4.97 acres and consist of the following:

- Section 1: Nine uninhabited mobile home lots which were formerly part of the mobile home park; approximately 1.09 acres in size
- Section 2a: Northern portion of the FRLLF consisting of a low, wooded area that did not receive the same amount or type of waste as did the southern portion; approximately 2.41 acres in size
- Section 2b: Southern portion of the FRLLF consisting of a mostly flat, open area that includes a grass cover and a fenced storage area; approximately 1.47 acres in size

## **Interim Action – Implementation of the Remedy**

Based on the results of the investigation, a remedy was selected that is protective of human health and the environment at the Site, but also reduces the risk of exposure of the waste due to transportation of the waste. The selected remedy is to excavate two feet of impacted soil from Sections 1 and 2b and consolidating/compacting it in Section 2a as presented in the interim action work plan. The excavations will be backfilled with clean fill from a tested and approved source. The consolidated waste material will be covered with two feet of low-permeability fill. The Site will be graded to ensure proper drainage of surface water. Figure 1-3 shows the locations of the excavation and fill areas.

All trees at the Site were recently cut down and will be removed, beginning June 1, 2017, prior to implementation of the remedy. In order to facilitate the tree removal, and subsequent excavation, consolidation, and filling activities, existing fencing will require removal. A phased approach to fence removal is discussed in the sections below.

### **Fence Removal During Tree Management**

In order to allow for the removal of the trees from the Site, a portion of the southern property fence must be removed to allow for the entrance of trucks and equipment into the FRLLF. The portion of the City's fence along the southern border of the FRLLF that must be removed during this time is shown in purple on Figure 1-4. No other portion of the fence around the Site will be removed during the tree removal, and the City's access gate at the east end of Holly Drive will be closed at the end of each day.

### **Fence Removal During Excavation, Consolidation, and Filling**

Following removal of the trees and brush from the Site, excavation from Sections 1 and 2b will be performed, with concurrent filling and consolidation within Section 2a. As such, the remainder of the City's fence along the southern portion of Section 2b (shown in blue-green on Figure 1-4) must be removed to allow for the removal of impacted soil to be excavated. In addition, the City's fence along the eastern side of the Site must be removed (shown in green on Figure 1-4) during filling and final grading. During the time that the eastern fence has been removed, temporary construction fence will be installed from the northeastern corner of the FRLLF to the City's fence that intersects the eastern fence approximately 90 feet south of that corner. In this way, the City property will be secure during all Site operations. The temporary fence is shown in orange on Figure 1-4.

When the cover over the consolidated waste has been installed, additional clean soil will be imported from the approved borrow area to provide fill for establishing the final grade. During that time, the fill will be spread and compacted so that it blends with the contours of the City's properties to the north and east of the FRLLF. Note that it may be necessary to temporarily remove a portion of the northern fence during the blending task. This is not expected, but if it is necessary, temporary fencing will be installed.

### **Fence Replacement**

Upon completion of filling, grading and seeding of the Site, an Ohio licensed land surveyor will locate and mark the property boundaries, and the fences that were removed along the property boundaries during Site activities will be replaced. The temporary fences will be removed once the permanent fences have been replaced.



# Figures







DATE: 02/18/2016

DWG NAME: Contaminants Soil PCBs

Legend

- Section 1, Marysville Estates
- Section 2a
- Section 2b

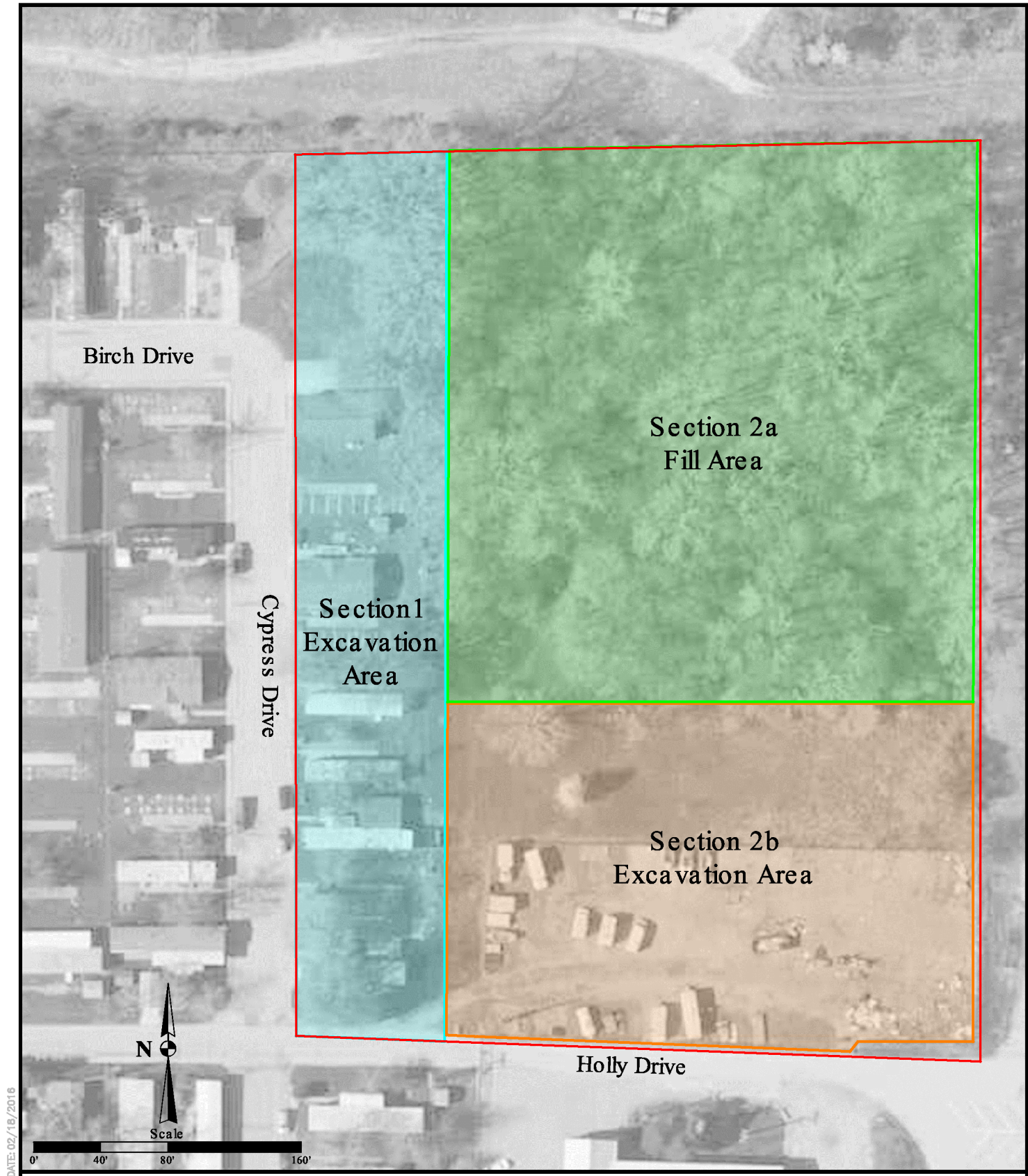
Source of Aerial Photograph: OGRIP, 2013.



Sections of the FRLLF Site,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

Figure  
1-2





DATE: 02/18/2016  
 DWG NAME: Contaminants Soil PCBs

Legend

- Potential Excavation Area, Section 1
- Northern Fill Area, Section 2a
- Southern Excavation Area, Section 2b

Approximate Boundary of Former Ray Lewis Landfill Site

Source of Aerial Photograph: OGRIP, 2013.



Site Layout Showing Excavation and Fill Areas,  
 Former Ray Lewis Landfill Site,  
 Marysville, Ohio

Figure  
**3-2**



DATE: 02/18/2016

DWG NAME: Contaminants Soil PCBs



Legend

- |                              |  |
|------------------------------|--|
| Existing Fence               | Temporary Construction Fence                           |
| Internal Fence to be Removed | City Fence to be Removed During Excavation and Filling |
| Fence to be Added            | City Fence to be Removed For Truck Access              |
| Eastern Boundary Fence       |  |

Source of Aerial Photograph: OGRIP, 2013.



Fences During Remediation,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio

Figure  
1-4

# Appendix B

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Underground Utility Map

Appendix B





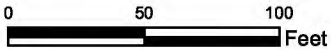
Source: Bing Maps Aerial



Extent Indicator Map

**Legend**

- Communication Line
- Gas Line
- Water Line
- Storm Sewer Line
- Catch Basin
- Sanitary Sewer Line
- Sanitary Manhole



**Marysville Estates**

Preliminary Underground  
Utility Mapping



Date: June 2017	Approved by: TB	L&A No. 15-0808	Figure 1
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File Name: Marysville OUPS.mxd

Edited: 6/19/2017 By: afraley



# Appendix C

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Specifications

Appendix C

# **SPECIFICATION CONTENTS**

- SPECIFICATION 1 - SUMMARY
- SPECIFICATION 2 - ADMINISTRATIVE REQUIREMENTS
- SPECIFICATOIN 3 - HEALTH AND SAFETY
- SPECIFICATION 4 - EXECUTION AND CLOSEOUT REQUIREMENTS
- SPECIFICATION 5 - TEMPORARY FACILITIES AND CONTROLS
- SPECIFICATION 6 - EXCAVATION
- SPECIFICATION 7 - FILL
- SPECIFICATOIN 8 - HYDROSEEDING

# **Specification I Summary**

## **I.I Background**

These specifications have been prepared to describe the procedures and expected performance standards to complete work necessary to mitigate the direct contact pathway to contaminated soil beneath portions of the Former Ray Lewis Landfill Site (FRLLF or Site) in Marysville, Ohio. Mitigation will be accomplished through the excavation of contaminated soil from two areas of the Site, consolidation and compaction of the excavated soil in another area of the Site, backfilling/compaction of the excavated areas with clean, low-permeability soil, and hydroseeding of disturbed areas. The Contractor shall furnish all implements, machinery, tools, material, and labor necessary for the performance of the work and shall furnish and do everything necessary to make the work satisfactory, complete, neat and finished.

The FRLLF is the subject of an Ohio EPA Director's Final Findings and Orders (DFFOs) for interim action and cost recovery. A copy of the DFFOs will be added to the Interim Action (IA) Work Plan once it is finalized. included in the IA Work Plan. Soil excavation and consolidation is being conducted as a component of the Site interim action. A description of the investigation and the results are included in the Work Plan.

The work will be completed for the GROUP, which consists of:

Marysville Estates, LLC  
c/o Rob Shouhayib, Principal, The Choice Group  
2265 Livernois, Suite 500  
Troy, Michigan 48083

and

The Scotts Company LLC  
c/o Christina Grasseschi, Manager, Legal - Regulatory & Advertising  
14111 Scottslawn Road  
Marysville, Ohio 43041

The work will be completed under the oversight of:

Cox-Colvin & Associates, Inc. (ENGINEER)  
7750 Corporate Boulevard  
Plain City, Ohio 43064  
Attention: Steve Williamson and Nick Petruzzi

## **I.2 Location**

The Site is located in a developed portion of the City of Marysville, Union County, Ohio. The Site address is 506 North Main Street, and is located to the northeast of the intersection of Holly and Cypress Drives.

Access to the Site is available from Holly Drive.

## **I.3 Description of Work**

CONTRACTOR must complete safety training requirements and forms prior to receiving access to Site.

Make all necessary arrangements with the local authorities having jurisdiction for the movement of CONTRACTOR material and equipment to and from the Site over public roadways. There can be no track out of soil from the Site onto Holly Drive.

The work will be performed in accordance with these specifications and the Work Plan. Figures from the Work Plan that are pertinent to the work are referenced in these specifications. If inconsistencies in the project scope, between these specifications and the Work Plan, are identified by the CONTRACTOR, the ENGINEER must be consulted for clarification.

A. The work generally includes, but is not limited to, the following:

1. Preparation of pre-work submittals and mobilization to the Site. A list of submittals is attached to these specifications (Table 1).
2. Development, implementation, and maintenance of a site-specific Health and Safety Plan.
3. Provision and maintenance of temporary facilities and controls, including tire wash and decontamination pads.
4. Obtaining a water meter from the Marysville Utilities Department and installing it on a fire hydrant on City property. The water will be used for dust control measures, truck washing, and decontamination.
5. Plugging of a surface water storm sewer as shown on Figure A-1 of the IA Work Plan.



6. Installation and maintenance of temporary erosion and sediment controls per the Construction Storm Water Pollution Prevention Plan (Appendix B of the IA Work Plan).
7. Excavation of soil in Sections 1 and 2b to 2 feet below ground surface (Figure 3-2 of the IA Work Plan).
8. Consolidation of soil excavated from Sections 1 and 2b into Section 2a; compaction of soil in Section 2a.
9. Importing fill materials from an approved off-Site source that meet permeability requirements; placing and compacting the soil in the excavated areas; covering the consolidated soil in Section 2a with at least two feet of soil; and grading soil as necessary to achieve required sloping.
10. Covering all disturbed areas of the Site with at least 2 inches of topsoil.
11. Hydroseeding all disturbed areas of the Site.
12. Decontamination of equipment, demobilization, and closeout.

## **I.4 Contractor Use of the Site**

When unfavorable weather, soil, drainage, or other unsuitable construction conditions exist, continue other operations which will not be adversely affected by such conditions. Do not construct or cause to be constructed any portion of the work under conditions which would adversely affect the quality of the work, unless special means or precautions are taken to perform the work in a proper and satisfactory manner and are pre-approved by the ENGINEER.

**END OF SECTION**

k:\cca\projects\ray lewis landfill\remedial action\remedial action work plan\appendices\app d specifications\specification 1 summary sew.docx

**Table I. List of Submittals**

<b>Submittal</b>	<b>Frequency/ Due Date</b>
Contact List of Personnel	Prior to mobilization
Construction Schedule	Prior to mobilization
Health and Safety Plan	Within 14 calendar days of the notice to proceed; at least 10 calendar days prior to mobilization
Proof of OSHA HAZWOPER training	Prior to mobilization; within 7 calendar days of notice to proceed
Certification of Medical Surveillance	Prior to mobilization; within 7 calendar days of notice to proceed
Proof of Respirator Fit Tests	Prior to mobilization; within 7 calendar days of notice to proceed
Excavation and Fill Plan	Within 14 calendar days of the notice to proceed; at least 10 calendar days prior to mobilization
Near Miss and Injury Reports	As necessary, ASAP after incident, not to exceed 24 hours
Air Monitoring Reports	Daily
Weigh Tickets for Concrete/Asphalt Disposal and Rootball Management	Weekly
Analytical Laboratory Reports and Tables Comparing Soils Results to VAP Standards	10 calendar days prior to importing soil to the Site
Geotechnical Laboratory Reports	10 calendar days prior to importing soil to the Site
Weigh Tickets for Imported Soil	Weekly
Laboratory Results for Decon Water to be Disposed	10 calendar days prior to disposal
Change Orders	As necessary
Compaction Testing Reports	Daily
Field Quality Control	Daily
Qualifications of Geotechnical Laboratory	Within 14 calendar days of the notice to proceed; at least 10 calendar days prior to transport of soil materials to the Site
Qualifications of Analytical Laboratory	Within 14 calendar days of the notice to proceed; at least 10 calendar days prior to transport of soil materials to the Site
Final Grading Plan	Within 7 calendar days of completion of excavation, consolidation, and receipt of the top of waste land survey
Field Changes of Dimension and Detail	As necessary and at the end of the project
Close Out Documents	Within 14 calendar days following demobilization

## **Specification 2**

### **Administrative Requirements**

#### **2.1 Specification Language and Disclaimer**

- A. Specifications are written in the imperative mode. Except where specifically intended otherwise, the subject of all imperative statements is the Contractor. For example, "Provide equipment" means "Contractor shall provide equipment".

#### **2.2 Mobilization And Startup**

- B. Do not mobilize to the Site without ENGINEER's prior written authorization and without assuring that insurance as required by the Contract documents is fully executed.
- C. Perform planning and scheduling activities as necessary for the performance of the work. See Table 1 for CONTRACTOR List of Submittals.
- D. Complete all required training and documentation to receive Site access. Adhere to the project Health and Safety Requirements in Specification 3 and the Health and Safety Plan.
- E. Purchase materials and mobilize equipment, supplies, and incidentals to the Site.
- F. Use the existing Site access roads to the designated work areas during mobilization. Do not block access to or interfere with operations on the City property adjacent to the Site. Complete improvements to roads as necessary for the performance of the work.
- G. Setup temporary utilities and facilities in areas designated by the ENGINEER. Obtain ENGINEER's approval prior to changing locations of temporary construction facilities. Do not use other areas without ENGINEER's prior approval. Provide additional land and access thereto not shown or described that may be required by CONTRACTOR for temporary construction facilities or storage of materials with no liability to GROUP or ENGINEER. Relocate construction equipment or other materials or equipment as required for the performance of the work.
- H. Do not commence work involving Contact with potentially contaminated materials until decontamination facilities are operational and approved by the ENGINEER.

## **2.3 Coordination**

- I. Coordinate scheduling, submittals, and work of the Specifications and other requirements of the Contract documents to assure efficient and orderly sequence of the work.
- J. Deliver to the Site only materials appropriate to the work under the Specifications and Contract documents.
- K. Coordinate delivery of material and equipment to the Site with work sequence; schedule deliveries to limit requirement for storage at the Site to the practical minimum; limit on-Site storage of materials to areas approved by ENGINEER.
- L. Coordinate completion and cleanup of work of Site sections in preparation for substantial completion.

## **2.4 Pre-Construction Meeting**

- M. ENGINEER will schedule and administer a pre-construction meeting at the Site after the date of notice to proceed and prior to mobilization to the Site.
- N. ENGINEER will make arrangements for meeting, prepare agenda with copies for participants, and preside at the meeting. CONTRACTOR will be prepared to discuss all items on the agenda.
- O. Minimum Attendance Required: CONTRACTOR's Project Manager and Site Manager.
- P. Agenda may include, but not necessarily be limited to, the following:
  - 1. Designation of responsible personnel.
  - 2. Lines of authority and communication.
  - 3. Health and safety.
  - 4. Use of the Site for storage, vehicle parking, access routes, and other Site requirements.
  - 5. GROUP requirements.
  - 6. CONTRACTOR Submittals.
  - 7. Temporary facilities and controls provided by CONTRACTOR.
  - 8. Field offices (if applicable).



9. Survey and Site layout.
  10. Security and housekeeping procedures.
  11. Procedures for processing field decisions, submittals, substitutions, applications for payments, Change Orders, and closeout procedures.
  12. Progress schedules.
  13. Procedures for testing and inspection.
  14. Procedures for maintaining Project record documents.
- Q. ENGINEER will record minutes and distribute copies to participants and those affected by decisions made. CONTRACTOR should identify errors in the minutes, if any, to ENGINEER in writing within 5 calendar days of receipt and prior to Site mobilization.
- R. CONTRACTOR will be solely responsible for the health and safety of its employees and the employees of any subcontractor(s).

## **2.5 Progress Meetings**

- S. ENGINEER will schedule and administer progress meetings at the Site throughout the progress of the Works at minimum weekly intervals or more frequently as required.
- T. ENGINEER will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings. Provide data required to ENGINEER and be prepared to discuss all items on the agenda.
- U. Attendance Required: CONTRACTOR's Health and Safety Officer, CONTRACTOR's superintendent, major Subcontractors and Suppliers, as appropriate to agenda topics for each meeting.
- V. Agenda will include, but not necessarily be limited to, the following:
1. Review of minutes of previous meetings.
  2. Review of work progress since last meeting.
  3. Field observations, problems, and decisions.
  4. Identification of problems which impede planned progress.
  5. Review of submittals schedule and status of submittals.
  6. Review of off-Site material delivery schedules.

7. Review of health and safety concerns and issues.
  8. Maintenance of progress schedule.
  9. Corrective measures to regain projected schedules.
  10. Planned progress during succeeding work period.
  11. Coordination of projected progress.
  12. Maintenance of quality and work standards.
  13. Effect of proposed changes on progress schedule and coordination.
  14. Change Orders.
  15. Applications for Payment.
  16. Other business relating to the work.
- W. ENGINEER will record minutes and distribute copies to participants and those affected by decisions made. Identify errors in the minutes, if any, to ENGINEER in writing within 3 days of receipt. All communication to Subcontractors, Suppliers, or others that CONTRACTOR is responsible for will be made through CONTRACTOR.

## **2.6 Pre-Construction Meetings**

- X. When required in a specification or by the ENGINEER, convene a pre-construction Site meeting prior to commencing the associated work.
- Y. Required attendance of parties directly affecting, or affected by, work of the specification.
- Z. Notify ENGINEER, in writing, a minimum of 3 calendar days in advance of a pre-installation meeting date.
- AA. Prepare agenda and preside at meeting:  
Review conditions of installation, preparation, and installation procedures.  
Review coordination with related work.
- BB. ENGINEER will record minutes and distribute copies to participants and those affected by decisions made. Identify errors in the minutes, if any, to ENGINEER in writing within 3 days of receipt.

END OF SECTION

## **Specification 3 Health And Safety**

### **3.1 General Requirements**

- A. Cox-Colvin & Associates has developed a general health and safety plan for the work to be completed at the Site. The CONTRACTOR will develop a written site-specific Health and Safety Plan (HASP) which complies with 29 CFR 1910.120 and 29 CFR 1926.65 prior to commencing mobilization to the Site and continue to implement, maintain, and enforce the HASP until final demobilization from the Site. The development, implementation, and maintenance of the HASP are CONTRACTOR's sole responsibility. As a minimum, the HASP shall address the requirements specified herein.
- B. The health and safety guidelines contained herein are minimal requirements intended to provide for a safe and minimal risk working environment for on-Site personnel and to minimize the impact of activities involving contact with hazardous constituents on the general public and the surrounding environment.
- C. Should CONTRACTOR seek relief from, or substitution for, any portion or provision of the health and safety requirements specified herein, or the HASP reviewed by the ENGINEER, such relief or substitution shall be requested from the ENGINEER in writing, and if accepted by ENGINEER, will be authorized in writing.
- D. Responsibility: Be responsible for the safety of persons and property on Site and for the protection of persons off Site and the environment to the extent that they may be affected by the conduct of the work. Comply with (and enforce compliance by employees of CONTRACTOR and Representatives) safety requirements of the Contract documents, Laws and Regulations, and the HASP. CONTRACTOR acknowledges that safety and environmental protection obligations are of paramount importance regarding all of the work to be performed under the Contract documents.
- E. Hazard Communication Requirements:
  - 1. Comply with the requirements of 29 CFR 1910.1200. Obtain information on any hazardous chemical or harmful physical agent to which personnel of CONTRACTOR and Representatives and visitors have potential exposure while on Site.

2. Provide ENGINEER with SDS documentation on "hazardous" chemicals that CONTRACTOR or Representatives plan to bring onto the Site. In addition, CONTRACTOR shall be responsible for meeting container warning label requirements of 29 CFR 1910.1200.
- F. Work Stoppage: Give precedence to the safety and health of the public and on-Site personnel and the protection of the environment over cost and schedule considerations for all of the work to be performed under the Contract documents. The ENGINEER's designated Health and Safety Officer shall be responsible for decisions regarding when the work shall be stopped or started for health or safety considerations and shall have the authority to stop or start the work for health or safety considerations. The ENGINEER and CONTRACTOR also have the right to stop the work for health and safety considerations.
- G. Unforeseen Hazards: Should an unforeseen or Site safety-related factor, hazard, or condition become evident during performance of the work, bring such to the attention of the ENGINEER verbally and in writing as quickly as possible, for resolution. In the interim, take prudent action to establish and maintain safe working conditions and to safeguard employees of CONTRACTOR and Representatives, the public, ENGINEER, and the environment.
- H. Ensure all personnel and visitors receive awareness training prior to entering the restricted work zones.

## **3.2 Basis of Program**

- I. OSHA standards and regulations contained in 29 CFR 1910 and 1926 provide the basis for the Site health and safety program. The program also reflects the position of the USEPA and NIOSH regarding procedures recommended or required to ensure safe operations at sites containing hazardous or toxic materials.

## **3.3 Site Characterization**

- J. Work at the Site will involve contact with soils which contain vermiculite and organochlorine pesticides as described in the Work Plan. Details regarding the character of the waste are contained in the Interim Action Work Plan.



## **3.4 Submittals**

**K. HASP:**

1. Within 14 calendar days after the date of the notice to proceed and no later than 10 calendar days prior to mobilization to the Site, CONTRACTOR will submit a site-specific HASP which complies with 29 CFR 1910.120 and 29 CFR 1926.65 to the ENGINEER. At a minimum, the HASP shall include the following:
  - a. A safety and health risk or hazard analysis for each work task and operation.
  - b. Personnel training assignments according to 29 CFR 1910.120(e) and 29 CFR 1926.65(e).
  - c. PPE to be used by personnel on Site for each work task and operation being conducted according to 29 CFR 1910.120(g)(5) and 29 CFR 1926.65 (g)(5).
  - d. Medical surveillance requirements according to 29 CFR 1910.120(f) and 29 CFR 1926.65(f).
  - e. Site control measures according to 29 CFR 1910.120(d) and 29 CFR 1926.65(d).
  - f. Decontamination procedures according to 29 CFR 1910.120(k) and 29 CFR 1926.65 (k).
  - g. Emergency Response Plans meeting the requirements of 29 CFR 1910.120(l) and 29 CFR 1926.65(l) for safe and effective responses to emergencies, including necessary PPE and other equipment.
  - h. A written respiratory protection program for work activities, if required.
  - i. Procedures dealing with heat and/or cold stress.
2. The ENGINEER will review the CONTRACTOR's Site-specific HASP and provide comments to CONTRACTOR within 5 calendar days after receipt of the HASP. Revise the HASP as appropriate and resubmit the HASP to ENGINEER within 3 calendar days after receipt of comments from ENGINEER and no later than 3 calendar days prior to Site mobilization.

- L. **Proof of OSHA Training:** Within 7 calendar days after the date of the notice to proceed and prior to mobilization to the Site, submit a list of all personnel who will be employed at the Site. For each of the listed personnel, provide proof of training as required under OSHA 29 CFR 1910.120 and 29 CFR 1926.65. Submit proof of training for any additional personnel as they are sent to the Site.
- M. **Medical Surveillance:** Within 7 calendar days after the date of the notice to proceed and prior to mobilization to the Site, submit certification of medical surveillance as required by 29 CFR 1910.120, 29 CFR 1926.65, and 29 CFR 1910.134 for all Site personnel. Submit additional certification of medical surveillance as personnel are sent to the Site.

### **3.5 Personnel Health, Safety, And Hygiene**

- N. **Levels of Protection:** Establish actual levels of protection for each work area based on planned activity and location of activity. The anticipated levels of personal protection based on work activity are as follows:

<b>Work Activity</b>	<b>Anticipated Level of Personal Protection</b>
Excavation	Level D
Backfill	Level D
Decontamination of Equipment and/or Personnel	Level D

Level D: Respiratory protection – none; masks for protection from nuisance dust may be used.

- O. **PPE:**
1. Furnish on-Site CONTRACTOR personnel with appropriate PPE. Clean and maintain safety equipment and protective clothing. As a minimum, each worker on Site shall wear a hard hat, safety glasses with side shields, safety boots with steel toes, full-length pants, appropriate work gloves, high visibility vest/shirt, and comply with all applicable Site PPE requirements.
  2. Develop PPE usage procedures and enforce strict compliance with such procedures by on-Site personnel. Include the following procedures as a minimum:
    - a. Do not permit prescription eyeglasses to be worn that are not safety glasses. Do not permit contact lenses to be worn within the Exclusion Zone or Contaminant Reduction Zone.

- b. Change respirator cartridges/filters (if used) daily during periods of respirator usage or prior to breakthrough, whichever occurs first.
- 3. Do not permit footwear to be worn that is not steel-toed safety boots. Require footwear to be covered by rubber overshoes or disposable coverings when entering or working in the Exclusion Zone. Overshoes should be removed and/or properly decontaminated and disposable coverings discarded within the Contaminant Reduction Zone to prevent trackout of contaminants into the Clean Zones. After clean fill is placed over Sections 1, 2a, and 2b at the Site, this requirement is no longer applicable.
- 4. Dispose of or decontaminate PPE worn on Site at the end of the work day.
- 5. Decontaminate reusable PPE before reissuing.

**P. Respiratory Protection:**

- 1. Furnish on-Site personnel with extensive training in the usage and limitations of, and qualitative fit testing for, air purifying and supplied-air respirators according to 29 CFR 1910.134 for confined space entry, or any work requiring Level C or higher protection.
- 2. Develop, implement, and maintain a written respiratory program according to 29 CFR 1910.134.
- 3. Monitor, evaluate, and provide respiratory protection for on-Site personnel as needed.
- 4. The selection of appropriate protection is based upon the potential presence of compounds with the lowest recommended threshold limit value.
- 5. In the absence of additional air monitoring information or substance identification, the following minimum levels of respiratory protection shall be required:
  - a. Immediately notify ENGINEER when VOCs in the breathing zone are 10 ppm greater than background values. Implement dust control measures if visible dust is being produced.
- 6. Be responsible for appropriate respiratory protection during work activities. Do not allow persons to enter the Exclusion Zone or Contaminant Reduction Zone without appropriate respiratory protection.

- Q. Heat Stress/Cold Stress: Implement a heat stress and/or cold stress monitoring program as applicable and include in the HASP.
- R. Personnel Hygiene and Personnel Decontamination Procedures:
  - 1. Provide, as a minimum, the following:
    - a. Suitable disposable and reusable PPE on a daily basis for the use of CONTRACTOR's on-Site personnel.
    - b. Suitable containers for storage and disposal of used disposable PPE.
    - c. Potable water and a suitable sanitation facility.
- S. Emergency and First-aid Equipment:
  - 1. Locate and maintain emergency and first-aid equipment in an appropriate on-Site location, including:
    - a. First-aid kit to accommodate the numbers of on-Site personnel.
    - b. Portable emergency eye wash.
    - c. Two 20-pound ABC type dry chemical fire extinguishers.
    - d. Blankets and towels.
  - 2. As a minimum, provide one certified first-aid technician on Site at all times when on-Site work activities are in progress. This technician may perform other duties but shall be immediately available to render first aid when needed.
- T. Site Communications: Emergency phone numbers should be provided in the HASP and readily accessible on Site.
- U. Safety Meetings: Conduct mandatory daily safety meetings for on-Site personnel prior to the start of work, and additionally as required by special or work-related conditions. Include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new Site conditions as they are encountered.

## **3.6 Wind Monitoring**

- V. Furnish a wind speed and direction indicator capable of providing an instantaneous indication of a wind speed. As indicated in Specification 5, a wind speed limit has



been established, which when conditions equal or exceed the limit, work will be required to temporarily halt. The indicator must be placed at an unobstructed on-Site location above the elevation of the work area, clearly visible to affected workers.

## **3.7 Site Control**

- W. Comply with 29 CFR 1910.120 (d) and 29 CFR 1926.65 (d).
- X. Provide in the HASP:
  - 1. A figure or map which presents the delineation of the work zones for work activities.
  - 2. A discussion on Site security issues.
  - 3. A detailed discussion on decontamination procedures for both equipment and personnel, including collection and disposal of wash waters, sediments, and spent PPE.
  - 4. Details for the personnel decontamination facility/equipment.
  - 5. Details for the truck/equipment decontamination pad.
- Y. Slip, Trip, and Fall Hazards: Maintain good housekeeping at the Site for the duration of the Works. Remove, mark, or guard trip hazards. Use extreme caution when working on or around slippery surfaces. Take all necessary precautions to protect personnel from injuries caused by slick surfaces.
- Z. Contaminant Migration Control: Take appropriate measures to prevent contaminant tracking on and off Site. Decontaminate vehicles, equipment, and workers leaving areas of potential contamination prior to entry into Clean Zones. Locate decontamination facilities and sequence work activities to prevent contaminant tracking.

END OF SECTION

## **Specification 4**

### **Execution and Closeout Requirements**

#### **4.1 Examination**

- A. Prior to commencement of work at the Site, inspect the Site with ENGINEER to review and establish the condition of surface features including existing roads, parking areas, buildings, wells, trees and other plants, grassed areas, fencing, service poles, wires, paving, and survey bench marks or monuments on or adjacent to the Site which may be affected by the Work. This inventory shall be mutually agreed between the ENGINEER and CONTRACTOR and shall not thereafter be subject to dispute. Such inventory, as may be amended from time to time, will be used by the ENGINEER to check compliance by CONTRACTOR with the requirements of the Contract documents. The site inspection will be performed concurrent with the pre-construction meeting (Specification 2).
- B. Provide ongoing review, inspection, and attendance during performance of the work to properly document conditions. Promptly inform the ENGINEER of any existing condition at the Site affected by the work which may require restoration, repair, or replacement. Do not cover up any of the work without prior approval from the ENGINEER.
- C. Maintain and protect existing Site structures and facilities from damage which may be affected by the work while work is in progress. Repair or replace damage resulting from the work to the ENGINEER's approval.
- D. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent work. Beginning new work means acceptance by CONTRACTOR of existing conditions.
- E. Verify that existing substrate is capable of structural attachment of new work being applied or attached or that existing or previously constructed surfaces are ready to receive subsequent work.
- F. Examine and verify specific conditions described in individual specifications.
- G. Verify that utility services are available, of the correct characteristics, and in the correct location.

## **4.2 Restoration**

- H. As a minimum, restoration shall mean replacement, repairs, or reconstruction to a condition at least as good as the condition prior to commencement of the work.
- I. Except where specifically required otherwise by other specifications, restore areas of the work and areas affected by the performance of the work to conditions that existed prior to commencement of the work and to match condition of similar adjacent, undisturbed areas.
- J. Ensure that restored areas match existing grade and surface drainage characteristics, except as otherwise specified in other specifications, and ensure a smooth transition from restored surfaces to existing surfaces.
- K. Do not alter original conditions without prior written approval from the ENGINEER.
- L. Without limiting the generality of the foregoing or other requirements of the Contract documents, preserve and protect existing features encountered at the Site during performance of the work including, but not limited to buildings, wells, structures, curbs and gutters, fences, pavement, manholes and catch basins, utilities, railroad sidings, roads, streets, walks, grassed areas, and other graded or improved areas.
- M. Use construction methods and procedures during performance of the work which keeps disturbance and damage of whatever nature to existing conditions to the practical minimum.
- N. Ensure that quality, grades, elevations, and the extent of bedding, cover, and other backfill materials including subgrades, finish grades, and thickness of pavements for roadways and parking areas are properly documented during their removal to ensure reconstruction to at least their original and functional condition.
- O. Should any dispute arise as to the quality or fitness of materials, whether obtained on or off Site, whether previously inspected by the ENGINEER prior to use or not, the decision to use any material or product in the finished work will rest solely with ENGINEER.
- P. Prior to commencement of restoration work, inform ENGINEER of proposed material, methods, and procedures to repair, replace, or reconstruct disturbed, damaged, or suspected damage to the work.
- Q. Repair pavement, roads, sod, and all other areas affected by construction operations and restore them to original condition or to minimum condition specified.

## **4.3 Progress Cleaning**

- R. Execute cleaning during progress of the work.
- S. Requirements of Regulatory Agencies:
  - 1. In addition to the requirements herein, maintain the cleanliness of the work area and surrounding premises within the work limits to comply with federal, state, and local fire and safety laws, ordinances, codes, and regulations.
  - 2. Comply with all federal, state, and local anti-pollution laws, ordinances, codes, and regulations when disposing of waste materials, debris, and rubbish.
- T. Coordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials on or within the work areas or on the premises surrounding the work.

## **4.4 Final Cleaning**

- U. Execute final cleaning prior to substantial completion of the work.
- V. Clean debris from drainage systems.
- W. Clean the Site; sweep paved areas and rake clean landscaped surfaces.
- X. Repair pavement, roads, sod, and all other areas affected by construction operations and restore them to original condition or to minimum condition specified.
- Y. Maintain cleaning until acceptance and occupation by the GROUP and ENGINEER.

## **4.5 Final Decontamination**

- Z. Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially contaminated materials prior to contacting clean materials and soils and prior to removal from the Site.
- AA. Perform decontamination as indicated in Specification 5 to the satisfaction of the ENGINEER. The ENGINEER will have the right to direct CONTRACTOR to perform additional decontamination if required.



## **4.6 Removal and Disposal**

- BB. Remove surplus materials and temporary facilities and controls from the Site.
- CC. Dispose of all non-contaminated waste materials, litter, debris, and rubbish off Site.
- DD. Do not burn or bury rubbish and waste materials on Site.
- EE. Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner on Site.
- FF. Do not discharge wastes into streams or waterways.
- GG. Dispose of the following materials at an appropriate off-Site facility identified by CONTRACTOR and approved by the ENGINEER:
  - 1. Debris including excess construction material, non-contaminated litter, and rubbish.
  - 2. Spent Tyvek and other disposable personal protective equipment worn during final cleaning.
  - 3. Wastewater from decontamination operations
  - 4. Lumber from the decontamination pads.
- HH. Wastewater: CONTRACTOR will perform sampling and analysis of stored wastewater for disposal purposes prior to removal from the Site. The results of the analyses will determine the appropriate methods of disposal. Upon receipt of the analytical results, the ENGINEER will instruct CONTRACTOR to transfer tank/container contents without spills or release to the off-Site disposal facility. Following completion of tank/container emptying, decontaminate the tank/container interior with a steam or high-pressure water wash supplemented by detergent (Alconox). Dispose of tank/container decontamination water with tank contents.

## **4.7 Protection of Installed Work**

- II. Protect installed work and provide special protection where specified in individual specifications.
- JJ. Provide temporary and removable protection for installed products. Control activity in the immediate work area to prevent damage.

## **4.8 Closeout Procedures**

- KK. Submit written certification that the Contract documents have been reviewed, the work has been inspected, and that the work is complete according to the Contract documents and in compliance with applicable Laws and Regulations including, but not limited to, the provision of all applicable federal, state, and local health, safety, and environmental laws and regulations, including OSHA, and ready for the ENGINEER's review.
- LL. Submit final Application for Payment identifying previous payments and amounts remaining due.
- MM. Complete and furnish submittals to the ENGINEER that are required by governing or other authorities and by the Contract documents. Payment shall not become due and payable until all submittals have been made acceptable to the ENGINEER.

## **4.9 Project Record Documents**

- NN. Maintain one set of the following Project record documents on Site; record actual revisions to the work:
1. Specifications.
  2. Change Orders and other modifications to the Contract.
  3. Reviewed drawings and product data.
  4. Manufacturer's instruction for assembly, installation, and adjusting.
  5. Photo log.
- OO. Ensure entries are complete and accurate, enabling future reference by the GROUP and ENGINEER.
- PP. Store project record documents separate from documents used for construction.
- QQ. Record information concurrent with construction progress.

RR. Project record documents and drawings: Legibly mark each item to record actual construction including:

1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
2. Field changes of dimension and detail.

SS. Submit documents to ENGINEER with claim for final application for payment.

END OF SECTION

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## **Specification 5 Temporary Facilities and Controls**

### **5.1 Temporary Utilities**

**A. Electricity:**

1. CONTRACTOR is responsible for all temporary electrical service (if any) needed for implementation of its work.

**B. Water Service:**

1. Provide and maintain suitable quality water service required for personnel hygiene and decontamination equipment. A fire hydrant is present on the adjacent City property that can be used as a water source. CONTRACTOR shall coordinate with the City of Marysville and obtain a permit and meter to use the hydrant.

**C. Telephone Service:**

1. CONTRACTOR is responsible for all telephone service (if any) needed for implementation of its work.

**D. Fire Protection:**

1. Take precautions to prevent fires. Provide and maintain temporary fire protection equipment of a type appropriate to the hazard anticipated according to Laws and Regulations and to the satisfaction of the ENGINEER and insurance authorities.
2. Temporary bulk storage of flammable liquids for equipment refueling purposes must conform to Federal Spill, Prevention, Control, and Countermeasures regulations. Handle flammable liquids in approved containers.
3. Open burning of rubbish is not permitted on Site.
4. Deliver, use, and dispose of flammable materials as required by authorities having jurisdiction.



## **5.2 Construction Facilities**

### **E. Equipment Decontamination Facility/Equipment:**

1. Prior to commencing work involving equipment that will contact with clean soil and potentially contaminated materials, construct an equipment decontamination pad/tire wash to accommodate the largest piece of on-Site potential contaminated equipment.
2. Submit equipment decontamination pad design to the ENGINEER for review prior to commencing construction.
3. Provide, operate, and maintain suitable portable, high-pressure, low-volume decontamination wash unit(s) equipped with self-contained water storage tank and pressurizing system and capable of heating and maintaining wash waters to 180 degrees F and providing a nozzle pressure of 150 psi.
4. Provide, operate, and maintain necessary equipment, pumps, and piping required to collect and contain equipment decontamination wash water and sediment. Wash water will be used for dust control during excavation, transportation and consolidation of excavated material. Sediment resulting from excavation, transportation, and consolidation of excavated material will be transported to the fill area in Section 2a of the Site.

### **F. Personnel Hygiene/Decontamination Facility:**

1. Provide, operate, and maintain personnel hygiene and decontamination facilities that comply with the requirements of 29 CFR 1910.141 and contains, as a minimum, the following:
  - a. Boot and glove washing facility and boot rack for washed boots to drain.
  - b. Toilet facilities with at least one toilet and one hand basin for every six on-Site CONTRACTOR personnel. Remove and dispose of sanitary wastes off Site on a periodic basis as required and according to applicable Laws and Regulations
  - c. Tank(s) for washwater and necessary pumping and piping from the Personnel Decontamination Facility to the designated wastewater storage tanks.
  - d. Potable water and wastewater pumping and piping.

- e. Containers for storage of spent disposable personal safety and protective equipment.
- f. Refuse container(s).
- 2. Connect necessary pumping and piping to convey:
  - a. Washwaters from hand basins and decontamination pads to designated wastewater storage tanks.
  - b. Potable water from the potable water tank to facilities requiring running water.
- 3. Maintain the personnel hygiene and decontamination facilities and premises in a clean and sanitary condition.

**G. Emergency First-aid Facility:**

- 1. Comply with Specification 3 and the Health and Safety Plan.

**H. Access Roads:**

- 1. Permanent Roads: The base for permanent roads may be used for construction traffic. Avoid traffic loading beyond paving design capacity. Tracked vehicles are not allowed.
- 2. Maintenance and Use:
  - a. Maintain temporary access roads in a sound condition, properly graded, and free of ruts, washboard, potholes, ponding, ice, snow, mud, soft material, excavated material, construction equipment, and products. Maintain access roads throughout the Contract period to ensure unimpeded access for passenger automobiles as well as construction vehicles within the area under CONTRACTOR control.
  - b. Remove soil and mud from all vehicles, trucks, and equipment before exiting the Site.
  - c. Do not allow contamination of Holly Drive. Immediately remove any soil, debris or material on Holly Drive.
  - d. The ENGINEER may collect soil samples for chemical analyses from the traveling surfaces of constructed and existing access routes prior to, during, and upon completion of the work. Excavate and dispose of soil that should be

clean which has been contaminated by CONTRACTOR's activities, and supply and place clean replacement soil materials, all at no additional cost to the GROUP.

I. Parking:

1. Arrange for temporary surface parking areas to accommodate use of construction personnel. Temporary surface parking must be approved by the GROUP.
2. When Site space is not adequate, provide additional off-Site parking.
3. Designate two parking spaces for the ENGINEER.
4. Maintain separate parking area for construction equipment.

J. Traffic Regulation:

1. Flagpersons Equipment: As required by local jurisdictions.
2. Control construction vehicular parking to prevent interference with public traffic and parking, and access by emergency vehicles.
3. Monitor parking of construction personnel's vehicles within the area under contractor's control. Maintain vehicular access to and through parking areas.
4. Prevent construction parking on or adjacent to access roads or in non-designated areas.
5. Provide trained and equipped flagpersons to regulate traffic when construction operations or traffic encroach on public traffic lanes.
6. Provide signs, barricades, gatepersons, and other measures required to control traffic on the Site.
7. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
8. Consult with authority having jurisdiction; establish thoroughfares to be used for haul routes and Site access.
9. Confine construction traffic to designated haul routes.

10. Provide traffic control at critical areas of haul routes to regulate traffic and to minimize interference with public traffic.
11. Remove equipment and devices when no longer required.

## **5.3 Temporary Barriers and Enclosures**

### **K. Barriers:**

1. Provide barriers to prevent unauthorized entry to construction, Site office, and on-Site parking areas, and to protect existing facilities and adjacent properties from damage from CONTRACTOR's operations.
2. Protect vehicular traffic, stored materials, the Site, and structures from damage.
3. Prevent inadvertent access of unauthorized personnel to the area under CONTRACTOR's control.

### **L. Fencing:**

1. Construction: Yellow construction ribbon to mark the perimeter of the work area if necessary.
2. Enforce and require that workers and visitors observe and respect the limits marked with temporary fencing.
3. CONTRACTOR to temporarily remove fence along Holly Drive and on the east side of the facility (Figure 3-1 of the Work Plan). Following removal of the trees and brush from the Site, excavation from Sections 1 and 2b will be performed, with concurrent filling and consolidation within Section 2a. As such, in accordance with the Fence Management Plan, the City's fence along the southern portion of Section 2b (shown in blue-green on Figure 1-4) must be removed to allow for the removal of impacted soil to be excavated. In addition, the City's fence along the eastern side of the Site must be removed (shown in green on Figure 1-4) during filling and final grading. During the time that the eastern fence has been removed, temporary construction fence will be installed from the northeastern corner of the FRLLF to the City's fence that intersects the eastern fence approximately 90 feet south of that corner. In this way, the City property will be secure during all Site operations. The temporary fence is shown in orange on Figure 1-4.

4. When the cover over the consolidated waste has been installed, additional clean soil will be imported from the approved borrow area to provide fill for establishing the final grade. During that time, the fill will be spread and compacted so that it blends with the contours of the City's properties to the north and east of the FRLLF. Note that it may be necessary to temporarily remove a portion of the northern fence during the blending task. This is not expected, but if it is necessary, temporary fencing will be installed.
5. Upon completion of filling, grading and seeding of the Site, an Ohio licensed land surveyor will locate and mark the property boundaries, and the fences that were removed along the property boundaries during Site activities will be replaced. The temporary fences will be removed once the permanent fences have been replaced. The existing chain-link should be salvageable; however the poles will not be reusable. The contractor must include the cost of removing and replacing the fencing. Restore fence upon completion of work at locations specified by the ENGINEER.

M. Security:

1. Maintain security of the Site throughout the construction period until demobilization from the Site.
2. Restrict entrance of unauthorized persons and vehicles into the work area.
3. Allow entrance into the work area only to authorized persons with proper training and identification.
4. Do not allow cameras on the Site or photographs to be taken except by prior written approval of the GROUP or ENGINEER.
5. If unauthorized personnel are observed in the work area, notify the ENGINEER and, if so directed by the ENGINEER, call upon the appropriate Site security for proper legal actions.
6. Do not permit visitors to enter the work area without the express permission of the Health and Safety Officer and the ENGINEER.
7. Check that the perimeter fencing and warning signs are secure and intact on a daily basis; if deterioration of CONTRACTOR's barriers for the work is observed, or if warning signs are found to be removed, bring the situation to the attention of the ENGINEER and immediately rectify.



## **5.4 Temporary Controls**

**N. Water Control:**

1. Maintain excavations free of water.
2. Protect the Site from puddling or running water. Grade the Site to drain. Provide water barriers as necessary to protect the Site from soil erosion.
3. Prevent surface water runoff from leaving work areas.
4. Do not discharge decontamination water, or surface water runoff, or groundwater which may have come in contact with potentially contaminated material, off Site or to Site sewers.
5. Direct surface waters that have not contacted potentially contaminated materials to existing surface drainage systems.
6. Control surface drainage including ensuring that water is not directed across or over pavements or sidewalks except through approved pipes or properly constructed troughs, and runoff from unstabilized areas is intercepted and diverted to a suitable outlet.
7. Dispose of water in a manner not injurious to public health or safety, to property, or to any part of the work completed or under construction.
8. Provide, operate, and maintain necessary equipment appropriately sized to keep excavations, staging pads, and other work areas free from water.
9. Have on hand sufficient pumping equipment, machinery, and tankage in good working condition for ordinary emergencies, including power outage, and competent workers for the operation of the pumping equipment.
10. In the event of an apparent conflict between this specification and the Construction Storm Water Pollution Prevention Plan (CSWPPP), the CSWPPP takes precedence.

**O. Erosion and Sediment Control:** Install and maintain temporary erosion and sediment controls in accordance with the Construction Storm Water Pollution Prevention Plan and per the direction of the ENGINEER.

**P. Dust and Particulate Control:**

1. Execute the work by methods to minimize raising dust from construction operations.
2. Implement and maintain dust and particulate control measures immediately upon commencement of construction and throughout the project.
3. Provide positive means to prevent airborne dust from dispersing into the atmosphere. Use potable water and/or decontamination water for dust and particulate control during excavation, transportation and consolidation of excavated material. During placement of clean fill and/or cover material, only potable water is to be used for dust and particulate control.
4. Do not use chemical means for a water misting system for dust and particulate control without the ENGINEER's prior written approval.
5. As a minimum, use appropriate covers on trucks hauling fine or dusty material and use watertight vehicles/containers to haul wet materials.
6. Prevent dust from becoming a nuisance to adjacent properties and occupants.
7. The ENGINEER may stop work at any time when CONTRACTOR's control of dusts and particulates is inadequate for the wind conditions present at the Site, or when wind speed indicates that the release of fugitive dusts and particulates into the atmosphere equals or exceeds 15 knots (approximately 17 mph). After work is stopped due to a threshold wind speed exceedance, the ENGINEER must be immediately notified and a minimum of 15 minutes must pass without another threshold exceedance before work can resume. It will be at the sole discretion of the ENGINEER as to when work can resume after the minimum 15 minutes have passed.
8. In the event that CONTRACTOR's dust and particulate control is not sufficient for controlling dusts and particulates into the atmosphere, work shall be discontinued and a meeting held between the ENGINEER and CONTRACTOR to discuss the procedures that CONTRACTOR proposes to resolve the problem. Make all necessary changes to operations prior to resuming any excavation, handling, processing, or any other work that may cause a release of dusts or particulates.

Q. Pollution Control:

1. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by construction operations.

2. Be prepared to intercept, clean up, and dispose of spills or releases that may occur, whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible on Site.
3. Promptly report spills and releases potentially causing damage to the environment to the ENGINEER. If the ENGINEER is not immediately available, also report applicable spills and releases to having jurisdiction or an interest in the spill or release including any conservation authority, water supply authorities, drainage authority, road authority, and fire department.
4. Contact the manufacturer of the pollutant, if known, and ascertain the hazards involved, precautions required, and best measures to be used in any cleanup or mitigating action.
5. Take immediate action using available resources to contain and mitigate the effects on the environment and persons from any spill or release.

R. Equipment Decontamination:

1. Do not commence work involving equipment contact with potentially contaminated material until the decontamination facility/equipment is operational.
2. Decontaminate equipment after working in potentially contaminated areas, prior to subsequent work or travel on clean areas, and prior to demobilization.
3. Perform equipment decontamination on CONTRACTOR-constructed equipment decontamination pad.
4. At a minimum, perform the following steps during equipment decontamination:
  - a. Mechanically remove packed dirt, grit, and debris by scraping and brushing without the use of steam or high-pressure water to reduce the amount of water needed and to reduce the amount of contaminated rinsate generated.
  - b. Use high-pressure, low-volume, hot water or steam supplemented by detergents if appropriate. For vehicles in which only tires are required to be

deconed to prevent soil and contaminant trackout, only high-pressure and low-volume potable water at any temperature is needed.

- c. Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages.
  - d. Scrub surfaces with long handle scrub brushes and a cleaning agent.
  - e. Rinse off and collect cleaning agent.
  - f. Air dry equipment in the Clean Zone before removing from the Site or travel on clean areas.
  - g. Perform an assessment to determine the effectiveness of the decontamination and verbally report results to the ENGINEER.
5. Each piece of equipment may be inspected by the ENGINEER after decontamination and prior to removal from the Site and/or travel on clean areas. The ENGINEER will have the right to require additional decontamination to be completed if deemed necessary.
  6. Take appropriate measures necessary to minimize the drift of mist and spray during decontamination including the provision of wind screens.
  7. Collect decontamination wastewaters and sediments which accumulate on the equipment decontamination pad. Transfer wastewaters to designated wastewater storage tank.
  8. Transfer sediments to Section 2a for consolidation prior to applying clean cover.
  9. Furnish and equip personnel engaged in equipment decontamination with protective equipment including suitable disposable clothing, respiratory protection, and face shields.
  10. Maintain piping and connections in good condition and leak-free.

## **5.5 Removal of Temporary Facilities and Controls**

- A. Remove temporary utilities, equipment, facilities, materials, prior to the final Site inspection to be performed by the ENGINEER.
- B. Remove underground installations to a minimum depth of 2 feet.

- C. Clean and repair damage caused by installation or use of temporary work.

**END OF SECTION**

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## **Specification 6 Excavation**

### **6.1 Definitions**

- A.     Excavation: Removal of materials of whatever nature encountered, whether wet, frozen or otherwise, including dense tills, hardpan, frozen materials, cemented materials, concrete fragments, asphalt pavement, boulders or rock fragments, and weathered rock which can be removed by ripping or excavating with heavy-duty mechanical construction equipment without drilling and blasting.
- B.     Excavation Limits: Approximate horizontal limits of excavation (shown on Figure 3-2 of the IA Work Plan) to two feet below ground surface or as directed by ENGINEER
- C.     Additional Excavation: Excavation beyond initial excavation limits either aerially or in depth, as directed by the ENGINEER following observation of soil

### **6.2 Coordination**

- D.     Coordinate and sequence excavation operations to maintain efficiency of other site operations, including, backfill of excavations, stockpiling of excavated material, transportation of excavated material to Section 2a for consolidation, and covering. Keep the time during which excavations remain open to the practicable minimum.

### **6.3 Scheduling**

- E.     Do not allow or cause any of work performed to be covered up or enclosed prior to required inspections, tests, or approvals.
- F.     Advise the ENGINEER a minimum of 48 hours in advance of excavation operations to enable the ENGINEER to layout excavation areas and mark any existing monitoring well locations that require protection.
- G.     Allow the ENGINEER 5 work days for processing of analytical samples and receipt and evaluation of data. Schedule excavation activities accordingly.

## **6.4 Surveying**

- H. The ENGINEER will provide a topographic survey of the Site prior to start of work, following excavation and consolidation, and following final grading. The ENGINEER will also mark the corners of the Site property boundaries and Sections 1, 2a, and 2b prior to the start of work. The CONTRACTOR will provide all other surveying throughout the work as necessary to ensure adequate horizontal and vertical control of the required work is achieved.

## **6.5 Ambient Conditions**

- I. Discontinue excavation activities and consult with ENGINEER if groundwater is encountered.
- J. Protect open excavating against damage due to surface runoff and run on. Take necessary precautions to prevent erosion of excavated or disturbed surfaces.
- K. Suspend operations whenever climatic conditions may detrimentally affect control of excavated material and may cause cross-contamination of site soil.
- L. After occurrence of heavy rains, do not operate equipment on approved excavations until the material has dried sufficiently to prevent occurrence of excessive rutting.
- M. Decontaminate equipment involved in excavation activities which may have come in contact with potentially contaminated material before being removed from the Site or being relocated to clean areas of the Site.
- N. Do not obstruct flow of surface drainage or natural watercourses.

## **6.6 Preparation**

- O. Private underground utilities in Section 1 will be abandoned by the owner prior to earthwork. The gas line in Section 1 will be abandoned by Columbia Gas prior to earthwork.
- P. Obtain clearances of existing underground utilities and provide documentation.
- Q. Locate, identify, and protect known utilities from damage. Confirm locations of buried utilities, depth of buried utilities and structures by careful test excavations or other suitable means. Remove utility poles and lines, as required by the GROUP or ENGINEER.

- R. Complete a non-intrusive utility survey to the American Society of Civil Engineers (ASCE) Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data , CI/ASCE 38-02 Quality Level B standard to identify the potential presence and depth of unknown utilities within the area under CONTRACTOR control. Locations of known utilities are presented on Figure A-1 of the IA Work Plan. Additional utilities lines may be present in the subsurface other than those shown on Figure A-1.
- S. Abandon the storm water sewer leading north from the catch basin near the southwest corner of Section 2b. During remedial activities at the Site, the catch basin will be sealed.
- T. Maintain and protect from damage bench marks and survey control points, wells, utilities, surface features, and structures encountered, and not designated for demolition or removal. In the event of disturbance of or damage to any such well, utility, surface features, or structures, immediately notify the ENGINEER. Repair or replace if needed any well, utility, surface feature, or structure damaged by CONTRACTOR operations unless specified for demolition or removal.
- U. Protect excavations from contamination.
- V. If CONTRACTOR believes that temporary well or utility disturbance is necessary, consult with the ENGINEER before moving or otherwise disturbing wells or utilities.
- W. Remove surface features or obstructions including, but not necessarily limited to, concrete pads, asphalt, tree root balls, shrubs, bush, and other vegetation from surfaces to be excavated, within the limits shown on Figure 3-2 of the IA Work Plan. Dispose of such obstructions at licensed off-Site disposal or recycling facilities. Soil from tree root balls will be cleaned/decontaminated as described in the IA Work Plan.

## **6.7 Excavating**

- X. The concrete driveways and mobile home piers, etc. in Section 1 of the Site are to be removed, decontaminated, and transported to a cement/concrete facility for recycling. All soil must be removed from the concrete prior to it being placed in trucks for transport to the recycling facility.
- Y. Remove debris and other obstructions encountered.
- Z. Notify the ENGINEER of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

- AA. Hand trim, make firm, and remove loose material and debris from excavations. Where natural or fill material at the bottom of excavation, is disturbed, compact disturbed soil to density at least equal to undisturbed soil or to the density specified for the succeeding layer of backfill, whichever is greater.
- BB. Maintain and protect from damage groundwater monitoring wells, utilities, and structures encountered. In event of disturbance or damage to well, utility, or structure, immediately notify ENGINEER. Repair or replace well, utility, or structure damaged by CONTRACTOR operations.
- CC. Protect groundwater monitoring wells and other structures and pipelines from uplift and displacement or disturbance during excavation operations.
- DD. Open excavations shall be CONTRACTOR's sole responsibility.
- EE. Excavate to the depths and dimension as shown on attached Figure 3-2 of the IA Work Plan. and as directed by the ENGINEER. An area of approximately 115,000 ft<sup>2</sup> will be excavated to a depth of 2 feet bgs. A volume of approximately 9,100 cubic yards (8,270 cubic yards plus approximately 10% contingency) will be excavated and transported to Section 2a.
- FF. Additional excavation will be completed depending on verification results and consolidated in Section 2a.
- GG. Perform excavation in such a manner that only the excavation bucket and boom contacts contaminated materials.
- HH. Maintain excavation depth tolerances. Excavation in excess of specified limits shall be considered unauthorized over-excavation unless prior written approval for such excess excavation is obtained from the ENGINEER.
- II. Schedule excavation activities in such a manner that access is available to any excavation area for additional excavation. In returning to an area for additional excavation, comply with previously specified access route restrictions.
- JJ. Decontaminate excavation equipment periodically including when visibly contaminated or when moving from a significantly contaminated area to one of lesser contamination for excavation work. Decontaminate equipment prior to performing additional excavation in an excavation previously left open pending sampling and analysis by the ENGINEER. Additional decontamination may be required if needed in the judgement of the ENGINEER.

## **6.8 Protecting Clean Soil from Contamination**

- KK. Notify the ENGINEER if soil at the bottom of the excavation appears to be visibly contaminated and proceed as directed by the ENGINEER.
- LL. Prevent contamination of adjacent clean soil.
- MM. Place plastic sheeting and plywood, if necessary, under excavation equipment and alongside the excavation to prevent contaminated soil from being mixed with surrounding clean soil. If CONTRACTOR believes it needs to use other means, consult with the ENGINEER. Do not mix excavated soil with imported materials.
- NN. Load contaminated soil and materials directly into transport vehicles and transport to Section 2a.
- OO. Decontaminate excavation equipment after handling contaminated materials and prior to handling clean overburden.

END OF SECTION

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## **Specification 7**

### **Fill**

#### **7.1 References**

A. Definitions:

1. SMDD: Standard Maximum Dry Density and in the context of this Contract means the maximum dry unit weight determined according to ASTM D698.

B. Reference Standards:

1. ASTM International:
  - a. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.  
ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
  - b. ASTM D2216 - Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
  - c. ASTM D2974 - Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
  - d. ASTM D4972 - Standard Test Method for pH of Soils.
  - e. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

#### **7.2 Scheduling**

- C. Do not allow or cause work performed to be covered up or enclosed prior to required inspections, tests, or approvals.

#### **7.3 Submittals**

- D. Excavation and Fill Plan: Within 14 calendar days after the date of the notice to proceed and no later than 10 calendar days prior to mobilization to the Site, submit a detailed Excavation and Fill Plan demonstrating compliance with specified requirements and to allow ENGINEER to schedule sampling activities. Include written procedures, schedules, and drawings as applicable and, at a minimum, address each of the following items:

1. Methods and procedures to be used to perform excavation, transport, backfilling, compacting, and grading.
  2. Sequencing and scheduling of activities, including allowances for time required for sampling and analysis by the ENGINEER.
  3. Sequencing and layout of access routes to and from excavation and fill areas.
  4. Methods and procedures to be used to perform additional excavation in open excavations.
  5. Anticipated crew sizes and number and types of equipment, on a weekly basis.
  6. Utilities to be rerouted or protected. Describe methods of rerouting and protecting.
  7. Methods for locating and verifying depth of utilities within the proposed excavation limits
  8. Methods of monitoring movement of adjacent structures.
- E.      Compaction Testing Reports: At the end of each work day, submit compaction testing reports certifying compliance with specified requirements.
- F.      Suppliers' Certificates: Submit certificate or laboratory data indicating that each type of imported fill material meets or exceeds specified requirements.
- G.      Weigh Tickets: At the end of each work week, submit delivery weigh tickets of imported fill materials delivered to the Site. Within 7 calendar days, submit weigh tickets of wastes disposed off Site.
- H.      Field Quality Control: Submit field data on same day testing is performed. Submit laboratory data within 24 hours of completion of test.
- I.      Qualification Statements:
1. Independent Geotechnical Testing Firm: Within 14 calendar days of the notice-to-proceed and at least 10 calendar days prior to commencing transport of soil materials to the Site, submit name and qualifications of independent geotechnical testing firm to provide geotechnical testing services for work of this specification.
  2. Independent Analytical Laboratory: At least 14 days prior to commencing transport of soil or aggregate materials to the Site location, submit name and qualifications of independent testing laboratory to provide chemical analysis for work of this specification.

## 7.4 Qualifications

- J. Geotechnical Testing Firm: Company specializing in performing work of this specification and complying with ASTM D3740 to perform testing of fill materials including density, moisture content, permeability, and particle size analysis for both soil and aggregate samples, as necessary.
- K. Independent Testing Laboratory: Company specializing in performing work of this specification to perform chemical analysis of fill material samples.

## 7.5 Delivery, Storage, and Handling

- L. Deliver, handle, and transport fill materials in a manner and with equipment that will prevent intermixing of soil or contamination.
- M. Minimize stockpiling requirements. Transport material from source directly to final position where possible.

## 7.6 Ambient Conditions

- N. Suspend operations whenever climatic conditions, as determined by the ENGINEER, are unsatisfactory for placing fill to the requirements of this specification.
- O. Do not operate equipment on approved excavations after heavy rain until material has dried sufficiently to prevent excessive rutting.

## 7.7 Materials

- P. Imported from an approved source.
- Q. Free of unsuitable materials including:
  - 1. Frozen material or material containing snow or ice.
  - 2. Trees, stumps, branches, roots, or other wood or lumber.
  - 3. Wire, steel, cast iron, cans, drums, or other foreign material.
  - 4. Materials containing hazardous or toxic constituents at hazardous or toxic concentrations.
- R. Must meet Ohio EPA Voluntary Action Program standards for residential land use.

- S. Compactable to specified density at specified moisture content.

## 7.8 Common Fill

- T. Type S1 – Imported Backfill: Clean excavated soil, free of organics including roots, weeds, topsoil, foreign material, and stones greater than 3 inches; in-situ moisture content less than 10 percent; and approved by the ENGINEER.
- U. Type S2 - Imported Backfill: Clean imported soil that has a minimum clay content of at least 15%, with no material sized greater than 3 inches; no topsoil or deleterious material; and approved by the ENGINEER.
- V. Type S3 – Imported Topsoil: Clean imported topsoil to be used to establish a vegetative cover, and approved by ENGINEER. The topsoil shall contain between 4 percent and 20 percent organic matter as determined by loss on ignition of samples oven dried to constant weight at 212° F (100° C) and consist of fertile, loose, friable, and loamy material that contains humus material. For topsoil to be considered loamy, ensure that the fraction passing the No. 10 (200) sieve does not contain more than 40 percent clay. Test topsoil according to AASHTO T 267.

## 7.9 Source Quality Control

- W. Testing and Analysis of Common Fill Soil Type S1:
1. Maximum Dry Density and Optimum Moisture Content, ASTM D698. One sample per 1,000 cu yd or portion thereof of material required.
  2. In place Moisture Content, ASTM D2216: One sample per 1,000 cu yd or portion thereof of material required.
  3. Grain Size, ASTM D422: One sample per 1,000 cu yd or portion thereof of material required.
- X. Testing and Analysis of Common Fill Soil Type S3:
1. pH, ASTM D4972: One sample per 500 cu yd or portion thereof of topsoil required.
  2. Organic Matter, ASTM D2974: One sample per 500 cu yd or portion thereof of topsoil required.
  3. Grain Size, ASTM D422: One sample per 500 cu yd or portion thereof of material required.
- Y. Chemical Characterization: Ten samples per source of S2 type of imported fill and five samples per source of topsoil; according to the following methods:

<b>Parameter</b>	<b>Analysis (EPA SW-846)</b>
VAP Volatile Organic Compound	8260B
VAP Polycyclic Aromatic Hydrocarbons (PAHs)	8270C
Organochlorine Pesticides	8081A
Herbicides	8151A
RCRA Metals	6010B/7471A
Cyanide	9012A

- Z. If tests indicate materials do not meet specified requirements, change material or material source and retest.
- AA. Provide materials of each type from the same source throughout the work.
- BB. In the event of changes to approved sources of materials during performance of the work, immediately advise the ENGINEER of revised locations and obtain approval of such locations and materials prior to use in the work.
- CC. Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

## 7.10 Preparation

- DD. Remove debris, snow, ice, water, soft soils, organic materials, or frozen ground from areas to be backfilled.
- EE. Decontaminate equipment which has handled contaminated or potentially contaminated material at the decontamination area prior to being used for backfilling operations.
- FF. Notify the ENGINEER of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- GG. Maintain and protect existing utilities designated to remain.
- HH. Obtain direction from ENGINEER before moving or otherwise disturbing utilities or structures.



- II. Protect benchmarks, survey control points, hydrants, structures, fences, paving, and curbs from equipment and vehicular traffic.
- JJ. Maintain and protect from damage groundwater monitoring wells, utilities, and structures encountered. In event of disturbance or damage to well, utility, or structure, immediately notify the ENGINEER. Repair or replace well, utility, or structure damaged by CONTRACTOR operations.
- KK. Protect groundwater monitoring wells and other structures and pipelines from uplift and displacement or disturbance during work.

## 7.II Backfilling

- LL. Obtain approval from the ENGINEER for completed excavations and previously placed material prior to placement of successive lifts of fill materials.
- MM. Do not cause excavations to be backfilled until ENGINEER has approved excavation as complete.
- NN. Remove debris or water from areas to be backfilled.
- OO. Ensure areas to be backfilled are free from debris, snow, ice, water, soft soils, organic materials, or frozen ground.
- PP. If necessary, proof roll subgrade surface to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.
- QQ. Backfill excavated areas (Section 1 and 2b) with common fill (S1) to within 2 inches of the surrounding ambient ground surface.
- RR. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- SS. Before placing topsoil or seed remove rock or other foreign material of 3 inches (75 mm) or greater in any dimension, from all areas.
- TT. Place topsoil in loose lifts of at least 2 inches in depth. The surface of the topsoil shall be such that the final grade as shown on the final grading plan is met.
- UU. Track the area with a dozer to compact and provide good contact between the topsoil and the underlying fill.

## 7.12 Compaction

- VV. Install both excavated soil and common fill in five to seven inch loose lifts and compact with at least three passes of suitable equipment to the satisfaction of the ENGINEER. If the excavated soil fill material cannot be properly compacted, it may be necessary to install structural matting to facilitate proper compaction. Prior to placing fill over existing ground, scarify/disc surface to depth of one to two inches. Maintain fill and existing surface at approximately same moisture content to facilitate bonding
- WW. Common Fill: Compact to 95 percent SMDD. The CONTRACTOR will be responsible for compaction testing at a frequency of one test per 4,000 square feet of fill material placed per lift. If the testing indicates unsatisfactory compaction, the contractor will provide the additional compaction to obtain the specified degree of compaction at no additional cost.
- XX. Apply potable water as necessary during compaction to obtain specified density. If material to be compacted is excessively moist, aerate with suitable equipment and method until moisture content is corrected. In areas not accessible to rolling equipment, compact material to specified density using mechanical tamper. Supply and pay for water.
- YY. When soil is wetted by sprinkling, do not direct jets of water at fill with such force that finer materials will be washed out.
- ZZ. Compaction Equipment: Use type, size, and efficiency of compaction equipment capable of achieving specified degree of compaction. When operating equipment adjacent to and immediately above structures, avoid causing damage or displacement of structure.

## 7.13 Grading

- AAA. Following completion of the consolidation and compaction of waste in Section 2a, prepare a final grading plan. The final grading plan is due to the ENGINEER within 7 days of completing the excavation, consolidation of the waste, and receipt of the final elevations of waste from the land surveyor.
- BBB. Grade to levels, profiles, and contours to match elevations in final grading plan.
- CCC. Prior to placing fill over existing ground, scarify/disc surface to depth of one to two inches. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

## 7.14 Surplus Material

- DDD. Remove surplus material and material unsuitable for fill as directed by the ENGINEER.

## 7.15 Tolerances

- EEE. Top Surface of Exposed Subgrade: Plus or minus 2 inches from required elevations
- FFF. Top Surface of topsoil finishing layer: Plus or minus 1 inch from required elevations.

## 7.16 Field Quality Control

- GGG. Testing by ENGINEER:
1. The ENGINEER may select samples of uncompacted fill intended for the work.
  2. The ENGINEER may perform quality assurance tests in the field and in the laboratory on samples of backfill to determine if materials meet specification.
  3. Testing by the ENGINEER will in no way relieve CONTRACTOR of responsibility to test all material prior to notifying the ENGINEER of materials' suitability for the work involved.
- HHH. Methods of Testing by the CONTRACTOR:
1. Bulk wet density will be determined in the field according to ASTM D6938.
  2. Moisture content will be determined in the field according to ASTM D6938.

## 7.17 Adjusting

- III. Correct surface irregularities by loosening and adding or removing material until the surface is within specified grade.
- JJJ. Leave work areas in a properly graded condition sloped as required to permit proper drainage and free of depressions that will pond or collect water or debris that will restrict flow.

END OF SECTION

## **Specification 8 Hydroseeding**

### **8.1 Summary**

This work consists of placing topsoil, preparing the seed bed, and placing and incorporating seed, agricultural lime, commercial fertilizer, and placing mulching material used to achieve NPDES permit final stabilization.

Perform this work in areas shown on the Figure 3-2 of the IA Work Plan for seeding and mulching.

Perform seeding and mulching after completing all work in the area and within the schedule identified within the Construction Storm Water Pollution Prevention Plan (Appendix B of the IA Work Plan). If it is anticipated that future work may disturb an area, place temporary NPDES-compliant structures as needed until final stabilization measures under this specification can be installed. If the Contractor disturbs a final area, then the Contractor shall restore this area. With the Engineer's approval, the Contractor may apply permanent seed between March 1 and October 30 on projects started and completed within the same calendar year.

### **8.2 Scheduling**

- A. Do not allow or cause work performed to be covered up or enclosed prior to required inspections, tests, or approvals.

### **8.3 Ambient Conditions**

- B. Suspend operations whenever climatic conditions, as determined by the ENGINEER, are unsatisfactory for proper seeding operations.
- C. Do not operate equipment on approved excavations after heavy rain until material has dried sufficiently to prevent excessive rutting.

### **8.4 Materials**

- D. Imported from an approved source.
- E. Free of unsuitable materials including:

1. Frozen material or material containing snow or ice.
2. Trees, stumps, branches, roots, or other wood or lumber.
3. Wire, steel, cast iron, cans, drums, or other foreign material.
4. Materials containing hazardous or toxic constituents at hazardous or toxic concentrations.

## **8.5 Seeding Method**

- F. Apply seed to prepared areas using hydroseeding techniques. If the prepared areas to be seeded become compacted before seeding, loosen the surface using disks, rakes, or other methods.
- G. All seed shall be fresh, new seed. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. Prior to seeding at the request of the GROUP and ENGINEER, the contractor shall provide a letter of certification and the original Association of Official Seed Analysts (AOSA) seed test results.
- H. Equipment used for application of slurry shall be a commercial-type Hydro-Seeder and have a built-in agitation system with an operation capacity sufficient to agitate, suspend and homogeneously mix slurry. Tank capacity shall be a minimum of 1,500 gallons and shall be mounted on a truck to allow access to the site. Distribution Lines: Large enough to prevent stoppage and allow for even distribution of slurry over the site. Pump: Shall be able to generate 150 psi at the nozzle.
- I. Mulch shall be composed of cellulose or wood fiber products with no growth or germination inhibiting substances, and shall be manufactured in such a manner that when thoroughly mixed with seed, fertilizer, organic stabilizer, and water, in the proportions specified, will form homogeneous slurry which is capable of being sprayed to form a porous mat. The fibrous mulch in its air-dry state shall contain no more than 15% by weight of water. The fiber shall have a temporary green dye and shall be accompanied by a certificate of compliance stating that the fiber conforms to these specifications.
- J. Fertilizer shall be a starter derived from urea formaldehyde (N-P-K 6-24-24) and conform to the requirements of the Ohio Department of Agriculture.



## **8.6 Hydroseeding Preparation**

K. Perform all slurry preparation at the job site:

1. Water, mulch, fertilizer, binder and other ingredients shall be added to the tank simultaneously so that the finished load is a homogenous mix of the specified ingredients.
2. Seed shall be added last and shall be discharged within 2 hours. Loads held over 2 hours will be recharged with an additional  $\frac{1}{2}$  the seed rate before application.
3. Once fully loaded, the complete slurry shall be agitated for 3-5 minutes to allow for uniform mixing.
4. All hydro seed applications are to be applied in a sweeping motion to form a uniform application and form a mat at the specific rates.

## **8.7 Native Grasses and Wildflowers**

- L. Table 2 lists the seed quantities by weight per area. Use Classes 4, 5, and 6 in the amounts of pure live seed (PLS) for each species listed. If seed tests show that the seed has an actual pure live seed (PLS) yield less than the intended yield, adjust the specified quantity to provide the intended PLS yields.
- M. For Class 4, 5, and 6 mixtures, provide seed specifically grown for the Ohio climate. Seed wildflower classes 5 and 6 from September 1 to October 30, unless the Engineer allows seeding at other times. Seed class 4 wildflowers from March 1 to May 31.

## **8.8 Repair Seeding and Mulching**

- N. Following germination of the seed, areas lacking germination larger than 8 inches by 8 inches (20 cm by 20 cm) must be reseeded. Repair all damage or erosion of the seeded and mulched areas before the completion of the project.
- O. Rework or reshape slopes, and bring in additional material, as necessary, using whatever equipment is necessary to restore slopes to grade. Seed and mulch repaired areas according to this specification.

## **8.9 Performance**

- P. The ENGINEER will inspect all seeded areas no earlier than 3 months and no later than 6 months after final seeding. For any area identified without a uniform density of at least 70 percent cover, repair seeding and mulching will need to be accomplished at no extra cost.

END OF SECTION

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**Table 2. Grass and Wildflower Seed Mixes, Former Ray Lewis Landfill, Marysville, Ohio**

Class	Mix Type Seeds	Weight per Area	
		lb/1000 ft2	kg/1000 m2
4A	Native Grass Mixture		
	Use for slopes flatter than 2:1 and seeding for wildlife habitat mitigation.		
	Big Bluestem (Andropogon gerardii)	0.07	0.34
	Indiangrass (Sorghastrum nutans)	0.09	0.44
	Switchgrass (Panicum virgatum)	0.02	0.09
	Annual Ryegrass (Lolium multiflorum) spring	0.11	0.54
	fall	0.34	1.66
4B	Low Growing Native Grass Mixture		
	Use for slopes flatter than 2:1 and seeding for wildlife habitat mitigation when low growing species are required.		
	Little Bluestem (Schizachyrium scoparium)	0.18	0.88
	Sideoats Grama (Bouteloua curtipendula)	0.04	0.19
	Prairie Dropseed (Sporobolus heterolepis)	0.04	0.19
	Annual Ryegrass (Lolium multiflorum) spring	0.11	0.54
	fall	0.34	1.66
5A	Annual and Perennial Wildflower Mixture		
	Use for slopes flatter than 2:1 and seeding for wildlife habitat mitigation.		
	Annual Mixture		
	Do not exceed 25% by weight of any one of the following species:		
	Corn Poppy (Papaver rhoeas)	0.07	0.34
	Cosmos (Cosmos bipinnatus)		
	Yellow Cosmos (Cosmos sulphureus)		
	Cornflower (Centaurea cyanus)		
	Rocket Larkspur (Delphinium ajacis)		
	Indian Blanket (Gaillardia pulchella)		
	Perennial Wildflower Mixture		
	Common Milkweed (Asclepias syriaca); vernalized	0.001	0.005
	Swamp milkweed (Asclepias incarnata); vernalized	0.001	0.005
	Do not exceed 50% by weight PLS of any one of the following species:		
	Black-eyed Susan (Rudbeckia hirta)	0.28	1.37
Purple Coneflower (Echinacea purpurea)			
Lance-leaved Coreopsis (Coreopsis lanceolata)			
	Native Wildflower and Grass Mixture		
	Use for slopes flatter than 2:1 and seeding for wildlife habitat mitigation.		
	Native Wildflower Mixture		
	Do not exceed 10% by weight PLS of any one of the following species:		
	Common Milkweed (Asclepias syriaca)	0.001	0.005
	Swamp milkweed (Asclepias incarnata)	0.001	0.005
	Butterfly-weed (Asclepias tuberosa)	0.34	1.66
	New England Aster (Aster novae-angliae)		
	Partridge Pea (Cassia fasciculata)		
	Purple Coneflower (Echinacea purpurea)		
	Rattlesnake Master (Eryngium yuccifolium)		

**Table 2. Grass and Wildflower Seed Mixes, Former Ray Lewis Landfill, Marysville, Ohio**

Class	Mix Type Seeds	Weight per Area	
		lb/1000 ft2	kg/1000 m2
5B	Ox-eye Sunflower ( <i>Heliopsis helianthoides</i> )		
	Wild Bergamot ( <i>Monarda fistulosa</i> )		
	Greyhead Coneflower ( <i>Ratibida pinnata</i> )		
	Orange Coneflower ( <i>Rudbeckia fulgida</i> )		
	Prairie Dock ( <i>Silphium terebinthinaceum</i> )		
	Whorled Rosinweed ( <i>Silphium trifoliatum</i> )		
	Stiff Goldenrod ( <i>Solidago rigida</i> )		
	<i>Grass Mixture</i>		
	Big Bluestem ( <i>Andropogon gerardii</i> )	0.046	0.22
	Little Bluestem ( <i>Schizachyrium scoparium</i> )	0.069	0.34
	Indiangrass ( <i>Sorghastrum nutans</i> )	0.023	0.11
	Annual Ryegrass ( <i>Lolium multiflorum</i> )	0.92	4.49
6	Wildlife Mixture		
	Use for slopes flatter than 2:1 and seeding for wildlife habitat mitigation.		
	Big Bluestem ( <i>Andropogon gerardii</i> )	0.13	0.63
	Little Bluestem ( <i>Schizachyrium scoparium</i> )	0.18	0.88
	Indiangrass ( <i>Sorghastrum nutans</i> )	0.13	0.63
	Ox-eye Sunflower ( <i>Heliopsis helianthoides</i> )	0.18	0.88
	Prairie Dock ( <i>Silphium terebinthinaceum</i> )	0.18	0.88
	Purple Coneflower ( <i>Echinacea purpurea</i> )	0.18	0.88
	Whorled Rosinweed ( <i>Silphium trifoliatum</i> )	0.11	0.54
	Downy Sunflower ( <i>Helianthus mollis</i> )	0.07	0.34
	New England Aster ( <i>Aster novae-angliae</i> )	0.07	0.34
	Annual Ryegrass ( <i>Lolium multiflorum</i> ) spring	0.11	0.54
	fall	0.34	1.66
	Temporary Erosion Control Mixture		
7	Annual Ryegrass ( <i>Lolium multiflorum</i> )	2.02	9.86
	Fawn Tall Fescue ( <i>Festuca arundinacea</i> )	3	14.64

K:\CCA\PROJECTS\Ray Lewis Landfill\Remedial Action\Remedial Action Work Plan\Appendices\App D Specifications\Table 2 seeding specification.xlsx]Table 2 Seeding

**Bid Request Scope of Work – Cost Matrix**  
**Former Ray Lewis Landfill Site Remediation Project**

*Page 1 of 2*

<b>Item</b>	<b>Unit Cost*</b>	<b>Units</b>	<b>Total Cost Per Item</b>	<b>Comments</b>
Premobilization, mobilization, demobilization, and HASP		1		
Development of the final grading plan		1		
Construction (or mobilization) of temporary tire wash/equipment decon pad and personnel decon pad		1 lump sum		
Abandonment of storm sewer		1 lump sum		
Installation and maintenance of storm water controls		1 lump sum		
Chain link fence removal (1270 lf) and reinstallation (850 lf), installation of temporary fence		1 lump sum		
Installation of weather station		1 lump sum		
Excavation and movement of soil from Sections 1 and 2b		9100 CY		
Placement and compacting of excavated soil in Section 2a		9100 CY		
Geotechnical laboratory costs for testing of common fill soil type S2		10 samples		
Geotechnical laboratory costs for testing of topsoil		7 samples		
Analytical Laboratory costs for chemical quality testing of common fill soil type S2		15 samples		
Transportation, backfill, compaction, testing, and grading of Sections 1 and 2b with common fill soil type S2		9100 CY		
Transportation, backfill, compaction, testing, and grading of Sections 1 and 2b with common fill soil type S2		8600 CY		



**Bid Request Scope of Work – Cost Matrix (continued)**  
**Former Ray Lewis Landfill Site Remediation Project**

*Page 2 of 2*

Item	Unit Cost	Units	Total Cost Per Item	Comments
Transportation and placement of imported soil type S3 (topsoil)		660 CY		
Hydroseeding		5.1 acre		
Routine dust suppression, road cleaning, and equipment decontamination		1 lump sum		
<b>Total</b>				

Item	Unit Cost	Units	Total Cost Per Item	Comments
Removal, cleaning and recycling of concrete		Per ton		
Removal, cleaning and recycling of asphalt		Per ton		
Removal, cleaning and offsite management of rootballs		Per ton		
Testing and management/disposal of decon/washwater				
<b>Total</b>				

*\*Pricing must be valid through December 1, 2017. If unit costs will be different for actual number of units that are greater or less than assumed, specify in comments section or as separate attachment.*

**Estimated number of days on site:** \_\_\_\_\_

**Submitted by:** \_\_\_\_\_

**Signed:** \_\_\_\_\_ **(printed name):** \_\_\_\_\_

**Bid Request Scope of Work – Source Location  
Former Ray Lewis Landfill Site Remediation Project**

**Submitted by:** \_\_\_\_\_

**Signed:** \_\_\_\_\_ **(printed name):** \_\_\_\_\_

Concrete recycling facility:

\_\_\_\_\_

Asphalt recycling facility:

\_\_\_\_\_

Root ball composting/disposal facility:

\_\_\_\_\_

Laboratory selected for analytical testing of the imported soil:

\_\_\_\_\_

Laboratory selected for geotechnical testing of the imported soil:

\_\_\_\_\_

Source(s) of common fill soil type S2:

\_\_\_\_\_

Source(s) of common fill soil type S3 (topsoil):

\_\_\_\_\_

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# Appendix D

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Health and Safety Plan (HASP)

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**Health and Safety Plan,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio**

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June 23, 2017

Prepared by:

Cox-Colvin & Associates, Inc.  
7750 Corporate Blvd.  
Plain City, Ohio 43064  
(614) 526-2040



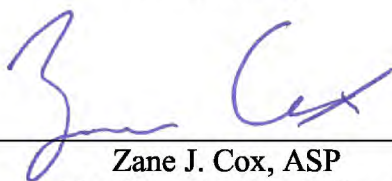
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**Health and Safety Plan,  
Former Ray Lewis Landfill Site,  
Marysville, Ohio**

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June 23, 2017

Submitted by:



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Zane J. Cox, ASP  
Health and Safety Officer  
Staff Scientist



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## Attachments

A	Safety Data Sheets (SDSs) for Compounds Known or Potentially Found in Environmental Media
B	Naturally Occurring Asbestos: Approaches for Reducing Exposure
C	Directions to Hospital from the Former Ray Lewis Landfill Site

## **List of Abbreviations**

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
CFR	Code of Federal Regulations
CO	carbon monoxide
eV	electron Volts
H <sub>2</sub> S	hydrogen sulfide
H&S	Health and Safety
HASP	Health and Safety Plan
IDLH	Immediately Dangerous to Life and Health
JSA	job safety analysis
LEL	Lower Explosive Limit
SDS	Safety Data Sheet
NIOSH	National Institute of Safety and Health
O <sub>2</sub>	Oxygen
OAC	Ohio Administrative Code
OUPS	Ohio Utilities Protection Service
OSHA	Occupational Safety and Health Administration
PAH	Poly-Aromatic Hydrocarbon
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PPE	Personal Protective Equipment
ppm	part per million
SHSO	Site Health and Safety Officer
SOP	Standard Operating Procedures
TWA	Time Weighted Average
VOC	Volatile Organic Compound

## **I.0 Introduction**

This site-specific Health and Safety Plan (HASP) has been developed to identify, assess and provide means to avoid or ameliorate potential health and safety issues during the implementation of the Interim Action (IA) at the Former Ray Lewis Landfill [(Site) (Figure 1-1)]. The purpose of the HASP is to provide information and procedures to be used by project team(s) to protect the health and safety of Site workers during the IA. This document addresses those items specified under Code of Federal Regulations (CFR) 29, number 1910.120 (b) Final Rule. Additional details concerning chemical exposure are based on the National Institute for Occupational Safety and Health (NIOSH) guidance and the results of the previous sampling events conducted by Cox-Colvin & Associates, Inc. (Cox-Colvin) personnel.

The IA will result in the excavation and consolidation of contaminated soil onsite and the restoration of the excavated areas through backfilling and establishment of a vegetative cover. The Site has been broken into three sections. Section 1 is the portion of the Site that comprises former mobile home lots along the east side of Cypress Drive. Section 2a is the northern portion of the former Ray Lewis Landfill. Section 2b is the southern portion of the former Ray Lewis Landfill. The trees and shrubs at the Site will be removed prior to excavation. During the excavation phase, two feet of soil in Sections 1 and 2b will be excavated and consolidated in Section 2a. Clean fill will be used to backfill the excavations and consolidated waste. The entire Site will be seeded to establish a vegetative cover. Details of the scope can be found in the IA Work Plan.

Surface soils (0-2 feet in depth) at the Site contain measurable quantities of vermiculite, chlordane, heptachlor, and heptachlor epoxide. Some concentrations of chlordane, heptachlor and heptachlor epoxide exceed their respective Ohio EPA VAP generic direct contact standards for residential land use. Vermiculite may contain asbestos fibers.

In groundwater beneath the Site, arsenic, atrazine, benzene, 4-chloroaniline, 1,2,4-trimethylbenzene, benzene, naphthalene, and trichloroethene, were detected at concentrations exceeding their respective VAP generic unrestricted potable use standards.

### **I.1 Project Organization**

The management of the project involves four main organizations: Marysville Estates, The Scotts Company, the Ohio Environmental Protection Agency (Ohio EPA) and Cox-Colvin & Associates (Cox-Colvin). Cox-Colvin is responsible for contracting and overall project execution, site and regulatory coordination, and contractor performance. Ohio EPA will provide regulatory oversight of the project. Marysville Estates owns and operates the Site. The Scotts Company has been identified by Ohio EPA as a responsible party. The project organization chart for the remediation/excavation is shown in Figure 1-2.

## **I.2 Health and Safety Plan Enforcement**

A Site Health and Safety Officer (SHSO) will be appointed by Cox-Colvin's Project Manager and he or she will be responsible for the overall Health & Safety (H&S) practices at the Site. The SHSO will have Specific functions and duties, which could include the following tasks:

- Implement the requirements of the HASP
- Audit activities to ensure that proper health and safety procedures are being used
- Inform any contractors on project issues related to health and safety
- Review H&S provisions for effectiveness in protecting project personnel, and modify the HASP to address deficiencies
- Update the HASP as needed, and inform Site workers of changes

All Cox-Colvin personnel, subcontractors, and others who will participate in field activities will be required to meet the training requirements outlined in Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.120 covering Hazardous Waste Operations and Emergency Response. All workers are required to provide evidence at the start of the field program that they have completed the training and health monitoring requirements of OSHA 29 CFR 1910.120.



## **2.0 Site-Specific Hazard Evaluation**

Site-specific hazard evaluation begins with a detailed analysis of the scope of work. The scope of work for this project is described in the *Interim Action Work Plan, Former Ray Lewis Landfill Site* (Cox-Colvin, 2017). This work will include the following tasks:

- Site preparation
- Clearing, grubbing, and surveying
- Excavation of soil
- Consolidation of excavated soil and clean fill placement
- Grading and Site restoration
- Explosive gas monitoring
- Groundwater monitoring

A daily job safety analysis (JSA) will be completed to identify both physical and chemical hazards for each task. The JSAs will note daily specifics that might change like the exit route and assembly point, whether hot work will be performed, etc. The JSAs will be reviewed by the health and safety officer, and will be modified as necessary according to the work required for each task.

### **2.1 Physical Hazards**

Physical hazards associated with the scope of work present a potential for injury. These may include hazards from heavy equipment, proximity to traffic, electric shock, hazardous work conditions, unseen obstacles, noise, heat stress, hypothermia, and poor illumination. Details of potential physical hazards will be presented in the daily JSA.

Injuries resulting from physical hazards can be avoided through the adoption of safe work practices and employing caution when working with machinery. Specific anticipated physical hazards and precautions are described in Table 2-1.

### **2.2 Heavy Equipment**

Heavy equipment such as excavators, loaders, dump trucks, and bulldozers will be used during remediation activities. Heavy equipment represents a substantial hazard to workers. Heavy equipment will have backup alarms, but Site personnel must be vigilant while working in areas where heavy equipment is being used. The movement of heavy equipment around the Site constitutes a risk, but there are other risks involved, such as

being struck by swinging arms of excavators; being struck by the backside/counterweight of the excavator when it is swinging around; being pinched by articulated loaders; being struck or crushed by dump trucks that tip over, etc.

Exposure to the hazards associated with heavy equipment will be minimized by Site workers:

- Staying out of temporary roadways
- When possible, standing no closer than 50 feet to any operating heavy equipment
- Having proper situational awareness
- Paying attention to backup alarms
- Avoiding the swing of an excavator bucket arm
- Make contact with the operator of the vehicle before approaching the heavy equipment

Additional safe work practices regarding the use of heavy equipment are contained in Section 6.2.

## **2.3 Chemical Hazards**

Based on previous soil sampling results, volatile organic compounds (VOCs) and poly-aromatic hydrocarbons (PAHs) were detected in soil and or groundwater. In addition, pesticides and vermiculite (which may contain minor amounts of asbestos) were detected in soil. VOCs were detected in soil at concentrations less than their residential direct-contact standards. Most PAHs were detected at concentrations less than the residential standards. In only one sample, RLSB-42.02 were SVOCs greater than residential or commercial standards. Benzo(a)pyrene was detected in one other sample at a concentration greater than its residential standard, but it was at a depth of 10- 12 feet (RLSB-55.12). Pesticides were detected at concentrations exceeding residential and in a few instances commercial/industrial direct contact standards. There appears to be a direct correlation between the occurrence of vermiculite and the occurrence of pesticides. The pathways of worker exposure to contaminated soil during Site work includes inhalation, absorption, dermal contact, and ingestion.

### **2.3.1 VOC Exposure**

As stated above, VOCs were detected in soil at the Site, but at concentrations less than their residential direct-contact standards. As such, it is unlikely that elevated concentrations of VOCs will be encountered during remedial activities at the Site. However, VOCs can be hazardous, and precautions will be taken to ensure that exposure to VOCs is minimized.

VOCs are central nervous system depressants which produce similar symptoms in victims exposed to moderate vapor-phase concentrations or, for certain compounds, through skin absorption (see Attachment A - NIOSH Chemical Sheets for compound-specific symptoms). General symptoms of VOC exposure, both acute and chronic, includes euphoria, headache, weakness, dizziness, nausea, narcosis, and possibly coma. VOCs can also be skin and eye irritants. If any of these symptoms are encountered during work, activities will be halted and the worker will seek immediate medical attention. Safety Data Sheets for specific products that contain chemicals that may be brought onto the job Site are stored in the Cox-Colvin field vehicles.

### **2.3.2 PAH Exposure**

Most PAHs were detected at concentrations less than the residential standards. In only one shallow sample, RLSB-42.02<sup>1</sup>, were PAHs greater than residential or commercial standards. Benzo(a)pyrene was detected in sample RLSB-55.12 at a concentration greater than its residential standard, but it was at a depth of 10-12 feet<sup>2</sup>.

The area in the vicinity of RLSB-41 has been designated as a fill area, so excavation of the soils at RLSB-42 is not anticipated. As such, exposure to the PAHs in that area is unlikely. Only two feet of soil in the vicinity of RSLB-55 will be excavated, so exposure to PAHs in soil that exceeded residential standards is unlikely in that area as well.

According to the ATSDR, general effects of acute exposure to PAHs include headache, nausea, respiratory and dermal irritation are probably caused by other agents, since PAHs have low acute toxicity. The effects of chronic exposure are bronchitis, cough irritation, bronchogenic cancer, dermatitis, cutaneous photosensitization, and pilosebaceous<sup>3</sup> reactions. Reported health effects associated with chronic exposure to coal tar and its by-products (e.g. PAHs) include: erythema, burns and warts on sun-exposed skin; irritation and photosensitivity of eyes; cough, bronchitis, and bronchogenic cancer; leukoplakia, buccal-pharyngeal cancer; and cancer of the lip; leukemia and lymphoma; hematuria and kidney and bladder cancers.

Because the soils that contain PAHs in concentrations greater than residential standards will not be disturbed during the work at the Site, exposure to PAHs is unlikely. However, precautions will be taken to minimize exposure to contaminated soil during the work at the Site.

---

<sup>1</sup> RLSB-42 is located in the southwestern portion of Section 2a. PAHs detected at concentrations greater than residential standards are benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and ideno(1,2,3-cd)pyrene.

<sup>2</sup> RLSB-55.12 is located in the east-central portion of Section 2b.

<sup>3</sup> Pertaining to the hair follicles and sebaceous glands.

### **2.3.3 Pesticide Exposure**

The pesticides detected at the Site during the IA Sampling Investigation include chlordane, heptachlor, heptachlor epoxide, and dieldrin. The results also indicated that the presence of vermiculite at the Site ranges from not being observed to greater than 50% in some areas of Section 2b. Vermiculite was not observed in the borings drilled on the west side of Cypress Drive. The detected concentrations of chlordane, heptachlor, and heptachlor epoxide are correlated with the presence of vermiculite. As a result, remedial activities that remove the vermiculite will also remediate other constituents of concern. Specific anticipated chemical hazards and precautions are described in Table 2-2.

According to the ATSDR, most health effects in humans that may be linked to chlordane exposure are on the nervous system, the digestive system, and the liver. These effects were seen mostly in people who swallowed chlordane mixtures.

The ASTDR webpage for heptachlor and heptachlor epoxide stated that:

“There is no reliable information on health effects in humans. Liver damage, excitability, and decreases in fertility have been observed in animals ingesting heptachlor. The effects are worse when the exposure levels were high or when exposure lasted many weeks.”

According to the ATSDR, workers exposed to moderate concentrations of dieldrin in the air for an extended period of time developed headaches, dizziness, irritability, vomiting, and uncontrolled muscle movements. Workers removed from the source of exposure rapidly recovered from most of these effects. ATSDR also stated that there is no conclusive evidence that dieldrin causes cancer in humans. The U.S. EPA has determined that dieldrin is a probable human carcinogen.

Exposure to soil containing pesticides will be minimized by dust control, clean work habits and sanitation, and by use of proper PPE.

## **2.4 Other Hazards**

Asbestos fibers are present in some vermiculite minerals. Testing of some of the vermiculite from the Site indicates that some of the vermiculite contains asbestos fibers. According to the U.S. EPA’s factsheet *Naturally Occurring Asbestos: Approaches for Reducing Exposure* (U.S. EPA, March 2008), the best approaches to mitigating exposure to naturally occurring asbestos (NOA) include limiting dust generating activities, excavation and disposal of NOA, and covering/capping NOA material. The factsheet also lists engineering practices that reduce exposure to NOA. A copy of this document is attached (Attachment B).

## **3.0 Personal Protection**

PPE will be worn by Site workers to protect from known or suspected chemical or physical hazards. The levels of personal protection to be employed for specific work tasks will be selected based upon known or anticipated hazards. Conditions will be monitored by the SHSO to determine if the level of protection should be increased or decreased.

### **3.1 Designated Levels of Protection and Recommended PPE**

The anticipated PPE and respirator protection for the tasks to be conducted during the remediation is provided. PPE will consist primarily of common construction worker attire, and will be worn for most activities to be conducted at the Site, including: drilling, monitoring well abandonment, replacement, and development, soil excavation, soil consolidation, backfilling, grading, seeding, and decontamination activities. PPE will consist of the following:

- Long-sleeved high-visibility work clothing
- Steel toed boots
- Work gloves when using hand tools
- Nitrile gloves when handling soil
- Hardhat
- Ear plugs/muffs
- Safety glasses
- Half-face dust mask

### **3.2 Limitations of Protective Clothing**

PPE has been selected to provide protection against contaminants at known or anticipated concentrations in soil and groundwater. To obtain optimum protection from PPE, workers using PPE should inspect all clothing, gloves, and boots both prior to and during use, for imperfect seams, non-uniform coatings, tears, and poorly functioning closures. Reusable garments, boots and gloves should be inspected prior to and during use for cracks, punctures, abrasions, or any sign of chemical permeation such as swelling, discoloration, stiffness, or brittleness. Reusable gloves, boots, sleeves, aprons, or coveralls exhibiting any of the characteristics listed above will be discarded. PPE used in areas known or suspected to exhibit highly elevated concentrations of contaminants should not be reused. Reusable PPE should be decontaminated and neatly stored in a clean area away from work zones.



### **3.3 Duration of Work Tasks**

The duration of field activities involving the use of PPE will be established by the SHSO or his/her designee based upon ambient temperature and weather conditions, the capacity of personnel to work in the designated level of PPE, and limitations of the protective equipment (i.e., clothing break through rates, respirator cartridges saturation rate, etc.). All rest breaks will be taken in an area away from a heavy traffic area after applicable decontamination and removal of PPE.

### **3.4 Respirator Selection, Use, and Maintenance**

Respirator use is not anticipated, however, if it is deemed to be necessary by the SHSO, dust masks, half-face or full-face air-purifying respirator equipped with a combination cartridge for organic vapor and particulates may be used based upon the substances which may be present and the concentrations of those compounds previously encountered at the Site. The selection of respiratory protection will be performed by the SHSO, in accordance with the guidelines for respiratory protection outlined in Section 4.0.

Air-purifying respirators are to be used only in conjunction with breathing space air monitoring, with strict adherence to the action limits as outlined in Section 4.0. Air-purifying respirators may only be used when the device affords protection from the substances being encountered. If an air-purifying respirator cannot provide protection against all substances present at concentrations exceeding the action level, upgrading of respiratory protection to require SCBAs or air-line respirators may be required.

The following limitations are items which may preclude the use of air-purifying respirators:

- Oxygen-deficient atmosphere (less than 19.5 percent oxygen)
- Concentrations of substances which may be Immediately Dangerous to Life and Health (IDLH)
- Entry into confined or unventilated areas which may contain airborne contaminants that have not been characterized
- Unknown contaminant concentrations or concentrations which exceed designated maximum use levels (see guidelines in Section 7.0)
- Presence of unidentified contaminants
- High relative humidity (reduces sorbent life)
- Identified substances which have inadequate warning properties and sorbent service life is unknown

## **4.0 Environmental Surveillance of Work Areas**

Air monitoring may be performed during designated work tasks to protect field personnel from exposure to airborne hazardous substances and health hazards and to determine appropriate levels of PPE for work tasks. Workers should be trained to recognize heat and cold stress depending on weather conditions observed at the Site. The SHSO and worker will be responsible for the limiting exposure in possibly dangerous conditions.

### **4.1 Initial/Prolonged Air Monitoring**

Depending on Site conditions and work task(s), initial or prolonged air monitoring of work areas may be performed, as appropriate, prior to startup and implementation of specific work tasks. If deemed necessary by the SHSO, air monitoring may be performed during specific tasks using real-time field survey instrumentation for the following parameters:

- Flammable atmospheres
- Oxygen-deficient atmospheres (<19.5%)
- Levels of airborne organic contaminants
- Wind speed and weather conditions

If required, these parameters may also be monitored at the beginning of each work day, to identify background contaminant concentrations and to monitor for any IDLH or other potentially hazardous situation which could develop during off-shift periods

### **4.2 Periodic Air Monitoring**

Depending on Site conditions and work tasks, air monitoring may also be performed on a periodic basis during specific field activities. If required, periodic monitoring will be performed at a minimum when:

- Contaminants other than those previously identified are being handled
- A different type of operation is initiated, such as well installation
- Employees are working in areas with obvious liquid contamination with the potential for VOCs
- Obvious lithologic change is encountered while drilling that appear to be the result of anthropogenic activity

Direct reading instruments will not be used to monitor for substances which cannot be accurately detected by the field survey instrument (false-negative response, or negative interference). Personal air monitoring or field monitoring equipment may be used to determine the amount of particulates in the air.

### **4.3 Monitoring Parameters and Survey Instrumentation**

Air monitoring for VOCs and particulates will be performed at the breathing zone on those workers most likely to be exposed to potentially hazardous concentrations of contaminants, and around the borehole or well. Monitoring of percent oxygen and combustible atmosphere may be conducted if necessary at waist height and near the ground surface to determine the presence and accumulation of heavier-than-air gasses.

Situations which require air monitoring and their action levels are presented below.

#### **4.3.1 Explosive Atmospheres and Percent Oxygen**

**Instrument:** Four Gas Personnel Monitor with Explosive Gas Indicator

**Tasks:** Drilling and subsurface soil sampling and excavation in areas where flammable or explosive vapors are a potential

**Sampling Frequency:** Periodically during drilling and soil sampling (~15 minutes)

**Action Levels:**

- <20% Lower Explosion limit (LEL): Continue investigation,
- >20% LEL: Explosion hazard. Withdraw from area immediately.
- <19.5%: Halt operations and evacuate area. (NOTE: Combustible gas readings are not valid in atmosphere with <19.5% oxygen).
- 19.5%-20.8%: Continue investigation with caution. Deviation from normal level may be due to presence of other substances.
- 20.8%: Normal working level.
- >21%: Fire hazard potential. Halt operations.

#### **4.3.2 Organic Vapors via Direct Reading Instrument**

Air monitoring should also be performed on a periodic basis during specific field activities. If elevated readings are encountered, the SHSO will determine if additional PPE is required or if work must be stopped and reevaluated. Measurements should be made and recorded if there are any reports of odors, or if workers experience symptoms of possible VOC exposure, such as headaches, nausea, or irritation of the eyes. While it is not expected based on the results of the investigation, Draeger tubes for benzene may be used to confirm consistent concentrations of benzene.

**Instrument:** Photoionization meter

**Tasks:** Drilling and subsurface soil sampling and excavation in areas where organic vapors are a potential

**Sampling Frequency:** Periodically during all earth moving activities (~15 minutes)

**Action Levels:**

Sustained readings of 10 ppm greater than background

#### **4.3.3 Fugitive Dust Potential**

**Instrument:** Personal dust monitor, observation

**Tasks:** Earth moving activities such as excavation and backfilling

**Sampling Frequency:** Continuous during all earth moving activities

**Action Levels:**

- Visible fugitive dust being generated: Apply dust suppression to active excavation/backfilling area
- Sustained wind speed exceeds 17 mph: Apply dust suppression and evaluate need to halt activities

#### **4.4 Use and Maintenance of Survey Instrumentation**

Personnel using field survey meters will be thoroughly briefed on the operation, limitations, and maintenance of these devices. Maintenance and calibration procedures will be in accordance with the manufacturer's guidelines by an individual familiar with the devices. Repairs, maintenance, or routine calibration of these devices will be recorded in an equipment maintenance logbook which shall be signed by the servicing technician.

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Air monitoring equipment (Explosive Gas Indicator, O<sub>2</sub> Meter, PID) will be calibrated per the manufacturers recommendations. Only routine maintenance, e.g., changing batteries or lamps; cleaning lamp and fan, will be done by staff members. Additional maintenance will be performed by the instrument provider or other qualified technicians.

## **4.5 Heat Stress Monitoring**

Heat stress is one of the most common and more serious of illnesses occurring at excavation sites. Heat stress is caused by several interacting factors including environmental conditions, clothing, workload, physical condition and characteristics of the employee, and the type of PPE required for the work task. The implementation of heat-stress monitoring will be determined by the SHSO, or if temperatures exceed 90°F, dependent upon the type of PPE worn, because PPE can add considerable weight, increase the body's expenditure of energy, and interfere with the body's normal heat-exchange mechanisms.

The risk of injury from excessive heat will be reduced by:

- Providing adequate liquids to replace lost body fluids. Replacement fluids can be water, commercial mixes such as Gatorade or Quick Kick, or a combination of these and fresh water.
- Establishing a work regimen that provides adequate rest periods for cooling down. This may require additional shifts for workers or earlier or later work schedules
- Using cooling devices such as vortex tubes or cooling vests that can be worn beneath protective garments, if needed
- Taking breaks in a shaded rest area, if possible
- Removing protective garments outside of the work zone during rest periods
- Not performing other tasks during rest periods
- Informing workers of the importance of adequate rest, acclimatization, proper diet, health hazards, recognition of heat illness, and first aid

## **4.6 Cold Stress Monitoring**

Cold stress may be of concern, especially when a wind-chill-adjusted temperature of 0° F or less is present. Workers will be made aware of the following:

- Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body which have high surface-area-to-volume ratios such as fingers, toes, and ears, are the most susceptible.



- Two factors influence the development of a cold injury: ambient temperature and wind velocity. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at - 18°F
- As a rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.
- Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be divided into the following categories:
  - Frostbite nip or initial frostbite: Characterized by sudden blanching or whitening of skin
  - Superficial frostbite: Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient
  - Deep frostbite: Tissues are cold, pale, and solid; this is an extremely serious injury
- Systemic hypothermia: This is caused by exposure to freezing and rapidly dropping temperature. Its symptoms are visually exhibited in five stages: (1) shivering, (2) apathy, listlessness, sleepiness, and sometimes rapid cooling of the body to less than 95°F, (3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate, (4) freezing of the extremities, and finally, (5) death.

Thermal socks, long cotton or thermal underwear, hard hat liners, and other cold weather gear can aid in the prevention of hypothermia. Blankets, warm drinks other than caffeinated coffee, and warm break areas are essential. In addition, personnel should be briefed on the dangers of cold stress and frostbite, and should be monitored during all rest breaks and field activities for signs of hypothermia or frostbite. Self-monitoring and co-worker monitoring are also encouraged. Periodic work breaks in a warm environment will also be taken to reduce the risk of injury.

## **5.0 Site Control**

The entire Site is surrounded by a chain link fence. If any portion of the fence has to be removed during filling operations, a temporary fence or caution tape will be installed. During Site work that disturbs or exposes environmental media, the work area will be marked with caution tape to demarcate the work area and identify the area where bystanders should be excluded. Access to the work area will be restricted to authorized persons. Visitors must sign-in with the SHSO, be made familiar with the HASP, and depending on the level of access to the site, have OSHA 40-hour HAZWOPER training, agree to comply with the provisions of the HASP, and participate in the daily safety meeting. The SHSO shall identify those work areas which visitors or personnel are authorized to enter, and will enforce Site control measures.

## **6.0 Safe Work Practices within the Work Area**

Provided below are some general and specific work practices that should be followed during the project to ensure a safe project:

- Only those vehicles and equipment required to complete work tasks should be permitted within a work area.
- High visibility clothing and safety cones should be used
- Personnel should not perform potentially harmful tasks without a partner. The Buddy System should be employed during activities of this project.
- All personnel should avoid contact with potentially contaminated environmental media, as reasonably as possible.
- Eyewash should be available on-Site immediately adjacent to the work area.
- Food and beverages should not be permitted or consumed in the work area. Use of tobacco products and the application of cosmetics are also prohibited in work areas.
- During remediation activities, all personnel should wash their hands and face before eating, drinking, smoking, or applying cosmetics. All personnel should wash hands and faces at the end of their shifts before leaving the job Site.
- Contaminated protective equipment, such as respirators, air hoses, boots, disposable protective clothing etc., should not be removed from the work area until it has been cleaned or properly packaged for cleaning or disposal.
- Field personnel should observe each other for signs of toxic exposure and heat or cold illness; and trained to recognize the signs and systems
- Field personnel should inform each other of non-visual effects of illness such as headaches; dizziness; nausea; blurred vision; cramps; and irritation of the eyes, skin, or respiratory tract.

### **6.1 Underground Utilities**

Call before you dig – the driller or construction contractor is required to Call Ohio Utilities Protection Service (OUPS) to initialize the Locate Work Order.

The Drilling Plan will require that the worker:

- Assess the route or drilling Site
- Gather all information needed to complete Locate Work Order
- Premark the location in white paint, flags, or both

- Call 48-hours, but not more than ten working days before starting drilling

If damage to an underground utility occurs during excavation/backfill, follow the emergency response actions in Section 8.

Cox-Colvin may have a third-party utility detecting service clear some of the locations that are within the Site to ensure that un-marked utilities do not exist.

## **6.2 Heavy Equipment**

Heavy equipment such as excavators, loaders, dump trucks, and bulldozers will be used during remediation activities. Heavy equipment can represent a substantial hazard to workers. In general, requirements for motor vehicles and material handling equipment are provided in the OSHA Construction Industry Standards 29 CFR 1926, Subpart O. The following procedures must be followed when heavy equipment is in use:

- Do not assume that the equipment operator is keeping track of your whereabouts. Never walk directly in back of, or to the side of, heavy equipment without the operator's knowledge.
- Remain alert at all times and maintain visual contact with equipment operator at all times.
- Establish hand signal communication when verbal communication is difficult. Determine one person per work group to give hand signals to equipment operators.
- Be aware of footing at all times.
- Ensure that all heavy equipment has a backup alarm of some type.
- Allow only qualified people to operate heavy equipment.
- Use chains, hoists, straps, and any other equipment to safely aid in moving heavy materials.
- Operate a piece of equipment only if you are familiar with its operation. This applies to heavy as well as light equipment, for example, steam cleaners.
- Prohibit loose-fitting clothing or unbound long hair around moving machinery.
- Instruct equipment operators to report to their supervisor any abnormalities such as equipment failure, oozing liquids, unusual odors, etc.
- Provide a second person to ensure adequate clearance when an equipment operator must negotiate in tight quarters.
- Keep all heavy equipment that comes into contact with potentially contaminated environmental media in the area until it can be decontaminated.

- Fully lower blades, buckets, dump bodies, and other hydraulic systems when equipment is not in use.
- Use parking brakes when equipment is not in use.
- Use seatbelts in all vehicles, including those with rollover protective structures.

### **6.3 Electrical Safety**

Electrical wiring used during field activities will satisfy the requirements of 29 CRF 1926, Subpart K, any applicable local electrical codes and Cox-Colvin's Health and Safety Plan. The following are some specific electrical safety requirements:

- All wiring is to be performed by a qualified person.
- All extension cords must have functional grounding conductors.
- All equipment that is not double insulated must have a functional grounding conductor.
- All electrical cords must be in good condition.
- Ground fault protected circuits must be used.
- Electrical cords and power tools should be inspected prior to use.
- Standing water and wet surfaces should be avoided when operating electrical equipment

### **6.4 Slip Trip and Fall Hazards**

Currently, the entire Site contains uneven ground and numerous slip/trip hazards. The planned excavations will be a maximum of two feet deep. Workers will be apprised of any new potential slip trip hazards through the daily health and safety meetings. Whenever possible, slip trip and fall hazards will be eliminated or clearly identified with yellow "caution" tape. Impalement hazards to workers will be eliminated as soon as they are identified. The entire Site is fenced, and gates are locked following completion of each day's work.

### **6.5 Power Line Clearance**

Power lines pose a significant risk to equipment such as excavators, cranes, and drilling rigs. If an above ground power line cannot be turned off or locked out, the following clearance distances will be observed between equipment and energized power lines:



<b>Voltage</b>	<b>Working Clearance (Ft)</b>	<b>Transit Clearance (Ft)</b>
50 kV or less	10	4
50 to 345 kV	10 ft + 0.4 in. per kV	10
345 to 750 kV	10 ft + 0.4 in. per kV	16

## **6.6 Noise Protection**

Workers should be protected from excessive noise exposure through equipment maintenance, noise monitoring, and hearing conservation programs which comply with 26 CFR 1910.95 and Cox-Colvin's Health and Safety Plan. Hearing protective equipment (e.g. ear plugs) should be worn during work tasks involving heavy equipment, power tools, or other sources of elevated noise levels. Hearing protection is required whenever noise levels exceed 90 decibels, which is typically the level at which a person must raise their voice to be understood. Both internal ear plugs and ear muffs might be needed to protect from high noise levels and will be determined by the SHSO or his/her designee.

## **6.7 Illumination**

Work will be conducted in adequate lighting. If it is necessary to work more than one-half hour before sunrise or after sundown artificial lighting is required.

## **6.8 Site Housekeeping**

Construction debris generated during excavation will be handled in accordance with OSHA 29 CFR 1926.25. During the course of the work, lumber with protruding nails and all other debris shall be kept cleared from work areas. Containers will be provided for the collection and separation of waste, trash, oily and used rags, and other refuse, as needed. Containers used for garbage and other oily, flammable, or potentially hazardous wastes, such as caustics, acids, harmful dusts, etc. will be equipped with covers.

Combustible scrap and debris should be removed at regular intervals during the course of the work and a safe means shall be provided for such removal. Containerized garbage and other waste should be disposed of at frequent and regular intervals.

## **6.9 Enforcement**

The SHSO is responsible for enforcement of safe work procedures and standard operating procedures during field activities. At least one copy of this Site-specific HASP will be available to field personnel at all times. A review of standard operating procedures (SOPs), and a discussion of any necessary changes in these practices, will be performed at the beginning of each day by the SHSO or their designee.

## **7.0 Decontamination**

Decontamination is the process of removing or neutralizing contaminants from personnel or equipment. When performed correctly, decontamination protects the worker from contaminants that may have accumulated on PPE, vehicles, tools, and other equipment. Decontamination serves as the principal means of preventing the transport of potentially harmful materials into unaffected areas. Figure 7-1 shows the planned Site layout, including the location of the decontamination area for personnel and heavy equipment.

Decontamination will take place within the contamination reduction zone. The SHSO will monitor decontamination procedures for their effectiveness in preventing migration of contaminants from the area.

Employees should decontaminate their persons by disposing of gloves, boot covers, disposable clothing, respirators, etc., as needed and washing their hands and faces. Permanent clothing should be laundered in a way to raise minimal dust and exposure. Equipment will be decontaminated prior to leaving the Site.

Every attempt should be made to reduce contamination on equipment and articles to levels that are low as reasonably achievable. Whenever possible, use of detergents and water should be used in place of solvents and chemical decontaminants. Solid and liquid wastes produced during decontamination should be collected for proper disposal.

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## **8.0 Emergency Contingency Planning**

The SHSO must be notified of any on-Site emergencies and is responsible for ensuring that the appropriate procedures are followed. Natural gas lines are extremely dangerous and sometimes not marked correctly. As a contingency specific procedure to follow if a gas line is damaged or has a leak are provided below.

### **8.1 Gas Line Damage/Leak**

Untreated natural gas is colorless and odorless. Gas companies add an odorant to give natural gas its distinctive rotten egg odor, but odorant might be absent near gas-production areas.

If contact is made with an underground natural gas pipeline, report the incident to the responsible natural gas utility company immediately. Even if the pipe does not appear to be damaged, it needs to be professionally inspected by utility crews before excavation can continue. A natural gas line is under pressure and a rupture may make a hissing, blowing or roaring sound. Because natural gas is lighter than air, it rises and mixes with air. When mixed with air, natural gas can be explosive. To burn or explode, natural gas needs an ignition source. Examples of ignition sources include: open flames, electrical sparks, mechanical sparks, and static electricity discharges.

If you suspect a gas leak, follow these steps:

- Shut off any equipment quickly (e.g. backhoe etc.)
- Do not try to stop a gas leak
- Remove all ignition sources, **if it can be done safely**
- Do not use electrical switches or other devices that may create a spark, including cellular telephones when near a gas line leak
- Leave the equipment and get away from escaping gas immediately, go upwind from the leak if possible
- Warn workers to evacuate the area and others to stay away from the area. Remain upwind of the leak at a safe distance
- Call 911 from a safe distance away from the gas line leak

## **8.2 Injury in the Work Zone**

In the event of a severe injury or emergency, notify the SHSO and follow the Site emergency procedures. The affected person will be decontaminated to the extent practical prior to removal from the work area. Appropriate first aid should be initiated, and an immediate request should be made for an ambulance, if necessary, and the designated medical facility should be notified. The emergency route and map should be determined at the daily safety meeting. No persons will re-enter the work area until the cause of injury or symptoms is determined.

## **8.3 Emergency Information Telephone Numbers**

Site Health and Safety Officer	Zane Cox, ASP (614-832-2509)
Police	911
Fire	911
Primary Hospital:	
Memorial Hospital, 500 London Ave, Marysville, OH 43040	(937) 578-2402

Remediation personnel should be familiar with the location of the nearest hospital. A map showing the location to the nearest hospital is provided in Attachment C.



## **9.0 References**

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Agency for Toxic Substances & Disease Registry website, 2017. Toxicological Profile for Chlordane

<https://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=355&tid=62>

Agency for Toxic Substances & Disease Registry website, 2017. ToxFAQs for Heptachlor and Heptachlor Epoxide.

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Agency for Toxic Substances & Disease Registry website, 2017. Polycyclic Aromatic Hydrocarbons (PAHs) Clinical Assessment.

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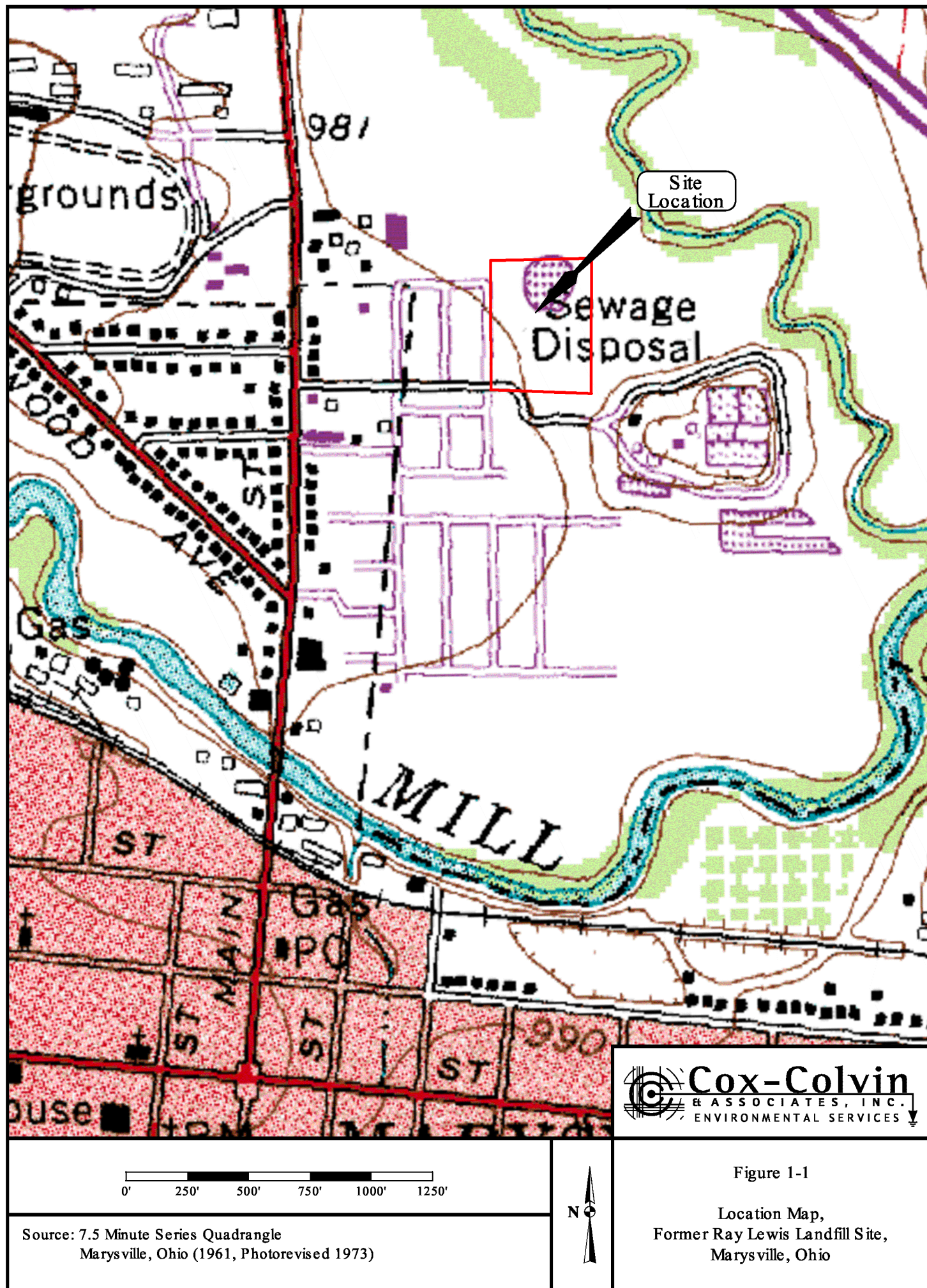
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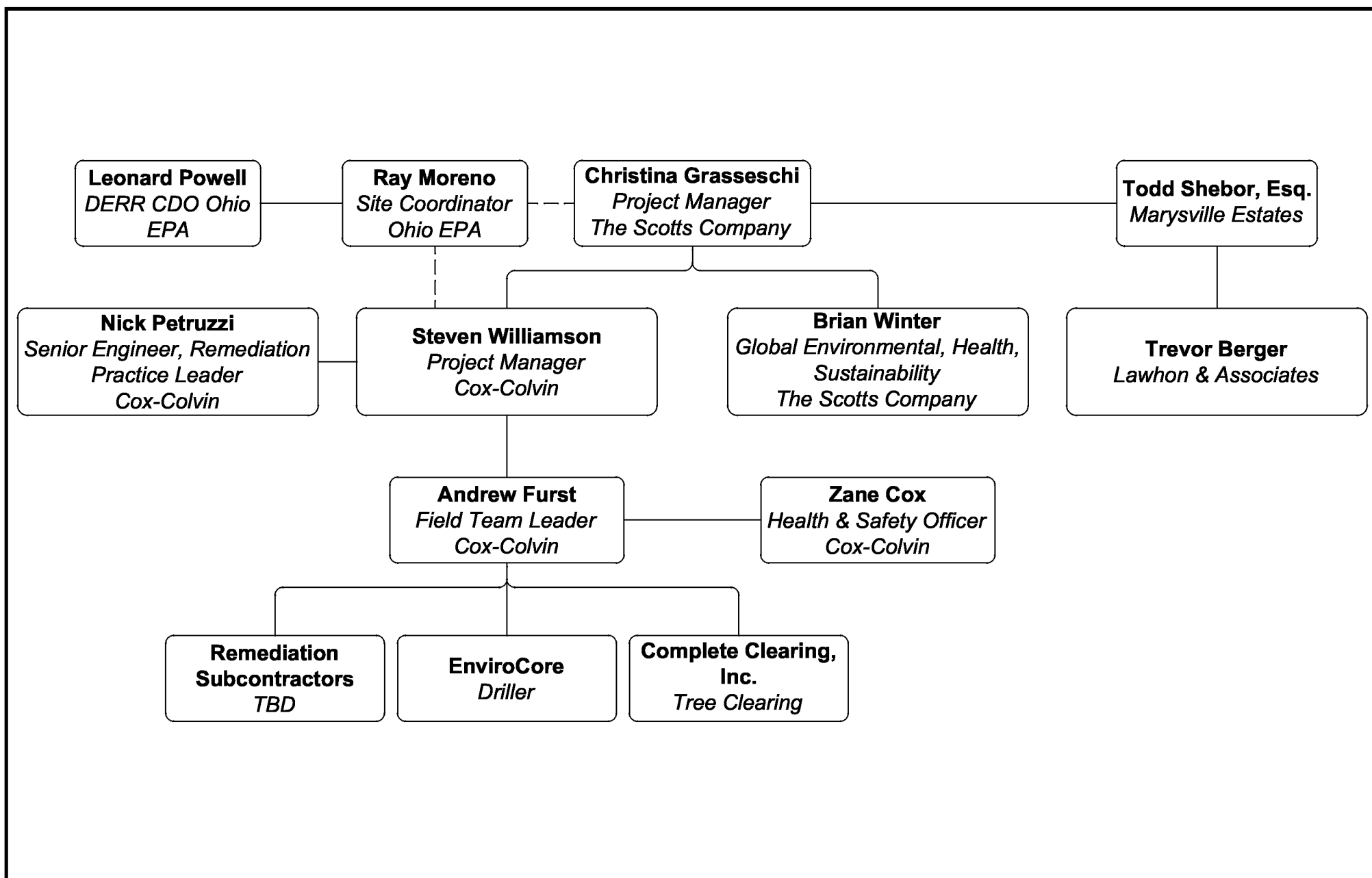
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# Figures









- Section 1, Marysville Estates
- Section 2a
- Section 2b

- Fence
- Egress/Gate

- Legend**
- Office Trailer
  - Approximate Location of the Tire Wash/Decon Pad
  - Weather Station

- Clean Area
- Decon Area
- Work Area

Source of Aerial Photograph: OGRIP, 2013.



# Tables

Table 2-1. Potential Physical Hazards and Precautions to Implement, Former Ray Lewis Landfill Site, Marysville, Ohio

Physical Hazard	Yes / No	
	Precautions	
Heavy Equipment	Y	Use caution. Stay away from equipment when in operation. Wear high-visibility vests. Be aware of surroundings. Watch for construction vehicles. Listen for back up alarms.
Lockout/Tagout:	N	This is not anticipated to be necessary during Site operations.
Vehicular Traffic	Y	Use cones/signs. Wear high-visibility vests. Be aware of surroundings. Watch for construction vehicles. Listen for back up alarms.
Slip/Trip/Fall	Y	Use caution when moving through construction areas and decon pad. Be aware of surroundings.
Falling/Dropping Hazard	Y	The use of ladders and scaffolding is not anticipated. During clearing and grubbing, trees will be felled. Be aware of surroundings. Stay in sight of loggers. Stand away from tree cutting and felling operations. Wear high-visibility vests.
Excavation/Boring	Y	Use caution. Wet cuttings/soil as necessary to prevent nuisance dust during drilling and excavation.
Overhead Lines	Y	Check for overhead lines. Call Dayton Power and Light; overhead utilities in Marysville Estates section need to be de-energized and abandoned/removed.
Power and Hand Tools	Y	High pressure power wash in decontamination area. Wear face shield, hearing protection, disposable boot covers, (or remove soil from boots) inner and outer gloves.
Waste Generation	Y	Follow the remediation work plan for waste handling and disposal. Water and solids produced in the decontamination area must be properly collected and disposed.
Insect/Animal/Plant	Y	Use caution. Use bug spray if necessary. Wear gloves and long sleeves to prevent exposure to poison ivy. Wash when field work is complete.
Crush or Cut	Y	Use caution. Be aware of pinch points and sharp objects. Stand away from the excavators, dump trucks, loaders, and compactors.
Material Spill	Y	Use caution around liquids. Use spill kit if fuel spill occurs. Notify field team leader.
Heat/Cold Stress	Y	Take breaks in cool or shady areas if temperatures are hot. Drink plenty of water.
Limited Vision/Hearing	Y	Use caution. Stay in sight of equipment operators..
Security/Violence	Y	Use caution. Keep communications open at all times. Be aware of situation. Keep site gates closed and locked whenever possible.
Confined Space	N	This is not anticipated to be necessary during Site operations.
Underground utilities	Y	Call OUPS/Underground utilities. Check for underground utilities. All underground utilities must be de-energized/abandoned prior to commencement of excavation.

K:\CCA\PROJECTS\Ray Lewis Landfill\Remedial Action\Health and Safety Plan\Tables\Table 2-1.xlsx

Table 2-2. Potential Chemical Hazards - Precautions and Personal Protective Equipment, Former Ray Lewis Landfill Site, Marysville, Ohio

Hazardous Constiuent	Inhalation	Absorbtion	Ingestion	Direct Contact	Precautions and Personal Protective Equipment
VOLATILE ORGANIC COMPOUNDS					
Benzene	X	X	X	X	PPE: Nitrile Gloves, Disposable Boot Covers, Eye Protection Precautions: Disposable Gloves, Wash Hands, Arms, and Face After Contact, Dust Control
1,2,4-trimethylbenzene	X		X	X	
Trichloroethene	X	X	X	X	
SEMI-VOLATILE ORGANIC COMPOUNDS					
Atrazine	X	X	X	X	PPE: Nitrile Gloves, Disposable Boot Covers, Eye Protection Precautions: Disposable Gloves, Wash Hands, Arms, and Face After Contact, Dust Control
Benzo(a)Anthracene	X	X	X	X	
Benzo(a)Pyrene	X	X	X	X	
Benzo(b)Fluoranthene	X	X	X	X	
4-Chloroaniline	X	X	X	X	
Indeno(1,2,3-cd)Pyrene	X	X	X	X	
Naphthalene	X	X	X	X	
INORGANICS					
Arsenic	X	X	X	X	PPE: Nitrile Gloves, Disposable Boot Covers, Eye Protection Precautions: Dispose Gloves, Wash Hands, Arms, and Face After Contact, Dust Control
PESTICIDES and OTHER					
Chlordane	X	X	X	X	PPE: Nitrile Gloves, Disposable Boot Covers, Eye Protection Precautions: Dispose Gloves, Wash Hands, Arms, and Face After Contact, Dust Control
Dieldrin	X	X	X	X	
Heptachlor	X	X	X	X	
Heptachlor epoxide	X	X	X	X	
Asbestos	X		X		

K:\CCA\PROJECTS\Ray Lewis Landfill\Remedial Action\Health and Safety Plan\Tables\[Table 2-2 rev 1.xlsx]Table 2-2

Table 4-1. Toxicological and Physical Properties of Potential Contaminants, Former Ray Lewis Landfill Site, Marysville, Ohio

Compound	CAS Number	OSHA PEL	NIOSH TWA	Ionization Potential eV (% Response)	IDLH (ppm)	LEL/UEL (%)
<b>VOLATILE ORGANIC COMPOUNDS</b>						
Benzene	71-43-2	1 / 5	0.1 / 1	9.24	500	1.2 / 7.8
1,2,4-trimethylbenzene	95-63-6	N/A	25 ppm	8.27	N/A	0.8 / 6.6
Trichloroethene	79-01-6	100	25 ppm	9.45	1000	8.0 / 10.5
<b>SEMI-VOLATILE ORGANIC COMPOUNDS</b>						
Atrazine	1912-24-9	N/A	5 mg/m3	N/A	N/A	N/A
Benzo(a)Anthracene	56-66-3	0.2 mg/m3	0.1 mg/m3	N/A	N/A	N/A
Benzo(a)Pyrene	50-32-8	0.2 mg/m3	0.1 mg/m3	N/A	N/A	N/A
Benzo(b)Fluoranthene	205-99-2	0.2 mg/m3	0.1 mg/m3	N/A	N/A	N/A
4-Chloroaniline	106-47-8	N/A	N/A	N/A	N/A	N/A
Indeno(1,2,3-cd)Pyrene	193-39-5	N/A	N/A	N/A	N/A	N/A
Naphthalene	91-20-3	10 ppm	10 ppm	8.12	250	0.9 / 5.9
<b>INORGANICS</b>						
Arsenic	7440-38-2	0.010 mg/m3	N/A	N/A	5 mg/m3	N/A
<b>PESTICIDES and OTHER</b>						
Chlordane	57-74-9	0.5 mg/m3	0.5 mg/m3	N/A	100 mg/m3	N/A
Dieldrin	60-57-1	0.25 mg/m3	0.25 mg/m3	N/A	50 mg/m3	N/A
Heptachlor	76-44-8	0.5 mg/m3	0.5 mg/m3	N/A	35 mg/m3	N/A
Heptachlor epoxide	1024-57-3	N/A	N/A	N/A	N/A	N/A
Asbestos	1332-21-4	0.1 Fiber/cm3	Lowest Feasible	N/A	N/A	N/A

ACGIH - American Conference of Governmental Industrial Hygienists

TLV - Threshold Limit Value for 8-hour working day

STEL - Short Term Exposure Limit, maximum 15-minute period

ppm - parts per million

OSHA - Occupation Safety and Health Administration

Ceiling - Maximum level for any period of time

N/D - Not Determined

N/A - Not Available

eV - electron volts

IDLH - Immediately Dangerous to Life and Health

LEL - Lower Explosive Limit

UEL - Upper Explosive Limit

NA - Not Available

PEL - Permissible Exposure Limit for 8-hour working day

REL - Recommended Exposure Limit

TLV, PEL, STEL, Ionization Potential, IDLH, LEL, & UEL from NIOSH Pocket Guide to Chemical Hazards, [www.cdc.gov/niosh/npg](http://www.cdc.gov/niosh/npg).

# Attachments



# Attachment A

## Chemical Safety Cards for Compounds known or potentially found in Environmental Media



(/niosh/index.htm)

## 2,4,5-T

### Synonyms & Trade Names

2,4,5-Trichlorophenoxyacetic acid

CAS No.

93-76-5

RTECS No.

AJ8400000

DOT ID & Guide

2765 152

Formula

$\text{Cl}_3\text{C}_6\text{H}_2\text{OCH}_2\text{COOH}$

Conversion

**IDLH****250 mg/m<sup>3</sup>****See: 93765****Exposure Limits****NIOSH REL****TWA 10 mg/m<sup>3</sup>****OSHA PEL****TWA 10 mg/m<sup>3</sup>****Measurement Methods****NIOSH 5001****See: NMAM or OSHA Methods****Physical Description****Colorless to tan, odorless, crystalline solid. [herbicide]****Molecular Weight****255.5****Boiling Point****Decomposes**

**Melting Point**  
**307°F**

**Solubility**  
**(77°F): 0.03%**

**Vapor Pressure**  
 **$1 \times 10^{-7}$  mmHg**

**Ionization Potential**  
**?**

**Specific Gravity**  
**1.80**

**Flash Point**  
**?**

**Upper Exposive Limit**  
**?**

**Lower Explosive Limit**  
**?**

Combustible Solid, but burns with difficulty.

Incompatibilities & Reactivities

None reported

Exposure Routes

inhalation, ingestion, skin and/or eye contact

Symptoms

In Animals: ataxia; skin irritation, acne-like rash; liver damage

Target Organs

Skin, liver, gastrointestinal tract

Personal Protection/Sanitation

(See protection codes (protect.html))

Skin:No recommendation

Eyes:No recommendation

Wash skin:No recommendation

Remove:No recommendation

Change:No recommendation

First Aid

(See procedures (firstaid.html))

Eye:Irrigate immediately

Skin:Soap wash



Breathing: Respiratory support  
Swallow: Medical attention immediately

## Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m<sup>3</sup>:

(APF = 5) Any quarter-mask respirator.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Up to 100 mg/m<sup>3</sup>:

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

(APF = 10) Any supplied-air respirator

Up to 250 mg/m<sup>3</sup>:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter.

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also

INTRODUCTION ICSC CARD: 0075 MEDICAL TESTS: 0249

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Content source: National Institute for Occupational Safety and Health (NIOSH) (/niosh/) Education and Information Division




Promoting productive workplaces  
through safety and health research



(/niosh/index.htm)

## ACENAPHTHENE

ICSC: 1674


1,2-Dihydroacenaphthylene 1,8-Ethylenenaphthalene $C_{12}H_{10}$ Molecular mass: 154.2 ICSC # 1674			CAS # 83-32-9 RTECS # <u>AB1000000</u> UN # 3077 October 12, 2006 Validated
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See NOTES.	PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Personal protection: P2 filter respirator for harmful particles. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants . Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	UN Hazard Class: 9 UN Packing Group: III Signal: Warning Enviro Very toxic to aquatic life with long lasting effects	
ICSC: 1674	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.		

ICSC: 1674

## ACENAPHTHENE

<p>I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> WHITE TO BEIGE CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> On combustion, forms toxic gases including carbon monoxide. Reacts with strong oxidants .</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. MAK not established.</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed .</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> See Notes.</p>
--	--

<b>PHYSICAL PROPERTIES</b>	Boiling point: 279°C Melting point: 95°C Density: 1.2 g/cm <sup>3</sup> Solubility in water, g/100 ml at 25°C: 0.0004 Vapour pressure, Pa at 25°C: 0.3 Relative vapour density (air = 1): 5.3 Flash point: 135°C o.c. Auto-ignition temperature: >450 °C Octanol/water partition coefficient as log Pow: 3.9 - 4.5
<b>ENVIRONMENTAL DATA</b>	The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. It is strongly advised that this substance does not enter the environment. 
<b>NOTES</b>	
Acenaphthene occurs as a pure substance and also as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Transport Emergency Card: TEC (R)-90GM7-III	
<b>ADDITIONAL INFORMATION</b>	
ICSC: 1674 <span style="float: right;">ACENAPHTHENE</span> (C) IPCS, CEC, 1994	
<b>IMPORTANT LEGAL NOTICE:</b>	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

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(/niosh/index.htm)

## Aldrin

### Synonyms & Trade Names

1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-endo-1,4-exo-5,8-dimethanonaphthalene, HHDN, Octalene

### CAS No.

309-00-2

### RTECS No.

IO2100000

### DOT ID & Guide

2761 151

### Formula

$C_{12}H_8Cl_6$

### Conversion

**IDLH****Ca [25 mg/m<sup>3</sup>]****See: 309002****Exposure Limits****NIOSH REL****Ca TWA 0.25 mg/m<sup>3</sup> [skin] See Appendix A ([nengapdxa.html](#))****OSHA PEL****TWA 0.25 mg/m<sup>3</sup> [skin]****Measurement Methods****NIOSH 5502****See: NMAM or OSHA Methods****Physical Description****Colorless to dark-brown crystalline solid with a mild chemical odor. [Note: Formerly used as an insecticide.]****Molecular Weight****364.9****Boiling Point****Decomposes**

**Melting Point**  
**219°F**

**Solubility**  
**0.003%**

**Vapor Pressure**  
**0.00008 mmHg**

**Ionization Potential**  
**?**

**Specific Gravity**  
**1.60**

**Flash Point**  
**NA**

**Upper Expositive Limit**  
**NA**

**Lower Explosive Limit**  
**NA**

Noncombustible Solid, but may be dissolved in flammable liquids.

**Incompatibilities & Reactivities**

Concentrated mineral acids, active metals, acid catalysts, acid oxidizing agents, phenol

**Exposure Routes**

inhalation, skin absorption, ingestion, skin and/or eye contact

**Symptoms**

headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort); myoclonic jerks of limbs; clonic, tonic convulsions; coma; hematuria (blood in the urine), azotemia; [potential occupational carcinogen]

**Target Organs**

central nervous system, liver, kidneys, skin

**Cancer Site**

[in animals: tumors of the lungs, liver, thyroid & adrenal glands]

**Personal Protection/Sanitation**

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated/Daily

Remove: When wet or contaminated

Change: Daily

Provide: Eyewash, Quick drench

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash immediately

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH**

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION ICSC CARD: 0774 MEDICAL TESTS: 0009

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(/niosh/index.htm)

## Coal tar pitch volatiles

### Synonyms & Trade Names

Acridine, Anthracene, Benzo(a)pyrene, Chrysene, Coal tar, Phenanthrene, pyrene [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]

CAS No.

65996-93-2

RTECS No.

GF8655000

DOT ID & Guide

2713 153(acridine)

Formula

Conversion

**IDLH****Ca [80 mg/m<sup>3</sup>]****See: 65996932****Exposure Limits****NIOSH REL****Ca TWA 0.1 mg/m<sup>3</sup> (cyclohexane-extractable fraction) See Appendix A ([nengapdx.html](#)) See Appendix C ([nengapdx.html](#))****OSHA PEL****TWA 0.2 mg/m<sup>3</sup> (benzene-soluble fraction) [1910.1002] See Appendix C ([nengapdx.html](#))****Measurement Methods****OSHA 58****See: NMAM or OSHA Methods****Physical Description****Black or dark-brown amorphous residue.****Molecular Weight****Properties vary depending upon the specific compound.**


**Combustible Solids**

Incompatibilities & Reactivities  
Strong oxidizers

Exposure Routes  
inhalation, skin and/or eye contact

Symptoms  
dermatitis, bronchitis, [potential occupational carcinogen]

Target Organs  
respiratory system, skin, bladder, kidneys

Cancer Site  
[lung, kidney & skin cancer]

Personal Protection/Sanitation  
(See protection codes (protect.html))  
Skin:Prevent skin contact  
Eyes:Prevent eye contact  
Wash skin:Daily  
Remove:No recommendation  
Change:Daily

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash immediately

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH**

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION ICSC CARD: 1415 MEDICAL TESTS: 0054

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## POLYCHLORINATED BIPHENYL (AROCOR 1254)

ICSC: 0939


Chlorobiphenyl (54% chlorine) Chlorodiphenyl (54% chlorine) PCB Molecular mass: 327 (average) ICSC # 0939		CAS # 11097-69-1 RTECS # <u>TQ1360000</u> UN # 2315 EC # 602-039-00-4 October 20, 1999 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: powder, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
•INHALATION		Ventilation.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.

•INGESTION	Headache. Numbness.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Consult an expert! Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.	Separated from food and feedstuffs . Cool. Dry. Keep in a well-ventilated room.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Severe marine pollutant. Note: C Xn symbol N symbol R: 33-50/53 S: 2-35-60-61 UN Hazard Class: 9 UN Packing Group: II	
ICSC: 0939	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.		

ICSC: 0939

## POLYCHLORINATED BIPHENYL (AROCOR 1254)

<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ROUTES OF EXPOSURE: LIGHT YELLOW VISCOUS LIQUID. The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes in a fire producing irritating and toxic gases .</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 mg/m<sup>3</sup> as TWA; (skin); A<sub>3</sub>; (ACGIH 2004). MAK: 0.05 ppm, 0.70 mg/m<sup>3</sup>; H; Peak limitation category: II(8); Carcinogen category: 3B; Pregnancy risk group: B; (DFG 2004). OSHA PEL: TWA 0.5 mg/m<sup>3</sup> skin NIOSH REL*: Ca TWA 0.001 mg/m<sup>3</sup> See Appendix A *Note: The REL also applies to other PCBs. NIOSH IDLH: Ca 5 mg/m<sup>3</sup> See: <u>IDLH INDEX</u></p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20° C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. Chloracne is the most visible effect. The substance may have effects on the liver . Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Relative density (water = 1): 1.5 Solubility in water: none</p> <p>Vapour pressure, Pa at 25°C: 0.01 Octanol/water partition coefficient as log Pow: 6.30 (estimated)</p>

<p><b>ENVIRONMENTAL DATA</b></p>	<p>In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment.</p> 
<p><b>NOTES</b></p>	
<p>Changes into a resinous state (pour point) at 10°C. Distillation range: 365°-390°C. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-90GM2-II-L</p>	
<p><b>ADDITIONAL INFORMATION</b></p>	
<p>ICSC: 0939 POLYCHLORINATED BIPHENYL (AROCOR 1254) (C) IPCS, CEC, 1994</p>	
<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>

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## ARSENIC

ICSC: 0013

<p>Grey arsenic As Atomic mass: 74.9 ICSC # 0013</p>		<p>CAS # 7440-38-2 RTECS # <u>CG0525000</u> UN # 1558 EC # 033-001-00-X October 18, 1999 Validated</p>	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Cough. Sore throat. Shortness of breath. Weakness. See Ingestion.	Closed system and ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.


•SKIN	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	Face shield or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and chest. Shock or collapse. Unconsciousness.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment.		Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.	Do not transport with food and feedstuffs. Marine pollutant. T symbol N symbol R: 23/25-50/53 S: 1/2-20/21-28-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II
ICSC: 0013		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0013

## ARSENIC



<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce toxic arsine gas (see: ICSC 0222).</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> OSHA PEL: 1910.1018 TWA 0.010 mg/m<sup>3</sup> NIOSH REL: Ca C 0.002 mg/m<sup>3</sup> 15-minute <u>See Appendix A</u> NIOSH IDLH: Ca 5 mg/m<sup>3</sup> (as As) See: 7440382 TLV: 0.01 mg/m<sup>3</sup> as TWA; A1 (confirmed human carcinogen); BEI issued; (ACGIH 2004). MAK: Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes, the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract, cardiovascular system, central nervous system and kidneys, resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders, shock, convulsions and kidney impairment. Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system, liver and bone marrow, resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment, anaemia. This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Sublimation point: 613°C Density: 5.7 g/cm<sup>3</sup></p> <p>Solubility in water: none</p>

<b>ENVIRONMENTAL DATA</b>	The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.		
<b>NOTES</b>			
<p>The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC 0377), Arsenic trichloride (ICSC 0221), Arsenic trioxide (ICSC 0378), Arsine (ICSC 0222). Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response. Card has been partly updated in October 2005 in section Effects of long-term or repeated exposure.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-61GT5-II</p>			
<b>ADDITIONAL INFORMATION</b>			
ICSC: 0013		ARSENIC	
(C) IPCS, CEC, 1994			
<b>IMPORTANT LEGAL NOTICE:</b>	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.		

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(/niosh/index.htm)

## Asbestos

### Synonyms & Trade Names

Actinolite, Actinolite asbestos, Amosite (cummingtonite-grunerite), Anthophyllite, Anthophyllite asbestos, Chrysotile, Crocidolite (Riebeckite), Tremolite, Tremolite asbestos

#### CAS No.

1332-21-4

#### RTECS No.

CI6475000

#### DOT ID & Guide

2212 171(blue, brown)

2590 171(white)

#### Formula

Hydrated mineral silicates

#### Conversion

IDLH

Ca [N.D.]

See: IDLH INDEX

#### Exposure Limits

NIOSH REL

Ca See Appendix A ([nengapdx.html](#)) See Appendix C ([nengapdxc.html](#))

OSHA PEL

[1910.1001] [1926.1101] See Appendix C ([nengapdxc.html](#))

#### Measurement Methods

NIOSH [7400](#) , [7402](#) ;

OSHA ID160 , ID191

See: NMAM or OSHA Methods

#### Physical Description

White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite) fibrous, odorless solids.

#### Molecular Weight

Varies

#### Boiling Point

Decomposes

**Melting Point**  
**1112°F (Decomposes)**

**Solubility**  
**Insoluble**

**Vapor Pressure**  
**0 mmHg (approx)**

**Ionization Potential**  
**NA**

**Specific Gravity**  
**?**

**Flash Point**  
**NA**

**Upper Expositive Limit**  
**NA**

**Lower Explosive Limit**  
**NA**

**Noncombustible Solids****Incompatibilities & Reactivities**

None reported

**Exposure Routes**

inhalation, ingestion, skin and/or eye contact

**Symptoms**

Asbestosis (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger clubbing; irritation eyes; [potential occupational carcinogen]

**Target Organs**

respiratory system, eyes

**Cancer Site**

[lung cancer]

**Personal Protection/Sanitation**

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: Daily

Remove: No recommendation

Change: Daily



**First Aid**

(See procedures ([firstaid.html](#)))

**Eye:**Irrigate immediately

**Breathing:**Fresh air

**Respirator Recommendations**

(See Appendix E) ([nengapdxe.html](#))

**NIOSH**

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also

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(/niosh/index.htm)

## BARIUM

ICSC: 1052

Ba Atomic mass: 137.3 ICSC # 1052		 CAS # 7440-39-3 RTECS # <u>CQ8370000</u> UN # 1400 October 20, 1999 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable. Many reactions may cause fire or explosion.	NO open flames, NO sparks, and NO smoking. NO contact with water.	Special powder, dry sand, NO hydrous agents, NO water.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
• INHALATION	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.

•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT wash away into sewer.		Separated from halogenated solvents, strong oxidants, acids. Dry. Keep under inert gas, oil or oxygen-free liquid.	UN Hazard Class: 4.3 UN Packing Group: II
ICSC: 1052		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 1052

## BARIUM

<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> <b>YELLOWISH TO WHITE LUSTROUS SOLID IN VARIOUS FORMS.</b></p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> The substance may spontaneously ignite on contact with air (if in powder form). The substance is a strong reducing agent and reacts violently with oxidants and acids. Reacts violently with halogenated solvents. Reacts with water, forming flammable/explosive gas (hydrogen - see ICSC0001), causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 mg/m<sup>3</sup> as TWA A4 (not classifiable as a human carcinogen); (ACGIH 2008). EU OEL: 0.5 mg/m<sup>3</sup> as TWA (EU 2006).</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by ingestion.</p> <p><b>INHALATION RISK:</b></p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance irritates the eyes, the skin and the respiratory tract.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b></p> <p>Boiling point: 1640°C Melting point: 725°C Density: 3.6 g/cm<sup>3</sup></p> <p>Solubility in water: reaction</p>

ENVIRONMENTAL DATA	
NOTES	
<p>Reacts violently with fire extinguishing agents such as water, bicarbonate, powder, foam, and carbon dioxide. Rinse contaminated clothes (fire hazard) with plenty of water.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-43G12</p> <p>Card has been partially updated in November 2008: see Occupational Exposure Limits.</p>	
ADDITIONAL INFORMATION	
ICSC: 1052 <span style="float: right;">BARIUM</span>	(C) IPCS, CEC, 1994
IMPORTANT LEGAL NOTICE:	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>

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## BENZENE

ICSC: 0015


Cyclohexatriene Benzol $C_6H_6$ Molecular mass: 78.1 ICSC # 0015		CAS # 71-43-2 RTECS # <u>CY1400000</u> UN # 1114 EC # 601-020-00-8 June 05, 2003 Validated	
			
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive. Risk of fire and explosion: see Chemical Dangers.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION	Dizziness. Drowsiness. Headache. Nausea. Shortness of breath. Convulsions. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.

•SKIN	MAY BE ABSORBED! Dry skin. Redness. Pain. (Further see Inhalation).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES	Redness. Pain.	Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Sore throat. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.		Fireproof. Separated from food and feedstuffs oxidants and halogens .	Do not transport with food and feedstuffs. Note: E F symbol T symbol R: 45-46-11-36/38-48/23/24/25-65 S: 53-45 UN Hazard Class: 3 UN Packing Group: II
ICSC: 0015		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0015

**BENZENE**

I  M  P  O  R  T  A  N  T   D   A   T   A	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with oxidants, nitric acid, sulfuric acid and halogens causing fire and explosion hazard. Attacks plastic and rubber.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 ppm as TWA; 2.5 ppm as STEL; (skin); A1; BEI issued; (ACGIH 2004). MAK: H; Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004). OSHA PEL: 1910.1028 TWA 1 ppm ST 5 ppm <u>See Appendix F</u> NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm <u>See Appendix A</u> NIOSH IDLH: Ca 500 ppm <u>See: 71432</u></p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation , through the skin and by ingestion .</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20° C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes , the skin and the respiratory tract . Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in lowering of consciousness . Exposure far above the occupational exposure limit value may result in unconsciousness and death .</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the bone marrow and immune system , resulting in a decrease of blood cells. This substance is carcinogenic to humans.</p>
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<b>PHYSICAL PROPERTIES</b>	Boiling point: 80°C Melting point: 6°C Relative density (water = 1): 0.88 Solubility in water, g/100 ml at 25° C: 0.18 Vapour pressure, kPa at 20°C: 10 Relative vapour density (air = 1): 2.7 Relative density of the vapour/air- mixture at 20°C (air = 1): 1.2 Flash point: -11°C c.c. Auto-ignition temperature: 498°C Explosive limits, vol% in air: 1.2-8.0 Octanol/water partition coefficient as log Pow: 2.13
<b>ENVIRONMENTAL DATA</b>	The substance is very toxic to aquatic organisms. 
<b>NOTES</b>	
Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response. Transport Emergency Card: TEC (R)-30S1114 / 30GF1-II NFPA Code: H2; F3; Ro	
<b>ADDITIONAL INFORMATION</b>	
ICSC: 0015 <span style="float: right;">BENZENE</span> (C) IPCS, CEC, 1994	
<b>IMPORTANT LEGAL NOTICE:</b>	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

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## BENZ(a)ANTHRACENE

ICSC: 0385

1,2-Benzoanthracene Benzo(a)anthracene 2,3-Benzphenanthrene Naphthanthracene $C_{18}H_{12}$ Molecular mass: 228.3 ICSC # 0385		CAS # 56-55-3 RTECS # <u>CV9275000</u> EC # 601-033-00-9 October 23, 1995 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.


•EYES		Safety goggles , face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.		Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61
ICSC: 0385		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0385

BENZ(a)ANTHRACENE



<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO YELLOW - BROWN FLUORESCENT FLAKES OR POWDER.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b></p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2 (as pyrolysis product of organic materials) (DFG 2005).</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is probably carcinogenic to humans.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Sublimation point: 435°C Melting point: 162°C Relative density (water = 1): 1.274 Solubility in water: none</p> <p>Vapour pressure, Pa at 20°C: 292 Octanol/water partition coefficient as log Pow: 5.61</p>

ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in seafood. 	
<b>NOTES</b>		
This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.		
<b>ADDITIONAL INFORMATION</b>		
ICSC: 0385	BENZ(a)ANTHRACENE	
(C) IPCS, CEC, 1994		
IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

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## BENZO(a)PYRENE

ICSC: 0104


Benz(a)pyrene 3,4-Benzopyrene Benzo(d,e,f)chrysene $C_{20}H_{12}$ Molecular mass: 252.3 ICSC # 0104		CAS # 50-32-8 RTECS # <u>DJ3675000</u> EC # 601-032-00-3 October 17, 2005 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants.	T symbol N symbol R: 45-46-60-61-43-50/53 S: 53-45-60-61
ICSC: 0104	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0104

**BENZO(a)PYRENE**

<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> PALE-YELLOW CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005). MAK: Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 496°C Melting point: 178.1°C Density: 1.4 g/cm<sup>3</sup></p> <p>Solubility in water: none (&lt;0.1 g/100 ml) Vapour pressure : negligible Octanol/water partition coefficient as log Pow: 6.04</p>

ENVIRONMENTAL DATA	<p>The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.</p> 
NOTES	
Do NOT take working clothes home. Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.	
ADDITIONAL INFORMATION	
ICSC: 0104	BENZO(a)PYRENE (C) IPCS, CEC, 1994
IMPORTANT LEGAL NOTICE:	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>

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## BENZO(b)FLUORANTHENE

ICSC: 0720


Benz(e)acephenanthrylene 2,3-Benzofluoranthene Benzo(e)fluoranthene 3,4-Benzofluoranthene $C_{20}H_{12}$ Molecular mass: 252.3 ICSC # 0720		CAS # 205-99-2 RTECS # <u>CU1400000</u> EC # 601-034-00-4 March 25, 1999 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61
ICSC: 0720	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0720

**BENZO(b)FLUORANTHENE**

<p>I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2; (DFG 2004).</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans. May cause genetic damage in humans.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 481°C Melting point: 168°C Solubility in water: none</p> <p>Octanol/water partition coefficient as log Pow: 6.12</p>

ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality.	
NOTES		
Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m³. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Card has been partly updated in October 2005. See section Occupational Exposure Limits.		
ADDITIONAL INFORMATION		
ICSC: 0720		BENZO(b)FLUORANTHENE
(C) IPCS, CEC, 1994		
IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

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## BENZO(k)FLUORANTHENE

ICSC: 0721

Dibenzo(b,jk)fluorene 8,9-Benzofluoranthene 11,12-Benzofluoranthene C <sub>20</sub> H <sub>12</sub> Molecular mass: 252.3 ICSC # 0721		CAS # 207-08-9 RTECS # <u>DF6350000</u> EC # 601-036-00-5 March 25, 1999 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety spectacles or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.


SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61
ICSC: 0721	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0721

**BENZO(k)FLUORANTHENE**



<p>I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> <b>YELLOW CRYSTALS</b></p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. <b>MAK:</b> Carcinogen category: 2; (DFG 2004).</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 480°C Melting point: 217°C Solubility in water: none</p> <p>Octanol/water partition coefficient as log Pow: 6.84</p>

ENVIRONMENTAL DATA	<p>This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in crustacea and in fish.</p>	
NOTES		
<p>Benzo(k)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(k)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m<sup>3</sup>. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Card has been partly updated in October 2005. See section Occupational Exposure Limits.</p>		
ADDITIONAL INFORMATION		
ICSC: 0721		BENZO(k)FLUORANTHENE
(C) IPCS, CEC, 1994		
IMPORTANT LEGAL NOTICE:	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>	

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(/niosh/index.htm)

## beta-HEXACHLOROCYCLOHEXANE

ICSC: 0796


1-alpha,2-beta,3-alpha,4-beta,5-alpha,6-beta-Hexachlorocyclohexane beta-1,2,3,4,5,6-Hexachlorocyclohexane beta-Benzenehexachloride (beta-BHC) $C_6H_6Cl_6$ Molecular mass: 290.8 ICSC # 0796		CAS # 319-85-7 RTECS # <u>GV4375000</u> EC # 602-042-00-0 November 24, 1998 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• INHALATION	Cough. Sore throat. See Notes.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.

•EYES		Safety goggles, or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Diarrhoea. Dizziness. Headache. Nausea. Vomiting. Tremors.	Do not eat, drink, or smoke during work.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles).		Well closed. Store in an area without drain or sewer access.	Note: C T symbol N symbol R: 21-25-40-50/53 S: 1/2-22-36/37-45-60-61
ICSC: 0796		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0796

beta-HEXACHLOROCYCLOHEXANE

<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> CRYSTALLINE POWDER.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes in a fire, producing very toxic fumes including phosgene (see ICSC 0007) and hydrogen chloride (see ICSC 0163).</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. MAK: (Inhalable fraction) 0.5 mg/m<sup>3</sup>; Peak limitation category: II(8); skin absorption (H); (DFG 2006).</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin or by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the blood, liver, kidney. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point at 0,07 kPa: 60°C Melting point: 309°C Density: 1.9 g/cm<sup>3</sup></p> <p>Solubility in water: none Vapour pressure, Pa at 20°C: 0.7 Octanol/water partition coefficient as log Pow: 3.8</p>

<b>ENVIRONMENTAL DATA</b>	<p>The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in seafood. The substance may cause long-term effects in the aquatic environment. It is strongly advised that this substance does not enter the environment.</p>	
<b>NOTES</b>		
<p>This substance is a component of the insecticide hexachlorocyclohexane (isomer mixture). Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Also consult ICSC # 0487 (Hexachlorocyclohexane).</p> <p>Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits, Environmental Data.</p>		
<b>ADDITIONAL INFORMATION</b>		
<p>ICSC: 0796 <span style="float: right;">beta-HEXACHLOROCYCLOHEXANE</span> (C) IPCS, CEC, 1994</p>		
<b>IMPORTANT LEGAL NOTICE:</b>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>	

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## CADMIUM

ICSC: 0020

Cd Atomic mass: 112.4 ICSC # 0020			CAS # 7440-43-9 RTECS # <u>EU9800000</u> UN # 2570 EC # 048-002-00-0 April 22, 2005 Validated
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).	Dry sand. Special powder. NO other agents.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.

•EYES	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.		Fireproof. Dry. Keep under inert gas. Separated from ignition sources, oxidants acids, food and feedstuffs .	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Note: E T+ symbol N symbol R: 45-26-48/23/25-62-63-68-50/53 S: 53-45-60-61 UN Hazard Class: 6.1
ICSC: 0020		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0020

**CADMIUM**

I M P O R T A N T D A T A	<p><b>PHYSICAL STATE; APPEARANCE:</b> SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001). Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium , causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: (Total dust) 0.01 mg/m<sup>3</sup>; (Respirable fraction) 0.002 mg/m<sup>3</sup>; as TWA; A2 (suspected human carcinogen); BEI issued; (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004). OSHA PEL*: 1910.1027 TWA 0.005 mg/m<sup>3</sup> *Note: The PEL applies to all Cadmium compounds (as Cd). NIOSH REL*: Ca <u>See Appendix A</u> *Note: The REL applies to all Cadmium compounds (as Cd). NIOSH IDLH: Ca 9 mg/m<sup>3</sup> (as Cd) See: <u>IDLH INDEX</u></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The fume is irritating to the respiratory tract . Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys , resulting in kidney impairment . This substance is carcinogenic to humans.</p>
PHYSICAL PROPERTIES	<p>Boiling point: 765°C Melting point: 321°C Density: 8.6 g/cm<sup>3</sup></p>	<p>Solubility in water: none Auto-ignition temperature: (cadmium metal dust) 250°C</p>

<b>ENVIRONMENTAL DATA</b>	
<b>NOTES</b>	
<p>Reacts violently with fire extinguishing agents such as water, foam, carbon dioxide and halons. Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Do NOT take working clothes home. Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.</p>	
<b>ADDITIONAL INFORMATION</b>	
ICSC: 0020	CADMIUM
(C) IPCS, CEC, 1994	
<b>IMPORTANT LEGAL NOTICE:</b>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>

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(/niosh/index.htm)

## Chlordane

### Synonyms & Trade Names

Chlordan, Chlordano, 1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindane

CAS No.

57-74-9

RTECS No.

PB9800000

DOT ID & Guide

2762 131

Formula

$C_{10}H_6Cl_8$

Conversion

**IDLH****Ca [100 mg/m<sup>3</sup>]****See: 57749****Exposure Limits****NIOSH REL****Ca TWA 0.5 mg/m<sup>3</sup> [skin] See Appendix A ([nengapdx.html](#))****OSHA PEL****TWA 0.5 mg/m<sup>3</sup> [skin]****Measurement Methods****NIOSH [5510](#) ;****OSHA 67****See: NMAM or OSHA Methods****Physical Description****Amber-colored, viscous liquid with a pungent, chlorine-like odor. [insecticide]****Molecular Weight****409.8****Boiling Point****Decomposes**



Freezing Point  
217-228°F

Solubility  
0.0001%

Vapor Pressure  
0.00001 mmHg

Ionization Potential  
?

Specific Gravity  
(77°F): 1.6

Flash Point  
NA

Upper Expositive Limit  
NA

Lower Explosive Limit  
NA

Noncombustible Liquid, but may be utilized in flammable solutions.

Incompatibilities & Reactivities

Strong oxidizers, alkaline reagents

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Blurred vision; confusion; ataxia, delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremor, convulsions; anuria; In Animals: lung, liver, kidney damage; [potential occupational carcinogen]

Target Organs

central nervous system, eyes, lungs, liver, kidneys

Cancer Site

[in animals: liver cancer]

Personal Protection/Sanitation

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet or contaminated

Change: Daily

Provide: Eyewash, Quick drench

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash immediately

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH**

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION MEDICAL TESTS: 0042

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## CHRYSENE

ICSC: 1672

Benzoaphenanthrene 1,2-Benzophenanthrene 1,2,5,6-Dibenzonaphthalene $C_{18}H_{12}$ Molecular mass: 228.3 ICSC # 1672		CAS # 218-01-9 RTECS # GCo7000000 UN # 3077 EC # 601-048-00-0 October 12, 2006 Validated	
			
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.


•EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.		Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	T symbol N symbol R: 45-68-50/53 S: 53-45-60-61 UN Hazard Class: 9 UN Packing Group: III Signal: Warning Health haz-Enviro Suspected of causing cancer Very toxic to aquatic life Toxic to aquatic life with long lasting effects
ICSC: 1672		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 1672

CHRYSENE



<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO BEIGE CRYSTALS OR POWDER</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic fumes . Reacts violently with strong oxidants.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006). MAK: skin absorption (H); Carcinogen category: 2 (DFG 2007).</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed .</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 448°C Melting point: 254 - 256°C Density: 1.3 g/cm<sup>3</sup></p>	<p>Solubility in water: very poor Octanol/water partition coefficient as log Pow: 5.9</p>

<b>ENVIRONMENTAL DATA</b>	<p>The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.</p>	
<b>NOTES</b>		
<p>Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-90GM7-III</p> <p style="text-align: center;">Card has been partially updated in January 2008: see Occupational Exposure Limits.</p>		
<b>ADDITIONAL INFORMATION</b>		
<b>ICSC: 1672</b> <span style="float: right;"><b>CHRYSENE</b></span> <p style="text-align: center;">(C) IPCS, CEC, 1994</p>		
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(/niosh/index.htm)

## 1,2-Dichloroethylene

### Synonyms & Trade Names

Acetylene dichloride, cis-Acetylene dichloride, trans-Acetylene dichloride, sym-Dichloroethylene

CAS No.

540-59-0

RTECS No.

KV9360000

DOT ID & Guide

1150 130P

Formula

ClCH=CHCl

Conversion

1 ppm = 3.97 mg/m<sup>3</sup>

**IDLH****1000 ppm****See: 540590****Exposure Limits****NIOSH REL****TWA 200 ppm (790 mg/m<sup>3</sup>)****OSHA PEL****TWA 200 ppm (790 mg/m<sup>3</sup>)****Measurement Methods****NIOSH 1003 ;****OSHA 7****See: NMAM or OSHA Methods****Physical Description****Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.****Molecular Weight****97.0****Boiling Point****118-140°F**

Freezing Point  
-57 to -115°F

Solubility  
0.4%

Vapor Pressure  
180-265 mmHg

Ionization Potential  
9.65 eV

Specific Gravity  
(77°F): 1.27

Flash Point  
36-39°F

Upper Exposed Limit  
12.8%

Lower Explosive Limit  
5.6%

**Class IB Flammable Liquid:** Fl.P. below 73°F and BP at or above 100°F.

**Incompatibilities & Reactivities**

Strong oxidizers, strong alkalis, potassium hydroxide, copper [Note: Usually contains inhibitors to prevent polymerization.]

**Exposure Routes**

inhalation, ingestion, skin and/or eye contact

**Symptoms**

irritation eyes, respiratory system; central nervous system depression

**Target Organs**

Eyes, respiratory system, central nervous system

**Personal Protection/Sanitation**

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet (flammable)

Change: No recommendation



**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash promptly

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH/OSHA****Up to 1000 ppm:**

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode<sup>£</sup>

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)<sup>£</sup>

(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

**Emergency or planned entry into unknown concentrations or IDLH conditions:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION ICSC CARD: 0436

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## BENZO(b)FLUORANTHENE

ICSC: 0720


Benz(e)acephenanthrylene 2,3-Benzofluoranthene Benzo(e)fluoranthene 3,4-Benzofluoranthene $C_{20}H_{12}$ Molecular mass: 252.3 ICSC # 0720		CAS # 205-99-2 RTECS # <u>CU1400000</u> EC # 601-034-00-4 March 25, 1999 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61
ICSC: 0720	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0720

**BENZO(b)FLUORANTHENE**

<p>I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2; (DFG 2004).</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans. May cause genetic damage in humans.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 481°C Melting point: 168°C Solubility in water: none</p> <p>Octanol/water partition coefficient as log Pow: 6.12</p>

ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality.	
NOTES		
Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m <sup>3</sup> . Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Card has been partly updated in October 2005. See section Occupational Exposure Limits.		
ADDITIONAL INFORMATION		
ICSC: 0720		BENZO(b)FLUORANTHENE (C) IPCS, CEC, 1994
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(/niosh/index.htm)

## BENZO(k)FLUORANTHENE

ICSC: 0721


Dibenzo(b,jk)fluorene 8,9-Benzofluoranthene 11,12-Benzofluoranthene $C_{20}H_{12}$ Molecular mass: 252.3 ICSC # 0721		CAS # 207-08-9 RTECS # <u>DF6350000</u> EC # 601-036-00-5 March 25, 1999 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety spectacles or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61
ICSC: 0721	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0721

**BENZO(k)FLUORANTHENE**

<p>I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> <b>YELLOW CRYSTALS</b></p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. <b>MAK:</b> Carcinogen category: 2; (DFG 2004).</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 480°C Melting point: 217°C Solubility in water: none</p> <p>Octanol/water partition coefficient as log Pow: 6.84</p>

ENVIRONMENTAL DATA	<p>This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in crustacea and in fish.</p>	
NOTES		
<p>Benzo(k)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(k)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m<sup>3</sup>. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Card has been partly updated in October 2005. See section Occupational Exposure Limits.</p>		
ADDITIONAL INFORMATION		
ICSC: 0721		BENZO(k)FLUORANTHENE
(C) IPCS, CEC, 1994		
IMPORTANT LEGAL NOTICE:	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>	

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(/niosh/index.htm)

## beta-HEXACHLOROCYCLOHEXANE

ICSC: 0796

1-alpha,2-beta,3-alpha,4-beta,5-alpha,6-beta-Hexachlorocyclohexane beta-1,2,3,4,5,6-Hexachlorocyclohexane beta-Benzenehexachloride (beta-BHC) $C_6H_6Cl_6$ Molecular mass: 290.8 ICSC # 0796		CAS # 319-85-7 RTECS # <u>GV4375000</u> EC # 602-042-00-0 November 24, 1998 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• INHALATION	Cough. Sore throat. See Notes.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.


•EYES		Safety goggles, or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Diarrhoea. Dizziness. Headache. Nausea. Vomiting. Tremors.	Do not eat, drink, or smoke during work.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles).		Well closed. Store in an area without drain or sewer access.	Note: C T symbol N symbol R: 21-25-40-50/53 S: 1/2-22-36/37-45-60-61
ICSC: 0796		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0796

beta-HEXACHLOROCYCLOHEXANE



<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> CRYSTALLINE POWDER.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes in a fire, producing very toxic fumes including phosgene (see ICSC 0007) and hydrogen chloride (see ICSC 0163).</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. MAK: (Inhalable fraction) 0.5 mg/m<sup>3</sup>; Peak limitation category: II(8); skin absorption (H); (DFG 2006).</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin or by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the blood, liver, kidney. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point at 0,07 kPa: 60°C Melting point: 309°C Density: 1.9 g/cm<sup>3</sup></p> <p>Solubility in water: none Vapour pressure, Pa at 20°C: 0.7 Octanol/water partition coefficient as log Pow: 3.8</p>

<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in seafood. The substance may cause long-term effects in the aquatic environment. It is strongly advised that this substance does not enter the environment.</p>	
<p><b>NOTES</b></p>		
<p>This substance is a component of the insecticide hexachlorocyclohexane (isomer mixture). Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Also consult ICSC # 0487 (Hexachlorocyclohexane). Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits, Environmental Data.</p>		
<p><b>ADDITIONAL INFORMATION</b></p>		
<p>ICSC: 0796 <span style="float: right;">beta-HEXACHLOROCYCLOHEXANE</span> (C) IPCS, CEC, 1994</p>		
<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>	

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## CADMIUM

ICSC: 0020

Cd Atomic mass: 112.4 ICSC # 0020			CAS # 7440-43-9 RTECS # <u>EU9800000</u> UN # 2570 EC # 048-002-00-0 April 22, 2005 Validated
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).	Dry sand. Special powder. NO other agents.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.

•EYES	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.		Fireproof. Dry. Keep under inert gas. Separated from ignition sources, oxidants acids, food and feedstuffs .	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Note: E T+ symbol N symbol R: 45-26-48/23/25-62-63-68-50/53 S: 53-45-60-61 UN Hazard Class: 6.1
ICSC: 0020		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0020

## CADMIUM

I M P O R T A N T D A T A	<p><b>PHYSICAL STATE; APPEARANCE:</b> SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001). Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium , causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: (Total dust) 0.01 mg/m³; (Respirable fraction) 0.002 mg/m³; as TWA; A2 (suspected human carcinogen); BEI issued; (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004). OSHA PEL*: 1910.1027 TWA 0.005 mg/m³ *Note: The PEL applies to all Cadmium compounds (as Cd). NIOSH REL*: Ca <u>See Appendix A</u> *Note: The REL applies to all Cadmium compounds (as Cd). NIOSH IDLH: Ca 9 mg/m³ (as Cd) See: <u>IDLH INDEX</u></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The fume is irritating to the respiratory tract . Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys , resulting in kidney impairment . This substance is carcinogenic to humans.</p>
PHYSICAL PROPERTIES	Boiling point: 765°C Melting point: 321°C Density: 8.6 g/cm³	Solubility in water: none Auto-ignition temperature: (cadmium metal dust) 250°C

<b>ENVIRONMENTAL DATA</b>	
<b>NOTES</b>	
<p>Reacts violently with fire extinguishing agents such as water, foam, carbon dioxide and halons. Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Do NOT take working clothes home. Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.</p>	
<b>ADDITIONAL INFORMATION</b>	
ICSC: 0020	CADMIUM
(C) IPCS, CEC, 1994	
<b>IMPORTANT LEGAL NOTICE:</b>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>

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(/niosh/index.htm)

## Chlordane

### Synonyms & Trade Names

Chlordan, Chlordano, 1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindane

CAS No.

57-74-9

RTECS No.

PB9800000

DOT ID & Guide

2762 131

Formula

$C_{10}H_6Cl_8$

Conversion

**IDLH****Ca [100 mg/m<sup>3</sup>]****See: 57749****Exposure Limits****NIOSH REL****Ca TWA 0.5 mg/m<sup>3</sup> [skin] See Appendix A ([nengapdx.html](#))****OSHA PEL****TWA 0.5 mg/m<sup>3</sup> [skin]****Measurement Methods****NIOSH [5510](#) ;****OSHA 67****See: NMAM or OSHA Methods****Physical Description****Amber-colored, viscous liquid with a pungent, chlorine-like odor. [insecticide]****Molecular Weight****409.8****Boiling Point****Decomposes**

Freezing Point  
217-228°F

Solubility  
0.0001%

Vapor Pressure  
0.00001 mmHg

Ionization Potential  
?

Specific Gravity  
(77°F): 1.6

Flash Point  
NA

Upper Expositive Limit  
NA

Lower Explosive Limit  
NA

Noncombustible Liquid, but may be utilized in flammable solutions.

Incompatibilities & Reactivities

Strong oxidizers, alkaline reagents

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Blurred vision; confusion; ataxia, delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremor, convulsions; anuria; In Animals: lung, liver, kidney damage; [potential occupational carcinogen]

Target Organs

central nervous system, eyes, lungs, liver, kidneys

Cancer Site

[in animals: liver cancer]

Personal Protection/Sanitation

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet or contaminated

Change: Daily

Provide: Eyewash, Quick drench

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash immediately

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH**

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION MEDICAL TESTS: 0042

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(<https://www.cdc.gov/Other/plugins/#pdf>)

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## CHRYSENE

ICSC: 1672


Benzoaphenanthrene 1,2-Benzophenanthrene 1,2,5,6-Dibenzonaphthalene $C_{18}H_{12}$ Molecular mass: 228.3 ICSC # 1672		CAS # 218-01-9 RTECS # GCo7000000 UN # 3077 EC # 601-048-00-0 October 12, 2006 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.

•EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.		Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	T symbol N symbol R: 45-68-50/53 S: 53-45-60-61 UN Hazard Class: 9 UN Packing Group: III Signal: Warning Health haz-Enviro Suspected of causing cancer Very toxic to aquatic life Toxic to aquatic life with long lasting effects
ICSC: 1672		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 1672

CHRYSENE

<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO BEIGE CRYSTALS OR POWDER</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning producing toxic fumes . Reacts violently with strong oxidants.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006). MAK: skin absorption (H); Carcinogen category: 2 (DFG 2007).</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed .</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 448°C Melting point: 254 - 256°C Density: 1.3 g/cm<sup>3</sup></p>	<p>Solubility in water: very poor Octanol/water partition coefficient as log Pow: 5.9</p>

<b>ENVIRONMENTAL DATA</b>	<p>The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.</p>	
<b>NOTES</b>		
<p>Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-90GM7-III</p> <p style="text-align: center;">Card has been partially updated in January 2008: see Occupational Exposure Limits.</p>		
<b>ADDITIONAL INFORMATION</b>		
<b>ICSC: 1672</b>	<b>CHRYSENE</b>  (C) IPCS, CEC, 1994	
<b>IMPORTANT LEGAL NOTICE:</b>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>	

Page last reviewed: July 22, 2015

Page last updated: July 1, 2014

Content source: National Institute for Occupational Safety and Health (<http://www.cdc.gov/NIOSH/>)



(/niosh/index.htm)

## 1,2-Dichloroethylene

### Synonyms & Trade Names

Acetylene dichloride, cis-Acetylene dichloride, trans-Acetylene dichloride, sym-Dichloroethylene

CAS No.

540-59-0

RTECS No.

KV9360000

DOT ID & Guide

1150 130P

Formula

ClCH=CHCl

Conversion

1 ppm = 3.97 mg/m<sup>3</sup>

**IDLH****1000 ppm****See: 540590****Exposure Limits****NIOSH REL****TWA 200 ppm (790 mg/m<sup>3</sup>)****OSHA PEL****TWA 200 ppm (790 mg/m<sup>3</sup>)****Measurement Methods****NIOSH 1003 ;****OSHA 7****See: NMAM or OSHA Methods****Physical Description****Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.****Molecular Weight****97.0****Boiling Point****118-140°F**



Freezing Point  
-57 to -115°F

Solubility  
0.4%

Vapor Pressure  
180-265 mmHg

Ionization Potential  
9.65 eV

Specific Gravity  
(77°F): 1.27

Flash Point  
36-39°F

Upper Exposive Limit  
12.8%

Lower Explosive Limit  
5.6%

**Class IB Flammable Liquid:** Fl.P. below 73°F and BP at or above 100°F.

**Incompatibilities & Reactivities**

Strong oxidizers, strong alkalis, potassium hydroxide, copper [Note: Usually contains inhibitors to prevent polymerization.]

**Exposure Routes**

inhalation, ingestion, skin and/or eye contact

**Symptoms**

irritation eyes, respiratory system; central nervous system depression

**Target Organs**

Eyes, respiratory system, central nervous system

**Personal Protection/Sanitation**

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet (flammable)

Change: No recommendation

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash promptly

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH/OSHA****Up to 1000 ppm:**

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode<sup>£</sup>

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)<sup>£</sup>

(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

**Emergency or planned entry into unknown concentrations or IDLH conditions:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION ICSC CARD: 0436

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(/niosh/index.htm)

## DDT

### Synonyms & Trade Names

p,p'-DDT, Dichlorodiphenyltrichloroethane, 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane

CAS No.  
50-29-3

RTECS No.  
KJ3325000

DOT ID & Guide  
2761 151

Formula  
 $(C_6H_4Cl)_2CHCl_3$

Conversion

IDLH

Ca [500 mg/m<sup>3</sup>]

See: 50293

#### Exposure Limits

NIOSH REL

Ca TWA 0.5 mg/m<sup>3</sup> See Appendix A ([nengapdxa.html](#))

OSHA PEL

TWA 1 mg/m<sup>3</sup> [skin]

#### Measurement Methods

NIOSH S274 (II-3)

See: NMAM or OSHA Methods

#### Physical Description

Colorless crystals or off-white powder with a slight, aromatic odor. [pesticide]

#### Molecular Weight

354.5

#### Boiling Point

230°F (Decomposes)



**Melting Point**  
**227°F**

**Solubility**  
**Insoluble**

**Vapor Pressure**  
**0.0000002 mmHg**

**Ionization Potential**  
**?**

**Specific Gravity**  
**0.99**

**Flash Point**  
**162-171°F**

**Upper Expositive Limit**  
**?**

**Lower Explosive Limit**  
**?**

**Combustible Solid****Incompatibilities & Reactivities**

Strong oxidizers, alkalis

**Exposure Routes**

inhalation, skin absorption, ingestion, skin and/or eye contact

**Symptoms**

irritation eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]

**Target Organs**

Eyes, skin, central nervous system, kidneys, liver, peripheral nervous system

**Cancer Site**

[in animals: liver, lung & lymphatic tumors]

**Personal Protection/Sanitation**

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated/Daily

Remove: When wet or contaminated

Change: Daily

Provide: Eyewash, Quick drench

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash promptly

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH**

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION ICSC CARD: 0034 MEDICAL TESTS: 0065

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(/niosh/index.htm)

## DIBENZO(a,h)ANTHRACENE

ICSC: 0431

1,25,6-Dibenzanthracene $C_{22}H_{14}$ Molecular mass: 278.4 ICSC # 0431		CAS # 53-70-3 RTECS # <u>HN2625000</u> EC # 601-041-00-2 October 23, 1995 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES	Redness.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING


Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61
ICSC: 0431	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0431

DIBENZO(a,h)ANTHRACENE



<p>I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALLINE POWDER.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b></p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established.</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the skin, resulting in photosensitization. This substance is probably carcinogenic to humans.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 524°C Melting point: 267°C Relative density (water = 1): 1.28</p> <p>Solubility in water: none Octanol/water partition coefficient as log Pow: 6.5</p>

<b>ENVIRONMENTAL DATA</b>	Bioaccumulation of this chemical may occur in seafood. 	
<b>NOTES</b>		
<p>This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH). Card has been partly updated in October 2005. See section EU classification.</p>		
<b>ADDITIONAL INFORMATION</b>		
ICSC: 0431	DIBENZO(a,h)ANTHRACENE (C) IPCS, CEC, 1994	
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(/niosh/index.htm)

## Dieldrin

### Synonyms & Trade Names

HEOD, 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo,exo-5,8-dimethanonaphthalene

CAS No.

60-57-1

RTECS No.

IO1750000

DOT ID & Guide

2761 151

Formula

$C_{12}H_8Cl_6O$

Conversion

**IDLH****Ca [50 mg/m<sup>3</sup>]****See: 60571****Exposure Limits****NIOSH REL****Ca TWA 0.25 mg/m<sup>3</sup> [skin] See Appendix A ([nengapdx.html](#))****OSHA PEL****TWA 0.25 mg/m<sup>3</sup> [skin]****Measurement Methods****NIOSH S283 (II-3)****See: NMAM or OSHA Methods****Physical Description****Colorless to light-tan crystals with a mild, chemical odor. [insecticide]****Molecular Weight****380.9****Boiling Point****Decomposes**

**Melting Point****349°F****Solubility****0.02%****Vapor Pressure****(77°F):  $8 \times 10^{-7}$  mmHg****Ionization Potential****?****Specific Gravity****1.75****Flash Point****NA****Upper Expositive Limit****NA****Lower Explosive Limit****NA**

**Noncombustible Solid****Incompatibilities & Reactivities**

Strong oxidizers, active metals such as sodium, strong acids, phenols

**Exposure Routes**

inhalation, skin absorption, ingestion, skin and/or eye contact

**Symptoms**

headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions; coma; ; In Animals: liver, kidney damage [potential occupational carcinogen]

**Target Organs**

central nervous system, liver, kidneys, skin

**Cancer Site**

[in animals: lung, liver, thyroid & adrenal gland tumors]

**Personal Protection/Sanitation**

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated/Daily

Remove: When wet or contaminated

Change: Daily

Provide: Eyewash, Quick drench



**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash immediately

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH**

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION ICSC CARD: 0787 MEDICAL TESTS: 0077

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## Endosulfan

### Synonyms & Trade Names

Benzoepin, Endosulphan, 6,7,8,9,10-Hexachloro-1,5,5a,6,9,9a-hexachloro-6,9-methano-2,4,3-benzo-dioxathiepin-3-oxide, Thiodan®

#### CAS No.

115-29-7

#### RTECS No.

RB9275000

#### DOT ID & Guide

2761 151

#### Formula

$C_9H_6Cl_6O_3S$

#### Conversion

IDLH

N.D.

See: IDLH INDEX

#### Exposure Limits

NIOSH REL

TWA 0.1 mg/m<sup>3</sup> [skin]

OSHA PEL

none See Appendix G ([nengapdxg.html](#))

#### Measurement Methods

OSHA PV2023

See: NMAM or OSHA Methods

#### Physical Description

Brown crystals with a slight, sulfur dioxide odor. [insecticide] [Note: Technical product is a tan, waxy, isomer mixture.]

#### Molecular Weight

406.9

#### Boiling Point

Decomposes

**Melting Point**  
**223°F**

**Solubility**  
**0.00001%**

**Vapor Pressure**  
**(77°F): 0.00001 mmHg**

**Ionization Potential**  
**?**

**Specific Gravity**  
**1.74**

**Flash Point**  
**NA**

**Upper Expositive Limit**  
**NA**

**Lower Explosive Limit**  
**NA**

Noncombustible Solid, but may be dissolved in flammable liquids.

#### Incompatibilities & Reactivities

Alkalis, acids, water [Note: Corrosive to iron. Hydrolyzes slowly on contact with water or decomposes in presence of alkalis and acids to form sulfur dioxide.]

#### Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

#### Symptoms

irritation skin; nausea, confusion, agitation, flushing, dry mouth, tremor, convulsions, headache; In Animals: kidney, liver injury; decreased testis weight

#### Target Organs

Skin, central nervous system, liver, kidneys, reproductive system

#### Personal Protection/Sanitation

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet or contaminated

Change: Daily

Provide: Eyewash, Quick drench

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap flush immediately

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations**

Not available.

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also

INTRODUCTION ICSC CARD: 0742

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(/niosh/index.htm)

## Ethyl benzene

### Synonyms & Trade Names

Ethylbenzol, Phenylethane

#### CAS No.

100-41-4

#### RTECS No.

DA0700000

#### DOT ID & Guide

1175 130

#### Formula

$\text{CH}_3\text{CH}_2\text{C}_6\text{H}_5$

#### Conversion

1 ppm = 4.34 mg/m<sup>3</sup>

**IDLH****800 ppm [10%LEL]****See: 100414****Exposure Limits****NIOSH REL****TWA 100 ppm (435 mg/m<sup>3</sup>) ST 125 ppm (545 mg/m<sup>3</sup>)****OSHA PEL****TWA 100 ppm (435 mg/m<sup>3</sup>) See Appendix G ([nengapdxg.html](#))****Measurement Methods****NIOSH 1501 ;****OSHA 7, 1002****See: NMAM or OSHA Methods****Physical Description****Colorless liquid with an aromatic odor.****Molecular Weight****106.2****Boiling Point****277°F**

Freezing Point  
-139°F

Solubility  
0.01%

Vapor Pressure  
7 mmHg

Ionization Potential  
8.76 eV

Specific Gravity  
0.87

Flash Point  
55°F

Upper Expositive Limit  
6.7%

Lower Explosive Limit  
0.8%

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

**Incompatibilities & Reactivities**

Strong oxidizers

**Exposure Routes**

inhalation, ingestion, skin and/or eye contact

**Symptoms**

irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma

**Target Organs**

Eyes, skin, respiratory system, central nervous system

**Personal Protection/Sanitation**

(See protection codes (protect.html))

Skin:Prevent skin contact

Eyes:Prevent eye contact

Wash skin:When contaminated

Remove:When wet (flammable)

Change:No recommendation

**First Aid**

(See procedures (firstaid.html))

Eye:Irrigate immediately

Skin:Water flush promptly

Breathing: Respiratory support  
Swallow: Medical attention immediately

#### Respirator Recommendations

##### NIOSH/OSHA

Up to 800 ppm:

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)\*

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)\*

(APF = 10) Any supplied-air respirator\*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also

INTRODUCTION ICSC CARD: 0268 MEDICAL TESTS: 0098

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## HEPTACHLOR

ICSC: 0743


1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene 1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene 3,4,5,6,8,8a-Heptachlorodicyclopentadiene C <sub>10</sub> H <sub>5</sub> Cl <sub>7</sub> Molecular mass: 373.3 ICSC # 0743			CAS # 76-44-8 RTECS # <u>PCo700000</u> UN # 2761 EC # 602-046-00-2 July 05, 2003 Validated
<div></div>			
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	
•INHALATION	Convulsions. Tremor.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! (See Inhalation).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.

•EYES		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	(See Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus.		Provision to contain effluent from fire extinguishing. Separated from strong oxidants, metals, food and feedstuffs. Well closed. Keep in a well-ventilated room. Dry.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 24/25-33-40-50/53 S: 1/2-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II
ICSC: 0743		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0743

## HEPTACHLOR

<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> WHITE CRYSTALS OR TAN WAXY SOLID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating above 160°C producing toxic fumes including hydrogen chloride . Reacts with strong oxidants . Attacks metal.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.05 mg/m<sup>3</sup> as TWA; (skin); A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004). MAK: (Inhalable fraction) 0.5 mg/m<sup>3</sup>; skin absorption (H); Peak limitation category: II(2); Carcinogen category: 3B; (DFG 2004). OSHA PEL: TWA 0.5 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.5 mg/m<sup>3</sup> skin <u>See Appendix A</u> NIOSH IDLH: Ca 35 mg/m<sup>3</sup> See: <u>76448</u></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of dusts from powder concentrates, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system .</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the liver . This substance is possibly carcinogenic to humans.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Decomposes below boiling point at 160°C Melting point: 95-96°C Density: 1.6 g/cm<sup>3</sup></p>	<p>Solubility in water: none Vapour pressure, Pa at 25°C: 0.053 Octanol/water partition coefficient as log Pow: 5.27-5.44</p>

ENVIRONMENTAL DATA	<p>The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur along the food chain, for example in fish and in milk. The substance may cause long-term effects in the aquatic environment. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.</p> 
NOTES	
<p>Other melting points: 46-74°C for the technical product. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Depending on the degree of exposure, periodic medical examination is suggested. Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-61GT7-II</p>	
ADDITIONAL INFORMATION	
ICSC: 0743	HEPTACHLOR (C) IPCS, CEC, 1994
IMPORTANT LEGAL NOTICE:	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>

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(/niosh/index.htm)

## INDENO(1,2,3-cd)PYRENE

ICSC: 0730

o-Phenylenepyrene 2,3-Phenylenepyrene $C_{22}H_{12}$ Molecular mass: 276.3 ICSC # 0730		CAS # 193-39-5 RTECS # <u>NK9300000</u> March 25, 1999 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.


SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	
ICSC: 0730	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0730

INDENO(1,2,3-cd)PYRENE

<p>I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> <b>YELLOW CRYSTALS</b></p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. <b>MAK:</b> Carcinogen category: 2; (DFG 2004).</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 536°C Melting point: 164°C Solubility in water: none</p> <p>Octanol/water partition coefficient as log Pow: 6.58</p>



ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish.	
NOTES		
Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m³. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Card has been partly updated in October 2005. See section Occupational Exposure Limits.		
ADDITIONAL INFORMATION		
ICSC: 0730		INDENO(1,2,3-cd)PYRENE
(C) IPCS, CEC, 1994		
IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

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## CUMENE

ICSC: 0170


(1-Methylethyl)benzene 2-Phenylpropane Isopropylbenzene $C_9H_{12}$ / $C_6H_5CH(CH_3)_2$ Molecular mass: 120.2 ICSC # 0170		CAS # 98-82-8 RTECS # <u>GR8575000</u> UN # 1918 EC # 601-024-00-X April 13, 2000 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Above 31°C explosive vapour/air mixtures may be formed.	Above 31°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
• INHALATION	Dizziness. Ataxia. Drowsiness. Headache. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN	Dry skin.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.

•EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: filter respirator for organic gases and vapours.		Fireproof. Separated from strong oxidants, acids. Cool. Keep in the dark. Store only if stabilized.	Marine pollutant. Note: C Xn symbol N symbol R: 10-37-51/53-65 S: 2-24-37-61-62 UN Hazard Class: 3 UN Packing Group: III
ICSC: 0170		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0170

**CUMENE**

<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with acids and strong oxidants causing fire and explosion hazard. The substance can form explosive peroxides.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 50 ppm as TWA; (ACGIH 2004). MAK: 50 ppm, 250 mg/m<sup>3</sup>; Peak limitation category: II(4); skin absorption (H); Pregnancy risk group: C; (DFG 2004). OSHA PEL: TWA 50 ppm (245 mg/m<sup>3</sup>) skin NIOSH REL: TWA 50 ppm (245 mg/m<sup>3</sup>) skin NIOSH IDLH: 900 ppm 10%LEL See: <u>98828</u></p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and through the skin.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20° C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the skin . Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system . Exposure far above the OEL may result in unconsciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis.</p>
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<b>PHYSICAL PROPERTIES</b>	Boiling point: 152°C Melting point: -96°C Relative density (water = 1): 0.90 Solubility in water: none Vapour pressure, Pa at 20°C: 427 Relative vapour density (air = 1): 4.2 Relative density of the vapour/air- mixture at 20°C (air = 1): 1.01 Flash point: 31°C c.c. Auto-ignition temperature: 420°C Explosive limits, vol% in air: 0.9-6.5 Octanol/water partition coefficient as log Pow: 3.66
<b>ENVIRONMENTAL DATA</b>	The substance is toxic to aquatic organisms. 
<b>NOTES</b>	
Check for peroxides prior to distillation; eliminate if found. Card has been partly updated in April 2005. See sections Occupational Exposure Limits, Emergency Response. Transport Emergency Card: TEC (R)-30S1918 or 30GF1-III NFPA Code: H2; F3; R1	
<b>ADDITIONAL INFORMATION</b>	
ICSC: 0170 <span style="float: right;">CUMENE</span> (C) IPCS, CEC, 1994	
<b>IMPORTANT LEGAL NOTICE:</b>	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

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## Lead

### Synonyms & Trade Names

Lead metal, Plumbum

CAS No.

7439-92-1

RTECS No.

OF7525000

DOT ID & Guide

Formula

Pb

Conversion

**IDLH**100 mg/m<sup>3</sup> (as Pb)

See: 7439921

**Exposure Limits****NIOSH REL**

TWA (8-hour) 0.050 mg/m<sup>3</sup> See Appendix C (nengapdx.html) [\*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]

**OSHA PEL**

[1910.1025] TWA 0.050 mg/m<sup>3</sup> See Appendix C (nengapdx.html) [\*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.]

**Measurement Methods**

NIOSH 7082 , 7105 , 7300 , 7301 , 7303 , 7700 , 7701 , 7702 ,  
9100 , 9102 , 9105 ;

OSHA ID206 , ID121 , ID125G

See: NMAM or OSHA Methods

**Physical Description**

A heavy, ductile, soft, gray solid.

**Molecular Weight**

207.2

**Boiling Point**

3164°F



**Melting Point**  
**621°F**

**Solubility**  
**Insoluble**

**Vapor Pressure**  
**0 mmHg (approx)**

**Ionization Potential**  
**NA**

**Specific Gravity**  
**11.34**

**Flash Point**  
**NA**

**Upper Expositive Limit**  
**NA**

**Lower Explosive Limit**  
**NA**

**Noncombustible Solid in bulk form.**

**Incompatibilities & Reactivities**

**Strong oxidizers, hydrogen peroxide, acids**

**Exposure Routes**

**inhalation, ingestion, skin and/or eye contact**

**Symptoms**

**lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension**

**Target Organs**

**Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue**

**Personal Protection/Sanitation**

**(See protection codes (protect.html))**

**Skin:Prevent skin contact**

**Eyes:Prevent eye contact**

**Wash skin:Daily**

**Remove:When wet or contaminated**

**Change:Daily**

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap flush promptly

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations**

(See Appendix E) ([nengapdx.html](#))

**NIOSH/OSHA**

Up to 0.5 mg/m<sup>3</sup>:

(APF = 10) Any air-purifying respirator with an N100, R100, or P100 filter (including N100, R100, and P100 filtering facepieces) except quarter-mask respirators.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m<sup>3</sup>:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter.

Up to 2.5 mg/m<sup>3</sup>:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m<sup>3</sup>:

(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Up to 100 mg/m<sup>3</sup>:

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also

INTRODUCTION ICSC CARD: 0052 MEDICAL TESTS: 0127

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How do I view different file formats (PDF, DOC, PPT, MPEG) on this site?

(<https://www.cdc.gov/Other/plugins/>)

(<https://www.cdc.gov/Other/plugins/#pdf>)

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## MERCURY

ICSC: 0056

Quicksilver Liquid silver Hg ICSC # 0056		 CAS # 7439-97-6 RTECS # <u>OV4550000</u> UN # 2809 EC # 080-001-00-0 April 22, 2004 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.


•SKIN	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.		Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs . Well closed.	Special material. Do not transport with food and feedstuffs. T symbol N symbol R: 23-33-50/53 S: 1/2-7-45-60-61 UN Hazard Class: 8 UN Packing Group: III
ICSC: 0056		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0056

## MERCURY



<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ROUTES OF EXPOSURE: ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL. The substance can be absorbed into the body by inhalation of its vapour and through the skin , also as a vapour!</p> <p><b>PHYSICAL DANGERS:</b> <b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.025 mg/m<sup>3</sup> as TWA; (skin); A4; BEI issued; (ACGIH 2004). MAK: 0.1 mg/m<sup>3</sup>; Sh; Peak limitation category: II(8); Carcinogen category: 3B; (DFG 2003). OSHA PEL<sup>†</sup>: C 0.1 mg/m<sup>3</sup> NIOSH REL: Hg Vapor: TWA 0.05 mg/m<sup>3</sup> skin Other: C 0.1 mg/m<sup>3</sup> skin NIOSH IDLH: 10 mg/m<sup>3</sup> (as Hg) See: <a href="#">7439976</a></p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20° C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the central nervous system and kidneys , resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. May cause inflammation and discoloration of the gums. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
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<b>PHYSICAL PROPERTIES</b>	Boiling point: 357°C Melting point: -39°C Relative density (water = 1): 13.5 Solubility in water: none Vapour pressure, Pa at 20°C: 0.26 Relative vapour density (air = 1): 6.93 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009 Electrical conductivity (NOT on card): $1.04 \times 10^{(+18)}$ pS/m
<b>ENVIRONMENTAL DATA</b>	The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish. 
<b>NOTES</b>	
Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home. Transport Emergency Card: TEC (R)-8oGC9-II+III	
<b>ADDITIONAL INFORMATION</b>	
ICSC: 0056 <span style="float: right;">MERCURY</span>	(C) IPCS, CEC, 1994
<b>IMPORTANT LEGAL NOTICE:</b>	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

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## METHOXYCHLOR

ICSC: 1306


1,1-(2,2,2-Trichloroethylidene)bis(4-methoxybenzene) 1,1,1-Trichloro-2,2-bis(p-methoxyphenyl)ethane Dimethoxy-DDT $C_{16}H_{15}Cl_3O_2$ Molecular mass: 345.7 ICSC # 1306		CAS # 72-43-5 RTECS # <u>KJ3675000</u> March 26, 1999 Validated La, ntry of chemistry data: 25-11-1998.	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, alcohol-resistant foam, water spray, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• INHALATION	See Ingestion.	Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.

•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Convulsions. Diarrhoea. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Give plenty of water to drink. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P2 filter respirator for harmful particles.		Separated from food and feedstuffs . Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs.
ICSC: 1306		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 1306

## METHOXYCHLOR

<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO LIGHT YELLOW CRYSTALS , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating and on burning producing toxic and corrosive gases including hydrogen chloride (see ICSC 0163). Reacts with oxidants . Attacks some plastics and rubber.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 10 mg/m<sup>3</sup> as TWA; A4 (not classifiable as a human carcinogen); (ACGIH 2004). MAK: (Inhalable fraction) 15 mg/m<sup>3</sup>; Peak limitation category: II(8); Pregnancy risk group: D; (DFG 2004). OSHA PEL<sup>†</sup>: TWA 15 mg/m<sup>3</sup> NIOSH REL: Ca <u>See Appendix A</u> NIOSH IDLH: Ca 5000 mg/m<sup>3</sup> See: <u>72435</u></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying or when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the liver, kidneys, central nervous system, when ingested in large amounts. Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Melting point: 89°C Density: 1.4 g/cm<sup>3</sup></p>	<p>Solubility in water: none Vapour pressure: negligible Octanol/water partition coefficient as log Pow: 4.68-5.08</p>

<b>ENVIRONMENTAL DATA</b>	<p>The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.</p>	
<b>NOTES</b>		
<p>Temperature of decomposition unknown in literature. Depending on the degree of exposure, periodic medical examination is suggested. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Maralate, Marlate, Metox, Prentox, Methoxicide are trade names. See also ICSC0034 for DDT. Card has been partly updated in April 2005. See section Occupational Exposure Limits.</p>		
<b>ADDITIONAL INFORMATION</b>		
ICSC: 1306	(C) IPCS, CEC, 1994	METHOXYCHLOR
<b>IMPORTANT LEGAL NOTICE:</b>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>	

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Page last updated: July 1, 2014

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(/niosh/index.htm)

## m-Xylene

### Synonyms & Trade Names

1,3-Dimethylbenzene, meta-Xylene, m-Xylol

#### CAS No.

108-38-3

#### RTECS No.

ZE2275000

#### DOT ID & Guide

1307 130

#### Formula

$C_6H_4(CH_3)_2$

#### Conversion

1 ppm = 4.34 mg/m<sup>3</sup>



IDLH

900 ppm

See: 95476

#### Exposure Limits

NIOSH REL

TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>)

OSHA PEL

TWA 100 ppm (435 mg/m<sup>3</sup>) See Appendix G ([nengapdxg.html](#))

#### Measurement Methods

NIOSH [1501](#) , [3800](#) ;

OSHA 1002

See: NMAM or OSHA Methods

#### Physical Description

Colorless liquid with an aromatic odor.

#### Molecular Weight

106.2

#### Boiling Point

282°F

Freezing Point  
-54°F

Solubility  
Slight

Vapor Pressure  
9 mmHg

Ionization Potential  
8.56 eV

Specific Gravity  
0.86

Flash Point  
82°F

Upper Expositive Limit  
7.0%

Lower Explosive Limit  
1.1%

**Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.**

**Incompatibilities & Reactivities**

**Strong oxidizers, strong acids**

**Exposure Routes**

**inhalation, skin absorption, ingestion, skin and/or eye contact**

**Symptoms**

**irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis**

**Target Organs**

**Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys**

**Personal Protection/Sanitation**

**(See protection codes (protect.html))**

**Skin:Prevent skin contact**

**Eyes:Prevent eye contact**

**Wash skin:When contaminated**

**Remove:When wet (flammable)**

**Change:No recommendation**

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash promptly

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH/OSHA****Up to 900 ppm:**

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)\*

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)\*

(APF = 10) Any supplied-air respirator\*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

**Emergency or planned entry into unknown concentrations or IDLH conditions:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION ICSC CARD: 0085

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(/niosh/index.htm)

## Naphthalene

### Synonyms & Trade Names

Naphthalin, Tar camphor, White tar

#### CAS No.

91-20-3

#### RTECS No.

QJ0525000

#### DOT ID & Guide

1334 133(crude or refined)

2304 133(molten)

#### Formula

$C_{10}H_8$

#### Conversion

1 ppm = 5.24 mg/m<sup>3</sup>

**IDLH****250 ppm****See: 91203****Exposure Limits****NIOSH REL****TWA 10 ppm (50 mg/m<sup>3</sup>) ST 15 ppm (75 mg/m<sup>3</sup>)****OSHA PEL****TWA 10 ppm (50 mg/m<sup>3</sup>) See Appendix G ([nengapdxg.html](#))****Measurement Methods****NIOSH [1501](#) ;****OSHA 35****See: NMAM or OSHA Methods****Physical Description****Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]****Molecular Weight****128.2****Boiling Point****424°F**



**Melting Point****176°F****Solubility****0.003%****Vapor Pressure****0.08 mmHg****Ionization Potential****8.12 eV****Specific Gravity****1.15****Flash Point****174°F****Upper Expositive Limit****5.9%****Lower Explosive Limit****0.9%**

**Combustible Solid, but will take some effort to ignite.**

**Incompatibilities & Reactivities**

**Strong oxidizers, chromic anhydride**

**Exposure Routes**

**inhalation, skin absorption, ingestion, skin and/or eye contact**

**Symptoms**

**irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage**

**Target Organs**

**Eyes, skin, blood, liver, kidneys, central nervous system**

**Personal Protection/Sanitation**

**(See protection codes (protect.html))**

**Skin:Prevent skin contact**

**Eyes:Prevent eye contact**

**Wash skin:When contaminated**

**Remove:When wet or contaminated**

**Change:Daily**

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Molten flush immediately/solid-liquid soap wash promptly

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH/OSHA****Up to 100 ppm:**

(APF = 10) Any air-purifying half-mask respirator with organic vapor cartridge(s) in combination with an N95, R95, or P95 filter. The following filters may also be used: N99, R99, P99, N100, R100, P100.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.\*

(APF = 10) Any supplied-air respirator\*

**Up to 250 ppm:**

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode\*

(APF = 50) Any air-purifying full-facepiece respirator equipped with organic vapor cartridge(s) in combination with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

(APF = 25) Any powered, air-purifying respirator with an organic vapor cartridge in combination with a high-efficiency particulate filter.\*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

**Emergency or planned entry into unknown concentrations or IDLH conditions:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also

INTRODUCTION ICSC CARD: 0667 MEDICAL TESTS: 0152

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(/niosh/index.htm)

## o-Xylene

### Synonyms & Trade Names

1,2-Dimethylbenzene, ortho-Xylene, o-Xylol

CAS No.

95-47-6

RTECS No.

ZE2450000

DOT ID & Guide

1307 130

Formula

$C_6H_4(CH_3)_2$

Conversion

1 ppm = 4.34 mg/m<sup>3</sup>

IDLH

900 ppm

See: 95476

#### Exposure Limits

NIOSH REL

TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>)

OSHA PEL

TWA 100 ppm (435 mg/m<sup>3</sup>) See Appendix G ([nengapdxg.html](#))

#### Measurement Methods

NIOSH [1501](#) , [3800](#) ;

OSHA 1002

See: NMAM or OSHA Methods

#### Physical Description

Colorless liquid with an aromatic odor.

#### Molecular Weight

106.2

#### Boiling Point

292°F



Freezing Point  
-13°F

Solubility  
0.02%

Vapor Pressure  
7 mmHg

Ionization Potential  
8.56 eV

Specific Gravity  
0.88

Flash Point  
90°F

Upper Expositive Limit  
6.7%

Lower Explosive Limit  
0.9%

**Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.**

**Incompatibilities & Reactivities**

**Strong oxidizers, strong acids**

**Exposure Routes**

**inhalation, skin absorption, ingestion, skin and/or eye contact**

**Symptoms**

**irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis**

**Target Organs**

**Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys**

**Personal Protection/Sanitation**

**(See protection codes (protect.html))**

**Skin:Prevent skin contact**

**Eyes:Prevent eye contact**

**Wash skin:When contaminated**

**Remove:When wet (flammable)**

**Change:No recommendation**

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash promptly

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH/OSHA****Up to 900 ppm:**

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)\*

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)\*

(APF = 10) Any supplied-air respirator\*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

**Emergency or planned entry into unknown concentrations or IDLH conditions:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION ICSC CARD: 0084

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(/niosh/index.htm)

## p-Xylene

### Synonyms & Trade Names

1,4-Dimethylbenzene, para-Xylene, p-Xylol

#### CAS No.

106-42-3

#### RTECS No.

ZE2625000

#### DOT ID & Guide

1307 130

#### Formula

$C_6H_4(CH_3)_2$

#### Conversion

1 ppm = 4.41 mg/m<sup>3</sup>

IDLH

900 ppm

See: 95476

#### Exposure Limits

NIOSH REL

TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>)

OSHA PEL

TWA 100 ppm (435 mg/m<sup>3</sup>) See Appendix G ([nengapdxg.html](#))

#### Measurement Methods

NIOSH [1501](#) , [3800](#) ;

OSHA 1002

See: NMAM or OSHA Methods

#### Physical Description

Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]

#### Molecular Weight

106.2

#### Boiling Point

281°F

Freezing Point  
56°F

Solubility  
0.02%

Vapor Pressure  
9 mmHg

Ionization Potential  
8.44 eV

Specific Gravity  
0.86

Flash Point  
81°F

Upper Expositive Limit  
7.0%

Lower Explosive Limit  
1.1%



**Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.**

**Incompatibilities & Reactivities**

**Strong oxidizers, strong acids**

**Exposure Routes**

**inhalation, skin absorption, ingestion, skin and/or eye contact**

**Symptoms**

**irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis**

**Target Organs**

**Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys**

**Personal Protection/Sanitation**

**(See protection codes (protect.html))**

**Skin:Prevent skin contact**

**Eyes:Prevent eye contact**

**Wash skin:When contaminated**

**Remove:When wet (flammable)**

**Change:No recommendation**

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash promptly

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH/OSHA****Up to 900 ppm:**

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)\*

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)\*

(APF = 10) Any supplied-air respirator\*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

**Emergency or planned entry into unknown concentrations or IDLH conditions:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

**See also**

INTRODUCTION ICSC CARD: 0086

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## PYRENE

ICSC: 1474


Benzo (d,e,f) phenanthrene beta-Pyrene $C_{16}H_{10}$ Molecular mass: 202.26 ICSC # 1474		CAS # 129-00-0 RTECS # <u>UR2450000</u> November 27, 2003 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Water spray, carbon dioxide, dry powder, alcohol-resistant foam, or polymer foam.
EXPLOSION			
EXPOSURE			
•INHALATION		Avoid inhalation of dust .	Fresh air, rest.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder. Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles.)	Separated from strong oxidants. Keep in a well-ventilated room.	Do not transport with food and feedstuffs.
ICSC: 1474	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 1474

## PYRENE

<p>I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> PALE YELLOW OR COLOURLESS SOLID IN VARIOUS FORMS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating producing irritating fumes .</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. MAK not established.</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation , through the skin and by ingestion .</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Exposure to sun may provoke an irritating effect of pyrene on skin and lead to chronic skin discoloration.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b></p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 404°C Melting point: 151°C Density: 1.27 g/cm<sup>3</sup></p> <p>Solubility in water: 0.135 mg/l at 25°C Vapour pressure, Pa at °C: 0.08 Octanol/water partition coefficient as log Pow: 4.88</p>

ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in crustacea, in fish, in milk, in algae and in molluscs. It is strongly advised that this substance does not enter the environment. 
NOTES	
Pyrene is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, pyrene may be encountered as a laboratory chemical in its pure form. Health effects of exposure to the substance have not been investigated adequately. See ICSC 1415 Coal-tar pitch.	
ADDITIONAL INFORMATION	
ICSC: 1474 <span style="float: right;">PYRENE</span> (C) IPCS, CEC, 1994	
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(/niosh/index.htm)

## Selenium

### Synonyms & Trade Names

Elemental selenium, Selenium alloy

CAS No.

7782-49-2

RTECS No.

VS7700000

DOT ID & Guide

2658 152(powder)

Formula

Se

Conversion

**IDLH****1 mg/m<sup>3</sup> (as Se)****See: 7782492****Exposure Limits****NIOSH REL****TWA 0.2 mg/m<sup>3</sup> [\*Note: The REL also applies to other selenium compounds (as Se) except Selenium hexafluoride.]****OSHA PEL****TWA 0.2 mg/m<sup>3</sup> [\*Note: The PEL also applies to other selenium compounds (as Se) except Selenium hexafluoride.]****Measurement Methods****NIOSH S190 (II-7) , Z300 , Z301 , Z303 , 9102 ;****OSHA ID121****See: NMAM or OSHA Methods****Physical Description****Amorphous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.]****Molecular Weight****79.0****Boiling Point****1265°F**

**Melting Point**  
**392°F**

**Solubility**  
**Insoluble**

**Vapor Pressure**  
**0 mmHg (approx)**

**Ionization Potential**  
**NA**

**Specific Gravity**  
**4.28**

**Flash Point**  
**NA**

**Upper Expositive Limit**  
**NA**

**Lower Explosive Limit**  
**NA**

**Combustible Solid****Incompatibilities & Reactivities**

Acids, strong oxidizers, chromium trioxide, potassium bromate, cadmium

**Exposure Routes**

inhalation, ingestion, skin and/or eye contact

**Symptoms**

irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; In Animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage

**Target Organs**

Eyes, skin, respiratory system, liver, kidneys, blood, spleen

**Personal Protection/Sanitation**

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: No recommendation

Wash skin: When contaminated

Remove: When wet or contaminated

Change: No recommendation

Provide: Quick drench

**First Aid**

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Soap wash immediately

Breathing:Respiratory support

Swallow:Medical attention immediately

**Respirator Recommendations****NIOSH/OSHA**

Up to 1 mg/m<sup>3</sup>:

(APF = 5) Any quarter-mask respirator.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.\*

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.\*

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter.\*

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter.\*

(APF = 10) Any supplied-air respirator\*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also

**INTRODUCTION ICSC CARD: 0072**

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(/niosh/index.htm)

## Silver (metal dust and soluble compounds, as Ag)

### Synonyms & Trade Names

Silver metal, Silver nitrate

#### CAS No.

7440-22-4 (metal)

#### RTECS No.

VW3500000 (metal)

#### DOT ID & Guide

#### Formula

Ag (metal)

#### Conversion



IDLH

10 mg/m<sup>3</sup> (as Ag)

See: 7440224

#### Exposure Limits

NIOSH REL

TWA 0.01 mg/m<sup>3</sup>

OSHA PEL

TWA 0.01 mg/m<sup>3</sup>

#### Measurement Methods

NIOSH 7300 , 7301 , 9102 ;

OSHA ID121

See: NMAM or OSHA Methods

#### Physical Description

Metal: White, lustrous solid.

#### Molecular Weight

107.9

#### Boiling Point

3632°F

**Melting Point**  
1761°F

**Solubility**  
Insoluble

**Vapor Pressure**  
0 mmHg (approx)

**Ionization Potential**  
NA

**Specific Gravity**  
10.49 (metal)

**Flash Point**  
NA

**Upper Expositive Limit**  
NA

**Lower Explosive Limit**  
NA

**Metal: Noncombustible Solid, but flammable in form of dust or powder.**

**Incompatibilities & Reactivities**

Acetylene, ammonia, hydrogen peroxide, bromoazide, chlorine trifluoride, ethyleneimine, oxalic acid, tartaric acid

**Exposure Routes**

inhalation, ingestion, skin and/or eye contact

**Symptoms**

Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance

**Target Organs**

Nasal septum, skin, eyes

**Personal Protection/Sanitation**

(See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet or contaminated ( $\text{AgNO}_3$ )

Change: Daily

Provide: Eyewash

## First Aid

(See procedures ([firstaid.html](#)))

Eye:Irrigate immediately

Skin:Water flush

Breathing:Respiratory support

Swallow:Medical attention immediately

## Respirator Recommendations

NIOSH/OSHA

Up to 0.25 mg/m<sup>3</sup>:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode<sup>£</sup>

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter.<sup>£</sup>

Up to 0.5 mg/m<sup>3</sup>:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Up to 10 mg/m<sup>3</sup>:

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also

INTRODUCTION ICSC CARD: o81o MEDICAL TESTS: o2o8

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## TOLUENE

ICSC: 0078

Methylbenzene Toluol Phenylmethane $C_6H_5CH_3$ / $C_7H_8$ Molecular mass: 92.1 ICSC # 0078		CAS # 108-88-3 RTECS # <u>XS5250000</u> UN # 1294 EC # 601-021-00-3 October 10, 2002 Validated	
			
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• INHALATION	Cough. Sore throat. Dizziness. Drowsiness. Headache. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.


•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Evacuate danger area in large spill! Consult an expert in large spill! Remove all ignition sources. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus in large spill.		Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-38-48/20-63-65-67 S: 2-36/37-46-62 UN Hazard Class: 3 UN Packing Group: II
ICSC: 0078		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0078

## TOLUENE



I  M  P  O  R  T  A  N  T  D  A  T  A	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 50 ppm as TWA; (skin); A4; BEI issued; (ACGIH 2004). MAK: Pregnancy risk group: C; (DFG 2004). EU OEL: 192 mg/m<sup>3</sup> 50 ppm as TWA 384 mg/m<sup>3</sup> 100 ppm as STEL (skin) (EU 2006). OSHA PEL<sup>†</sup>: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak) NIOSH REL: TWA 100 ppm (375 mg/m<sup>3</sup>) ST 150 ppm (560 mg/m<sup>3</sup>) NIOSH IDLH: 500 ppm See: <u>108883</u></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20° C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the respiratory tract . The substance may cause effects on the central nervous system . If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure at high levels may result in cardiac dysrhythmia and unconsciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system . Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<b>PHYSICAL PROPERTIES</b>	Boiling point: 111°C Melting point: -95°C Relative density (water = 1): 0.87 Solubility in water: none Vapour pressure, kPa at 25°C: 3.8 Relative vapour density (air = 1): 3.1 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 4°C c.c. Auto-ignition temperature: 480°C Explosive limits, vol% in air: 1.1-7.1 Octanol/water partition coefficient as log Pow: 2.69
<b>ENVIRONMENTAL DATA</b>	The substance is toxic to aquatic organisms. 
<b>NOTES</b>	
Depending on the degree of exposure, periodic medical examination is suggested. Use of alcoholic beverages enhances the harmful effect. Card has been partly updated in October 2006: see section Occupational Exposure Limits. Transport Emergency Card: TEC (R)-30S1294 NFPA Code: H 2; F 3; R 0;	
<b>ADDITIONAL INFORMATION</b>	
ICSC: 0078 <span style="float: right;">TOLUENE</span>	
(C) IPCS, CEC, 1994 <b>IMPORTANT LEGAL NOTICE:</b> Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

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## TRICHLOROETHYLENE

ICSC: 0081


1,1,2-Trichloroethylene Trichloroethene Ethylene trichloride Acetylene trichloride $C_2HCl_3$ / $ClCH=CCl_2$ Molecular mass: 131.4 ICSC # 0081		CAS # 79-01-6 RTECS # <u>KX4550000</u> UN # 1710 EC # 602-027-00-9 April 10, 2000 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION		Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
• INHALATION	Dizziness. Drowsiness. Headache. Weakness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.

•SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment.		Separated from metals ( see Chemical Dangers ), strong bases, food and feedstuffs . Dry. Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. Marine pollutant. T symbol R: 45-36/38-52/53-67 S: 53-45-61 UN Hazard Class: 6.1 UN Packing Group: III
ICSC: 0081		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0081

## TRICHLOROETHYLENE

I  M  P  O  R  T  A  N  T  D  A  T  A	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes ( phosgene , hydrogen chloride ). The substance decomposes on contact with strong alkali producing dichloroacetylene , which increases fire hazard. Reacts violently with metal powders such as magnesium, aluminium, titanium, and barium. Slowly decomposed by light in presence of moisture, with formation of corrosive hydrochloric acid.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 50 ppm as TWA; 100 ppm as STEL; A5; BEI issued; (ACGIH 2004). MAK: Carcinogen category: 1; Germ cell mutagen group: 3B; (DFG 2004). OSHA PEL<sup>†</sup>: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours) NIOSH REL: Ca <u>See Appendix A</u> <u>See Appendix C</u> NIOSH IDLH: Ca 1000 ppm See: <u>79016</u></p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20° C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the skin . Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system , resulting in respiratory failure . Exposure could cause lowering of consciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system , resulting in loss of memory. The substance may have effects on the liver and kidneys (see Notes). This substance is probably carcinogenic to humans.</p>
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<b>PHYSICAL PROPERTIES</b>	Boiling point: 87°C Melting point: -73°C Relative density (water = 1): 1.5 Solubility in water, g/100 ml at 20°C: 0.1 Vapour pressure, kPa at 20°C: 7.8 Relative vapour density (air = 1): 4.5 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3 Auto-ignition temperature: 410°C Explosive limits, vol% in air: 8-10.5 Octanol/water partition coefficient as log Pow: 2.42 Electrical conductivity (NOT on card): 800pS/m
<b>ENVIRONMENTAL DATA</b>	The substance is harmful to aquatic organisms. The substance may cause long-term effects in the aquatic environment. 
<b>NOTES</b>	
<p>Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-61S1710</p> <p style="text-align: right;">NFPA Code: H2; F1; Ro;</p>	
<b>ADDITIONAL INFORMATION</b>	
ICSC: 0081 <span style="float: right;">TRICHLOROETHYLENE</span> (C) IPCS, CEC, 1994	
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## VINYL CHLORIDE

ICSC: 0082

Chloroethene Chloroethylene VCM $C_2H_3Cl$ / $H_2C=CHCl$ Molecular mass: 62.5 (cylinder) ICSC # 0082		CAS # 75-01-4 RTECS # <u>KU9625000</u> UN # 1086 (stabilized) EC # 602-023-00-7 April 13, 2000 Validated	
			
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Dizziness. Drowsiness. Headache. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.




•SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Protective gloves. Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes.
•EYES	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources. Personal protection: complete protective clothing including self-contained breathing apparatus.		Fireproof. Separated from incompatible materials .( See Chemical Dangers. ) Cool. Store only if stabilized.	Note: D F+ symbol T symbol R: 45-12 S: 53-45 UN Hazard Class: 2.1
ICSC: 0082		Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

ICSC: 0082

## VINYL CHLORIDE


I	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS COMPRESSED LIQUEFIED GAS , WITH CHARACTERISTIC ODOUR.</p> <p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation.</p>
M	<p><b>PHYSICAL DANGERS:</b> The gas is heavier than air, and may travel along the ground; distant ignition possible. Vinyl chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents.</p> <p><b>INHALATION RISK:</b> A harmful concentration of this gas in the air will be reached very quickly on loss of containment.</p>
P	<p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p>
O	<p>The substance is irritating to the eyes . The liquid may cause frostbite. The substance may cause effects on the central nervous system . Exposure could cause lowering of consciousness. Medical observation is indicated.</p>
R	<p><b>CHEMICAL DANGERS:</b> The substance can under specific circumstances form peroxides, initiating explosive polymerization. The substance will polymerize readily due to heating and under the influence of air, light and on contact with a catalyst, strong oxidizing agents and metals such as copper and aluminium, with fire or explosion hazard. The substance decomposes on burning producing toxic and corrosive fumes ( hydrogen chloride , phosgene ). Attacks iron and steel in the presence of moisture.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the liver, spleen, blood and peripheral blood vessels, and tissue and bones of the fingers. This substance is carcinogenic to humans.</p>
T	
A	
N	
T	
D	<p><b>OCCUPATIONAL EXPOSURE LIMITS:</b></p>
A	<p>TLV: 1 ppm as TWA; A1 (confirmed human carcinogen); (ACGIH 2004).</p> <p>MAK: Carcinogen category: 1; (DFG 2004).</p> <p>OSHA PEL: 1910.1017 TWA 1 ppm C 5 ppm 15-minute</p> <p>NIOSH REL: Ca <u>See Appendix A</u></p> <p>NIOSH IDLH: Ca N.D. See: <u>IDLH INDEX</u></p>
T	
A	

<b>PHYSICAL PROPERTIES</b>	Boiling point: -13°C Melting point: -154°C Relative density (water = 1): 0.9 (liquid) Density: 8 (vapour) at 15°C g/l Solubility in water: none Relative vapour density (air = 1): 2.2 Flash point: -78°C c.c. Auto-ignition temperature: 472°C Explosive limits, vol% in air: 3.6-33 Octanol/water partition coefficient as log Pow: 0.6
<b>ENVIRONMENTAL DATA</b>	This substance may be hazardous to the environment; special attention should be given to ground water contamination. 
<b>NOTES</b>	
<p>Depending on the degree of exposure, periodic medical examination is suggested. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Card has been partly updated in April 2005. See section Occupational Exposure Limits.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-20S1086</p> <p style="text-align: right;">NFPA Code: H 2; F 4; R 2;</p>	
<b>ADDITIONAL INFORMATION</b>	
ICSC: 0082 <span style="float: right;">VINYL CHLORIDE</span> (C) IPCS, CEC, 1994	
<b>IMPORTANT LEGAL NOTICE:</b>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>

Page last reviewed: July 22, 2015

Page last updated: July 1, 2014

Content source: National Institute for Occupational Safety and Health (<http://www.cdc.gov/NIOSH/>)

ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in seafood. 	
NOTES		
This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.		
ADDITIONAL INFORMATION		
ICSC: 0385	BENZ(a)ANTHRACENE (C) IPCS, CEC, 1994	
IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.	

Page last reviewed: July 22, 2015

Page last updated: July 1, 2014

Content source: National Institute for Occupational Safety and Health (<http://www.cdc.gov/NIOSH/>)

# Attachment B

## Naturally Occurring Asbestos; Approaches for Reducing Exposure



# Naturally Occurring Asbestos: Approaches for Reducing Exposure

## *Purpose and Intended Audience*

This fact sheet provides an overview of approaches for reducing exposures to naturally occurring asbestos (NOA). It is intended to make general information about management options available to state and local government officials, project managers, and environmental professionals. The information should serve as a starting point for identifying current NOA management practices. In general, selecting an appropriate approach to reduce NOA exposure should be determined on a location-specific basis.

*NOA management approaches can reduce but may not completely eliminate potential exposures to naturally occurring asbestos.*

Information contained in this fact sheet was obtained from the currently available literature, including state and local government publications. To obtain more information on NOA management approaches, including their performance and frequency of use, refer to the resources provided at the end of this fact sheet.

## *Naturally Occurring Asbestos*

NOA occurs in rocks and soil as a result of natural geological processes. Natural weathering or human activities may disturb NOA-bearing rock or soil and release mineral fibers into the air, which pose a greater potential for human exposure by inhalation.

The U.S. Geological Survey (USGS) has an ongoing project to map the locations of historical asbestos mines, former asbestos exploration prospects, and natural asbestos occurrences. At least 35 states have reported NOA locations. To locate NOA areas in a specific part of the country, begin by consulting the USGS reports (see below) and contact a state geologist.

<b>U.S. Geological Survey</b>	<ul style="list-style-type: none"><li>• Eastern United States <a href="http://pubs.usgs.gov/of/2005/1189/">http://pubs.usgs.gov/of/2005/1189/</a></li><li>• Central United States <a href="http://pubs.usgs.gov/of/2006/1211/">http://pubs.usgs.gov/of/2006/1211/</a></li><li>• Rocky Mountain States <a href="http://pubs.usgs.gov/of/2007/1182">http://pubs.usgs.gov/of/2007/1182</a></li></ul>
<b>California Geological Survey</b>	Asbestos Reports, Maps and Guidelines for Geologic Investigations <ul style="list-style-type: none"><li>• <a href="http://www.conservation.ca.gov/cgs/minerals/hazardous_minerals/asbestos/Pages/Index.aspx">http://www.conservation.ca.gov/cgs/minerals/hazardous_minerals/asbestos/Pages/Index.aspx</a></li></ul>

*This fact sheet is intended solely to provide general information on approaches that may be useful when addressing naturally occurring asbestos (NOA). It is not intended, nor can it be relied upon, to create any rights enforceable by any party, including any party in litigation with the United States. EPA considers NOA to be in an altered form if it has been disturbed by human activity; NOA is not considered to be altered if modified solely through naturally occurring processes or phenomena, from a location where it is naturally found. This fact sheet may be revised periodically without public notice. Use or mention of trade names does not constitute endorsement or recommendation for use.*

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In this fact sheet, NOA does not refer to commercially processed, asbestos-containing material, such as insulation and fire protection in buildings or automobile brake linings. Information about commercial asbestos-containing products is available in other publications, including the resources mentioned on EPA's asbestos Web page <http://www.epa.gov/asbestos>.

## *Approaches for Mitigating Exposures to NOA*

The following general approaches to mitigate inhalation exposures to NOA are aimed at reducing NOA releases from rock or soil into the air:

- Leave NOA material in place and undisturbed
- Cover or cap NOA material
- Limit dust generating activities
- Excavate and dispose of NOA material

Depending on the situation, a combination of engineering controls, work practices, and institutional (administrative) controls may be needed to implement an approach and reduce potential exposures to NOA. Selecting an approach depends on factors including:

- Accessibility of NOA (ground surface vs. below ground surface)
- Types of activities that disturb NOA (construction project vs. gardening)
- Climate and weather conditions
- Current and future land uses
- Technical and administrative feasibility of the approach

*Approaches for reducing NOA exposure are similar to practices used for asbestos-containing materials in commercial applications.*

Typical engineering controls involve the use of covers and caps, vegetation, fencing, landscaping, and in some conditions, the application of water to suppress dust. Local factors, such as climate, influence the extent to which these approaches are implemented. For example, areas with dry or windy conditions may need more dust control than those with humid or less windy conditions.

Common work practices include limiting activities on NOA-containing areas, reducing driving speed on unpaved roads that may contain NOA, and cleaning vehicles driven over NOA. For example, during road construction or maintenance activities on unpaved areas where NOA is present, the Asbestos Airborne Toxics Control Measure (ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations of the California Air Resources Board (ARB) requires that vehicle speeds not exceed 15 miles per hour.<sup>1</sup> Worker health and safety measures that include respiratory protection may be warranted. For information, consult with Occupational Safety and Health Administration Asbestos Standards for the General Industry and Asbestos Standards for the Construction Industry (<http://www.osha.gov/SLTC/asbestos/hazards.html>).



## *Examples of Engineering and Work Practices that Reduce Exposure to NOA*

<b>Excavation, Grading, or Utility Work at Construction Projects</b>	<ul style="list-style-type: none"><li>• Wet road surfaces with water using trucks, hoses, or sprinklers<sup>1</sup></li><li>• Wet piles of excavated material and cover them with tarps, plastic sheeting, or other items<sup>1</sup></li><li>• Continuously mist the work area<sup>1</sup></li><li>• Install wind barriers around the work area<sup>1</sup></li><li>• Clean or decontaminate equipment and vehicles to ensure that no equipment or workers track soil out of the work area (a gravel pad, tire shaker, or wheel wash system may be used to clear soil from vehicles)<sup>1</sup></li><li>• Wet the work area using a spray system attached directly to rock cutting or drilling equipment, such as a fine-mist sprayer or a variable-rate fogger nozzle (similar to those used in fire fighting)<sup>2</sup></li><li>• Excavate utility trenches to an adequate depth and backfill them with clean soil so that future repair work will not need excavation into potential NOA-containing materials<sup>3</sup></li><li>• When transporting NOA-containing materials, avoid overloading trucks; keep the material below the top of each truck compartment and cover material with a tarp<sup>4</sup></li><li>• Limit personnel and vehicle access to the work area<sup>5</sup></li><li>• Identify NOA-containing areas with signs<sup>2</sup></li><li>• Reduce driving speed<sup>1</sup></li><li>• Reduce drilling or excavating speeds<sup>6</sup></li><li>• Excavate during periods of calm or low winds<sup>1</sup></li></ul>
<b>Roads and Parking Areas (unpaved and gravel roads)</b>	<ul style="list-style-type: none"><li>• Cover roads with non-NOA-containing rock, chemical sealants or dust suppressants, chip seals, limestone aggregate, petroleum sealants, or asphalt cement paving<sup>1, 7, 8</sup></li><li>• Wet road surfaces with water<sup>1</sup></li><li>• Install windbreaks or berms<sup>1</sup></li><li>• Reduce driving speed<sup>1</sup></li><li>• Avoid dusty areas, especially in windy conditions<sup>1</sup></li></ul>

## **Around Communities (playgrounds, ball fields, pathways, and gardens)**

- Cover areas of rock and soil with clean soil, rock, vegetation, or other material (see next section, General Considerations for Using Covers or Caps)<sup>3, 9</sup>
- Pave over unpaved walkways, driveways, or roadways containing NOA<sup>1, 10</sup>
- Landscape areas with vegetation, such as NOA-tolerant plants, and add a layer of organic mulch or NOA-free soil. Water plants often until they are established to minimize erosion<sup>9</sup>
- Water garden areas before digging<sup>9</sup>
- Keep windows and doors closed on windy days and during periods when nearby rock or soil may be disturbed, such as during construction<sup>9</sup>
- Limit track-in by using entryway (door) mats, and wipe down pets before they enter buildings to reduce the amount of soil tracked indoors<sup>4, 9</sup>
- Allow children to play in outdoor areas only if the area has a ground covering, such as wood chips, mulch, sand, pea gravel, grass, asphalt, shredded rubber, or rubber mats<sup>4</sup>
- Relocate outdoor activities to areas that do not contain NOA (walk, run, hike, and bike only on paved trails)<sup>4</sup>
- Avoid dusty areas, especially in windy conditions<sup>11</sup>

## ***General Considerations for Using Covers or Caps***

One of the most common engineering controls is to place a cover system over the NOA. Cover materials may include clean soil or rock, concrete, chemical sealants or dust suppressants, chip seals, limestone aggregate, petroleum sealants, asphalt paving, geotextiles, wood chips, mulch, sand, pea gravel, shredded rubber, rubber mats, and vegetation.

The complexity of cover systems can vary from simple (e.g., a single soil layer) to complex (e.g., multiple layers of varying materials). Several factors, including cover material properties and site characteristics, affect the type of cover system appropriate for a particular area.

The availability of materials may influence the type of cover used. Materials that are readily available and close to the NOA area may be more desirable and cost effective than materials found farther away. For example, artificial turf and other imported materials may be more expensive than locally available soils. The cover material will likely need to be assessed for NOA or other undesirable constituents. Expected lifetime, maintenance, and monitoring requirements also affect the cost of covers.

The slope of the NOA area may influence the type and thickness of the cover material used. For example, steep slopes may need vegetation or shotcrete (concrete or mortar sprayed onto a surface with a pressurized hose) to promote slope stabilization. Steep slopes typically have a higher potential for erosion and therefore may demand thicker cover material.

The thickness of the cover material should provide a safety factor sufficient to ensure that airborne releases will not occur. Thicker covers may be needed in areas where there is a significant potential for erosion. The surface of a cover should protect against erosion by wind and rain. Materials used for erosion control typically include a layer of topsoil and vegetation. In areas where adequate vegetation is not possible, gravel, admixtures, or riprap may be used for the surface layer. The thickness of the cover may also depend on the presence of other cover components, such as irrigation lines.

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A geotextile, which is a geosynthetic material made of polymer fabric, may be placed below the cover material to mark the presence of NOA and serve as an erosional indicator. Geotextiles also can provide protection, reinforcement, drainage, and separation when applied to the soil surface or between layers of materials. The California Department of Toxic Substances Control (DTSC) recommends that landscaped areas and play fields at schools include a geotextile marker covered by sufficient cover material to provide an effective barrier to reduce NOA exposures.<sup>3</sup> Placement of geotextile markers will demand additional time and expertise.

## ***Long-Term Management Approaches***

For long-term management of areas with NOA, institutional controls (ICs) and a maintenance plan may be desirable. In areas where NOA poses potential health concerns, local and state government officials should consider providing educational material to supplement engineering approaches for reducing exposures to NOA. The Agency for Toxic Substances and Disease Registry has developed a fact sheet about asbestos and NOA for the general public entitled “Asbestos and Health: Frequently Asked Questions.”<sup>4</sup>

### **Institutional Controls**

Generally, ICs are administrative or legal mechanisms that are designed to help minimize the potential for human exposure to contamination. They also protect the integrity of the engineering measures. ICs are generally divided into four categories:

- *Government controls* include laws and permits (such as local zoning laws and permits required for excavating or digging). Work that may disturb NOA-containing soil may require government approval and may be subject to local or state construction guidelines. In California, the ATCM of the California ARB requires owners and operators to notify the local air quality management district within one business day of discovering NOA, serpentine mineral, or ultramafic rock in an area to be disturbed by construction, grading, quarrying, or surface mining operations.<sup>1</sup> In Virginia, the Fairfax County Health Department requires a compliance plan that includes air monitoring to ensure effective dust control during construction in areas containing NOA.<sup>2</sup>
- *Proprietary controls* include property use restrictions based on private property laws, such as land use easements or covenants.
- *Enforcement tools* include legally binding documents that require individuals or companies to conduct or prohibit specific actions.
- *Informational devices* include deed notices, public advisories, and other measures (such as warning signs and worker health and safety awareness training) that alert and educate people about an area.

For additional information about ICs, refer to the Land Use Controls Web site at <http://www.lucs.org>

### **Maintenance Plan**

A maintenance plan can help ensure that engineering controls and work practices remain effective. In California, for example, DTSC and school districts enter into an agreement to develop and implement an approved long-term operation and maintenance plan under DTSC oversight. These plans generally contain information about the following topics:<sup>3</sup>

- Building locations, utility line locations, and the thickness of cover material across the area
- Routine inspections

- Maintenance work, including erosion and storm water control
- Procedures for repairing cover damage
- Monitoring activities, such as perimeter or personal air monitoring
- Reporting format and frequency
- Restrictions on future activities that may expose NOA
- Management of imported soil and future excavation or trenching activities

### Additional Information

- Agency for Toxic Substances and Disease Registry - <http://www.atsdr.cdc.gov/NOA>
- California Air Resources Board - <http://www.arb.ca.gov/toxics/asbestos/asbestos.htm>
- El Dorado County, California - <http://www.co.el-dorado.ca.us/emd/apcd/asbestos.html>
- Fairfax County, Virginia - <http://www.fairfaxcounty.gov/hd/asb>
- Sacramento County, California - <http://www.airquality.org/compliance/asbestosNaturallyOccurring.shtml>
- U.S. Environmental Protection Agency - <http://www.epa.gov/asbestos/pubs/clean.html>

### References

1. California Environmental Protection Agency (Cal/EPA) Air Resources Board (ARB). 2002. Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surfacing Mining Operations. Final Regulation Order. Section 93105. July 22. <http://www.arb.ca.gov/toxics/atcm/asb2atcm.htm>
2. Fairfax County Health Department. Undated. "Control and Prevention of Asbestos Exposure from Construction in Naturally Occurring Asbestos." <http://www.fairfaxcounty.gov/hd/asb/pdf/tbrdpubfin.pdf>
3. Cal/EPA Department of Toxic Substances Control (DTSC). 2004. Interim Guidance: Naturally Occurring Asbestos (NOA) at School Sites. September 29. [http://www.dtsc.ca.gov/Schools/upload/SMBRP\\_POL\\_Guidance\\_Schools\\_NOA.pdf](http://www.dtsc.ca.gov/Schools/upload/SMBRP_POL_Guidance_Schools_NOA.pdf)
4. Agency for Toxic Substances and Disease Registry. Undated. "Asbestos and Health: Frequently Asked Questions." U.S. Department of Health and Human Services. <http://www.atsdr.cdc.gov/NOA/Asbestos-and%20Health.pdf>
5. El Dorado County. 2003. Naturally Occurring Asbestos and Dust Protection. Ordinance. Chapter 8.44. June 12. [http://www.co.el-dorado.ca.us/emd/apcd/PDF/Naturally\\_Occuring\\_Asbestos\\_June\\_12.pdf](http://www.co.el-dorado.ca.us/emd/apcd/PDF/Naturally_Occuring_Asbestos_June_12.pdf)
6. Fairfax County Health Department. Undated. "Basic Elements for a Naturally Occurring Asbestos Compliance Plan." <http://www.fairfaxcounty.gov/hd/asb/pdf/asb50.pdf>
7. Cal/EPA ARB. 2002. "Fact Sheet #3: Ways to Control Naturally-Occurring Asbestos Dust." January. <http://www.arb.ca.gov/toxics/asbestos/3control.pdf>
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10. Cal/EPA DTSC. 2006. "Fact Sheet: Recommended Housekeeping Activities to Reduce Exposure to Naturally-Occurring Asbestos in Schools." October. [http://www.dtsc.ca.gov/Schools/upload/Recommended\\_Housekeeping\\_for\\_NOA\\_102306.pdf](http://www.dtsc.ca.gov/Schools/upload/Recommended_Housekeeping_for_NOA_102306.pdf)
  11. University of California Cooperative Extension. Undated. "Lake County Serpentine Landscape Demonstration Garden." Asbestos Serpentine Soils Education Program. <http://www.capcoa.org/noa/%5B5%5D%20Lake%20County%20Serpentine%20Landscaping.pdf>

### *List of Acronyms*

ARB	Air Resources Board
ATCM	Airborne Toxic Control Measure
DTSC	Department of Toxic Substance Control
ICs	institutional controls
NOA	naturally occurring asbestos
USGS	U.S. Geological Survey

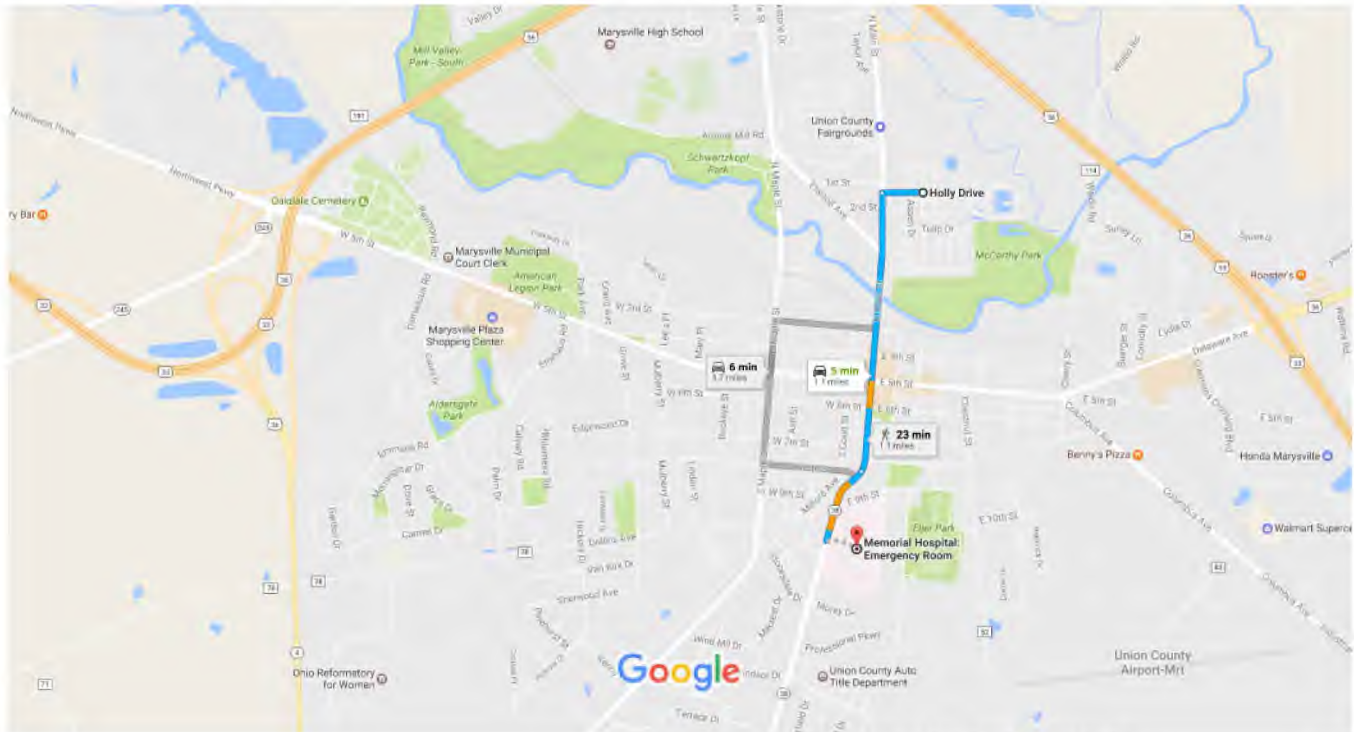
# Attachment C

## Directions to Hospital from the Former Ray Lewis Landfill Site



## Holly Dr, Marysville, OH 43040 to Memorial Hospital: Emergency Room

Drive 1.1 miles, 5 min



Map data ©2017 Google

1000 ft

via N Main St

Fastest route, the usual traffic

5 min

1.1 miles

via N Maple St

6 min

1.7 miles

via N Main St

23 min


1.1 miles



## YOUR TRIP TO:

Memorial Hospital



4 MIN | 1.4 MI 

**Est. fuel cost: \$0.13**

Trip time based on traffic conditions as of 11:45 AM on April 5, 2017. Current Traffic: Moderate

Directions from the former RLLF to Memorial Hospital, Marysville, Ohio



1. Start out going **south** on Cypress Dr toward Holly Dr.

Then 0.08 miles

0.08 total r



2. Take the 1st **right** onto Holly Dr.

*If you reach Pecan Dr you've gone a little too far.*

Then 0.15 miles

0.22 total r



3. Turn **left** onto N Main St/OH-38/County Hwy-123. Continue to follow OH-38.

Then 1.06 miles

1.28 total r



4. Turn **left**.

*0.1 miles past W 9th St.*

*If you reach Morey Dr you've gone about 0.1 miles too far.*

Then 0.02 miles

1.30 total r



5. Turn **slight left**.

Then 0.01 miles

1.31 total r



6. Take the 1st **right**.

Then 0.04 miles

1.35 total r



7. Take the 1st **left**.

Then 0.01 miles

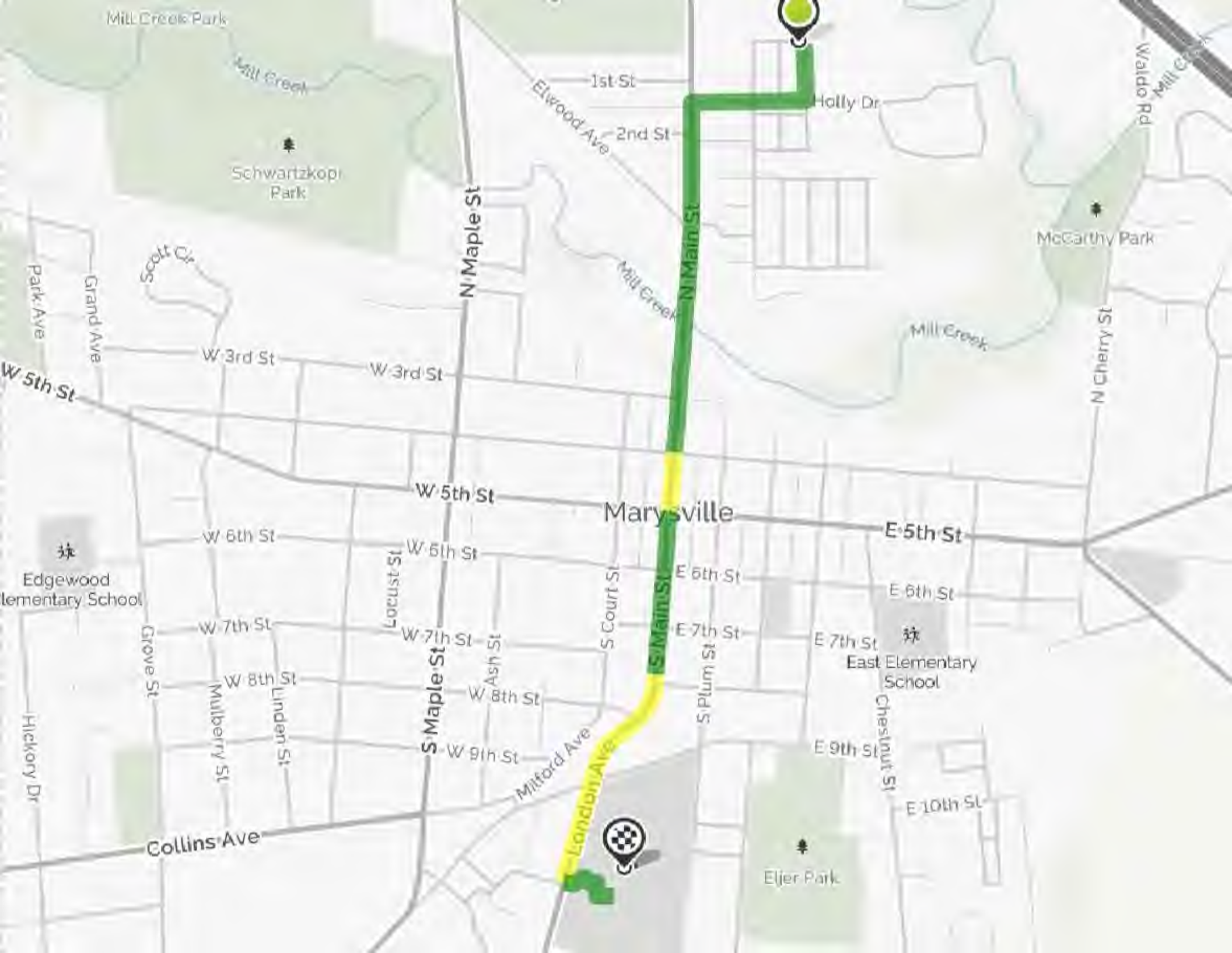
1.36 total r



8. Take the 1st **right**.

Then 0.01 miles

1.37 total r





Sent Via Email

August 7, 2017

Raymond Moreno  
Site Coordinator  
Ohio EPA Central District Office  
PO Box 1049  
Columbus, Ohio 43216-1049

**RE: Addendum to the Interim Action Work Plan, Ray Lewis Landfill, 506 N. Main Street, Marysville, Ohio**

Dear Mr. Moreno:

Cox-Colvin & Associates, Inc., (Cox-Colvin), on behalf of The Scotts Company LLC (Scotts) and Marysville Estates LLC, is responding to your email of July 24, 2017, wherein you provided comments on the July 10, 2017 Interim Action Work Plan (IA Work Plan) for the former Ray Lewis Landfill (FRLLF). In the paragraphs below, Ohio EPA comments are shown in bold and italics with the responses following in regular text. Numbers have been added to the list of comments to facilitate further discussion, if required.

### **Ohio EPA Comments and the Responses**

- 1. Figure 4-1, Site Layout During Remediation, shows the location of the proposed clean and decontamination areas in the south end of Section 1 of the site. As previously discussed, further characterization and sampling prior to mobilization may be necessary to determine if soil removal and replacement is necessary to allow use of these areas as proposed in the interim action work plan.***

Following removal of the trailers from the nine mobile home lots and subsequent tree clearing, vermiculite was observed in the soil beneath the southernmost mobile home. This area was assumed to be a "clean area," and as such, was being considered for use as the support zone, which would include the locations of the field office, decontamination pads, tire wash, and sanitary facilities. The assumption that this area did not contain vermiculite was based on the soil sampling conducted by Ohio EPA, Lawhon and Associates, and Cox-Colvin. The location of the field office, decontamination pad, and other support areas will be discussed with the potential subcontractors during the pre-bid meeting at the site. One possibility may be that the field office and other support equipment will be temporarily set up in the former RV storage area during the time that the southern portion of Section 1 is excavated and backfilled with clean fill. Once that area of Section 1 has been properly addressed, the office trailer and other support equipment can be moved to the southern portion of Section 1.

As discussed in Section 3.3 of the Interim Action Work Plan, the horizontal extent of excavation within Section 1 will be guided by the observed presence of vermiculite in the soil. By using the presence of vermiculite as a guide, the soils containing constituents above the VAP commercial/industrial standards within this interval will also be excavated. Accordingly, no additional sampling or characterization is proposed.



- 2. Indicate which underground utilities (or sections of utilities), as shown on Figure 1 of Appendix B, Preliminary Underground Utility Mapping, will be removed from service or relocated from the site and which utilities will remain in service on site. Describe how the storm sewer, which currently discharges to Section 2a, will be managed.***

The natural gas line, sanitary sewer, potable water line, and underground cable, if any, will be removed from Section 1. The revised map in Appendix B (attached) shows the utilities that will be abandoned and which will remain. The figure also shows the direction of wastewater flow in the sanitary sewer.

A short section of the sanitary sewer in the southernmost area of Section 1 will remain. This sanitary sewer crosses from the west side of Cypress Drive to a catch basin in Section 1 near the southern fence along Holly Drive. The sanitary sewer from the nine lots in Section 1 also flows into this catch basin. The wastewater flows from this catch basin to the south, across Holly Drive. This section of sanitary sewer, including the catch basin, will be the only underground utility that remains on the FRLLF property.

The storm sewer that currently discharges into Section 2a of the FRLLF will be disconnected at the catch basin located at the southwest corner of Section 1, and all storm sewer piping within the Site boundary will be removed (see revised map in Appendix B attached hereto). A plan for rerouting the storm water flow to an appropriate discharge point is being discussed by Marysville Estates and UMH. Discussions with the City of Marysville regarding the relocation of the storm sewer have been reopened so that the best resolution to the issue can be determined.

- 3. Two types of general fill, designated S-1 and S-2, are described in Specification 7.8 (Common Fill) of Appendix C with Fill Type S-2 subject to chemical characterization before being brought to the site. However, based on a recent discussion with Cox-Colvin, it is Ohio EPA's understanding that only general fill type, S-2, will be used at the site. Confirm which fill type(s) will be used and the chemical characterization that will be conducted on the fill types.***

Specification 7, "Fill" is a general specification regarding filling of excavations. Section 7.8, "Common Fill" of the specification lists three types of common fill: Type 1, imported backfill; Type 2 imported backfill with at least 15% clay content; and Type 3, which is imported topsoil. Types 2 and 3 general fill will be used at the FRLLF. As described in Section 3.4 of the IA Work Plan, Type 2 common fill will be used to fill in the excavations in Sections 1 and 2b, and will be used to construct the two-foot thick cover over the consolidated material in Section 2a. Type 2 common fill will also be used for final grading as described in Section 3.5 of the IA Work Plan. Type 3 common fill (topsoil) will be applied, graded and seeded over all disturbed areas to ensure the establishment of a vegetative cover.

The chemical characterization of the soil is discussed in the response to Comment #4, below.



4. *Include polychlorinated biphenyls and semi-volatile organic compounds (instead of polycyclic aromatic hydrocarbons) as analytical parameters for chemical characterization of imported general fill and topsoil.*

The specification has been revised to clarify that laboratory analysis of both Type 2 and Type 3 common fill will be required. The table in Specification 7.4 Y has been revised as requested. The chemical characterization of the imported soil (Type 2 and Type 3) now includes semi-volatile organic compounds (SVOCs) rather than polycyclic aromatic hydrocarbons (PAHs). Polychlorinated biphenyl (PCB) analysis has been added to the list of analyses. A copy of the revised specification is attached.

5. *Adjust the screen lengths of the explosive gas probes as necessary to ensure that the upper portion of the probe is screened across unsaturated waste.*

The explosive gas probes installed in Section 1 following the interim action remediation will be constructed so that the screened section of the probe will be above the saturated soil/waste.

6. *Section 2.1.5, Endangered and Threatened Species Habitat, states the bat habitat assessment conducted by Civil and Environmental Consultants is attached. However, the assessment was not attached in the interim action work plan. Provide a copy of the assessment.*

The CEC bat assessment report referred to in Section 2.1.5 is attached to this addendum.

7. *Provide a figure showing the pre-excavation topography of the landfill and excavation area.*

A pre-excavation topographic map of the FRLLF Site was prepared by R.E. Warner surveyors of Westlake, Ohio. The topographic map was finalized on June 22, 2017. A copy of the pre-excavation topographic map is attached to this addendum.

8. *Expand Section 5.0, Air Emissions, to include measures that will be taken to control dust during the excavation operations (e.g., monitoring, watering, stopping work during excessive wind) and to reduce equipment contact with contaminated material during excavation (keeping equipment tracks and wheels out of contaminated material when possible to avoid tracking). Describe steps to mitigate dust generated from "clean activities" such as backfill placement and final grading. Caution must be taken not to track potentially contaminated material onto Holly Drive.*

Section 5.0, "Air Emissions", has been revised. A copy of the revised text is attached.

**9. *Provide notice to the Union County Health Department and the Ohio Manufactured Home Commission when Ohio EPA is notified that excavation activities will commence.***

Marcia Dreiseidel, the Director of Environmental Health at the Union County Health Department, will be informed that excavation activities will commence at the same time that the Ohio EPA is informed.

Terry Swackhammer, the inspector for Union County for the Ohio Manufactured Homes Commission, will be informed that excavation activities will commence at the same time that the Ohio EPA is informed.

If you have any questions or comments concerning items presented in this addendum, please feel free to contact us at (614) 526-2040.

Respectfully Submitted,  
Cox-Colvin & Associates, Inc.



Nick M. Petruzzi, PE, CPG  
Senior Engineer



Steven C. Williamson, CPG  
Senior Scientist

**Attachments**

- c: Christina Grasseschi, The Scotts Company
- Rob Shouhayib, The Choice Group
- Kristin Watt, Vorys, Sater, Seymour, and Pease
- Ryan Elliott, Vorys, Sater, Seymour, and Pease
- Todd Schebor, Dykema
- Trevor Berger, Lawhon & Associates
- Craig A. Cox, Cox-Colvin & Associates

# FRLLF Site Underground Utility Map





**Extent Indicator Map**

**Legend**

- Communication Line
- Gas Line
- Water Line
- Storm Sewer Line
- Catch Basin
- Sanitary Sewer Line
- Sanitary Manhole
- Utility to be Removed/ Abandoned

0 50 100 Feet

North Arrow

**Marysville Estates**

**Proposed Underground Utility Removal/ Relocation**

**Lawton & Associates, Inc.**

Date: July 2017

Approved by: TB

L&A No. 15-0808

Figure 2

FRLLF Specification 7  
Fill  
Revision 1, August 2017



## Specification 7

### Fill

#### 7.1 References

A. Definitions:

1. SMDD: Standard Maximum Dry Density and in the context of this Contract means the maximum dry unit weight determined according to ASTM D698.

B. Reference Standards:

1. ASTM International:
  - a. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.  
ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
  - b. ASTM D2216 - Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
  - c. ASTM D2974 - Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
  - d. ASTM D4972 - Standard Test Method for pH of Soils.
  - e. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

#### 7.2 Scheduling

- C. Do not allow or cause work performed to be covered up or enclosed prior to required inspections, tests, or approvals.

#### 7.3 Submittals

- D. Excavation and Fill Plan: Within 14 calendar days after the date of the notice to proceed and no later than 10 calendar days prior to mobilization to the Site, submit a detailed Excavation and Fill Plan demonstrating compliance with specified requirements and to allow ENGINEER to schedule sampling activities. Include written procedures, schedules, and drawings as applicable and, at a minimum, address each of the following items:

1. Methods and procedures to be used to perform excavation, transport, backfilling, compacting, and grading.
  2. Sequencing and scheduling of activities, including allowances for time required for sampling and analysis by the ENGINEER.
  3. Sequencing and layout of access routes to and from excavation and fill areas.
  4. Methods and procedures to be used to perform additional excavation in open excavations.
  5. Anticipated crew sizes and number and types of equipment, on a weekly basis.
  6. Utilities to be rerouted or protected. Describe methods of rerouting and protecting.
  7. Methods for locating and verifying depth of utilities within the proposed excavation limits
  8. Methods of monitoring movement of adjacent structures.
- E. Compaction Testing Reports: At the end of each work day, submit compaction testing reports certifying compliance with specified requirements.
- F. Suppliers' Certificates: Submit certificate or laboratory data indicating that each type of imported fill material meets or exceeds specified requirements.
- G. Weigh Tickets: At the end of each work week, submit delivery weigh tickets of imported fill materials delivered to the Site. Within 7 calendar days, submit weigh tickets of wastes disposed off Site.
- H. Field Quality Control: Submit field data on same day testing is performed. Submit laboratory data within 24 hours of completion of test.
- I. Qualification Statements:
1. Independent Geotechnical Testing Firm: Within 14 calendar days of the notice-to-proceed and at least 10 calendar days prior to commencing transport of soil materials to the Site, submit name and qualifications of independent geotechnical testing firm to provide geotechnical testing services for work of this specification.

2. Independent Analytical Laboratory: At least 14 days prior to commencing transport of soil or aggregate materials to the Site location, submit name and qualifications of independent testing laboratory to provide chemical analysis for work of this specification.

## 7.4 Qualifications

- J. Geotechnical Testing Firm: Company specializing in performing work of this specification and complying with ASTM D3740 to perform testing of fill materials including density, moisture content, permeability, and particle size analysis for both soil and aggregate samples, as necessary.
- K. Independent Testing Laboratory: Company specializing in performing work of this specification to perform chemical analysis of fill material samples.

## 7.5 Delivery, Storage, and Handling

- L. Deliver, handle, and transport fill materials in a manner and with equipment that will prevent intermixing of soil or contamination.
- M. Minimize stockpiling requirements. Transport material from source directly to final position where possible.

## 7.6 Ambient Conditions

- N. Suspend operations whenever climatic conditions, as determined by the ENGINEER, are unsatisfactory for placing fill to the requirements of this specification.
- O. Do not operate equipment on approved excavations after heavy rain until material has dried sufficiently to prevent excessive rutting.

## 7.7 Materials

- P. Imported from an approved source.
- Q. Free of unsuitable materials including:
  1. Frozen material or material containing snow or ice.



2. Trees, stumps, branches, roots, or other wood or lumber.
  3. Wire, steel, cast iron, cans, drums, or other foreign material.
  4. Materials containing hazardous or toxic constituents at hazardous or toxic concentrations.
- R. Must meet Ohio EPA Voluntary Action Program standards for residential land use.
- S. Compactable to specified density at specified moisture content.

## 7.8 Common Fill

- T. Type S2 - Imported Backfill: Clean imported soil that has a minimum clay content of at least 15%, with no material sized greater than 3 inches; no topsoil or deleterious material; and approved by the ENGINEER.
- U. Type S3 – Imported Topsoil: Clean imported topsoil to be used to establish a vegetative cover, and approved by ENGINEER. The topsoil shall contain between 4 percent and 20 percent organic matter as determined by loss on ignition of samples oven dried to constant weight at 212° F (100° C) and consist of fertile, loose, friable, and loamy material that contains humus material. For topsoil to be considered loamy, ensure that the fraction passing the No. 10 (200) sieve does not contain more than 40 percent clay. Test topsoil according to AASHTO T 267.

## 7.9 Source Quality Control

- V. Geotechnical Testing and Analysis of Common Fill Soil Type S2:
1. Maximum Dry Density and Optimum Moisture Content, ASTM D698. One sample per 1,000 cu yd or portion thereof of material required.
  2. In place Moisture Content, ASTM D2216: One sample per 1,000 cu yd or portion thereof of material required.
  3. Grain Size, ASTM D422: One sample per 1,000 cu yd or portion thereof of material required.
- W. Geotechnical Testing and Analysis of Common Fill Soil Type S3:

1. pH, ASTM D4972: One sample per 500 cu yd or portion thereof of topsoil required.
  2. Organic Matter, ASTM D2974: One sample per 500 cu yd or portion thereof of topsoil required.
  3. Grain Size, ASTM D422: One sample per 500 cu yd or portion thereof of material required.
- X. Chemical Characterization: Ten (10) samples per source of S2 type of imported fill and five (5) samples per source of S3 type of imported fill, according to the following methods:

Parameter	Analysis (EPA SW-846)
VAP Volatile Organic Compounds	8260B
VAP Semi-Volatile Organic Compounds (SVOCs)	8270C
Organochlorine Pesticides	8081A
Polychlorinated biphenyls (PCBs)	8082
Herbicides	8151A
RCRA Metals	6010B/7471A
Cyanide	9012A

- Y. If tests indicate materials do not meet specified requirements, change material or material source and retest.
- Z. Provide materials of each type from the same source throughout the work.
- AA. In the event of changes to approved sources of materials during performance of the work, immediately advise the ENGINEER of revised locations and obtain approval of such locations and materials prior to use in the work.
- BB. Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.



## 7.10 Preparation

- CC. Remove debris, snow, ice, water, soft soils, organic materials, or frozen ground from areas to be backfilled.
- DD. Decontaminate equipment which has handled contaminated or potentially contaminated material at the decontamination area prior to being used for backfilling operations.
- EE. Notify the ENGINEER of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- FF. Maintain and protect existing utilities designated to remain.
- GG. Obtain direction from ENGINEER before moving or otherwise disturbing utilities or structures.
- HH. Protect benchmarks, survey control points, hydrants, structures, fences, paving, and curbs from equipment and vehicular traffic.
- II. Maintain and protect from damage groundwater monitoring wells, utilities, and structures encountered. In event of disturbance or damage to well, utility, or structure, immediately notify the ENGINEER. Repair or replace well, utility, or structure damaged by CONTRACTOR operations.
- JJ. Protect groundwater monitoring wells and other structures and pipelines from uplift and displacement or disturbance during work.

## 7.11 Backfilling

- KK. Obtain approval from the ENGINEER for completed excavations and previously placed material prior to placement of successive lifts of fill materials.
- LL. Do not cause excavations to be backfilled until ENGINEER has approved excavation as complete.
- MM. Remove debris or water from areas to be backfilled.
- NN. Ensure areas to be backfilled are free from debris, snow, ice, water, soft soils, organic materials, or frozen ground.
- OO. If necessary, proof roll subgrade surface to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

- PP. Backfill excavated areas (Section 1 and 2b) with common fill (S1) to within 2 inches of the surrounding ambient ground surface.
- QQ. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- RR. Before placing topsoil or seed remove rock or other foreign material of 3 inches (75 mm) or greater in any dimension, from all areas.
- SS. Place topsoil in loose lifts of at least 2 inches in depth. The surface of the topsoil shall be such that the final grade as shown on the final grading plan is met.
- TT. Track the area with a dozer to compact and provide good contact between the topsoil and the underlying fill.

## 7.12 Compaction

- UU. Install both excavated soil and common fill in five to seven inch loose lifts and compact with at least three passes of suitable equipment to the satisfaction of the ENGINEER. If the excavated soil fill material cannot be properly compacted, it may be necessary to install structural matting to facilitate proper compaction. Prior to placing fill over existing ground, scarify/disc surface to depth of one to two inches. Maintain fill and existing surface at approximately same moisture content to facilitate bonding
- VV. Common Fill: Compact to 95 percent SMDD. The CONTRACTOR will be responsible for compaction testing at a frequency of one test per 4,000 square feet of fill material placed per lift. If the testing indicates unsatisfactory compaction, the contractor will provide the additional compaction to obtain the specified degree of compaction at no additional cost.
- WW. Apply potable water as necessary during compaction to obtain specified density. If material to be compacted is excessively moist, aerate with suitable equipment and method until moisture content is corrected. In areas not accessible to rolling equipment, compact material to specified density using mechanical tamper. Supply and pay for water.
- XX. When soil is wetted by sprinkling, do not direct jets of water at fill with such force that finer materials will be washed out.
- YY. Compaction Equipment: Use type, size, and efficiency of compaction equipment capable of achieving specified degree of compaction. When operating equipment



adjacent to and immediately above structures, avoid causing damage or displacement of structure.

## 7.13 Grading

- ZZ. Following completion of the consolidation and compaction of waste in Section 2a, prepare a final grading plan. The final grading plan is due to the ENGINEER within 7 days of completing the excavation, consolidation of the waste, and receipt of the final elevations of waste from the land surveyor.
- AAA. Grade to levels, profiles, and contours to match elevations in final grading plan.
- BBB. Prior to placing fill over existing ground, scarify/disc surface to depth of one to two inches. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

## 7.14 Surplus Material

- CCC. Remove surplus material and material unsuitable for fill as directed by the ENGINEER.

## 7.15 Tolerances

- DDD. Top Surface of Exposed Subgrade: Plus or minus 2 inches from required elevations
- EEE. Top Surface of topsoil finishing layer: Plus or minus 1 inch from required elevations.

## 7.16 Field Quality Control

- FFF. Testing by ENGINEER:
  - 1. The ENGINEER may select samples of uncompacted fill intended for the work.
  - 2. The ENGINEER may perform quality assurance tests in the field and in the laboratory on samples of backfill to determine if materials meet specification.
  - 3. Testing by the ENGINEER will in no way relieve CONTRACTOR of responsibility to test all material prior to notifying the ENGINEER of materials' suitability for the work involved.

GGG. Methods of Testing by the CONTRACTOR:

1. Bulk wet density will be determined in the field according to ASTM D6938.
2. Moisture content will be determined in the field according to ASTM D6938.

## **7.17 Adjusting**

- HHH. Correct surface irregularities by loosening and adding or removing material until the surface is within specified grade.
- III. Leave work areas in a properly graded condition sloped as required to permit proper drainage and free of depressions that will pond or collect water or debris that will restrict flow.

END OF SECTION

"K:\CCA\PROJECTS\Ray Lewis Landfill\Remedial Action\Remedial Action Work Plan\Appendices\App D Specifications\Specification 7 - Fill.docx"

# Bat Habitat Assessment

March 8, 2017

Ms. Kristin Watt  
Partner  
Vorys, Sater, Seymour, & Pease, LLP.  
52 East Gay Street  
Columbus, OH 43215

Dear Ms. Watt:

Subject: Former Ray Lewis Landfill Bat Assessment  
Marysville, Union County, Ohio  
CEC Project 171-071

Vorys, Sater, Seymour, & Pease, LLP. (VSSP) retained Civil & Environmental Consultants, Inc. (CEC) to provide professional ecological services regarding potential bat habitat for the purpose of pre-season tree clearing for the Former Ray Lewis Landfill Project (Project).

This letter serves to report CEC's findings with respect to potential summer Indiana bat (*Myotis sodalis*) habitat, as well as provide our professional opinion of proposed tree clearing activity.

## 1.0 BACKGROUND

The Project spans an area of approximately 3 to 3.5 acres and is located in Marysville, Union County, Ohio. It is located at latitude 40.245184° and longitude -83.362600°, adjacent Cypress Drive to the west. Holly Drive is approximately 165 feet to the south. Mill Creek is located about 500 feet to the northeast of the Project. Most of the area surrounding the Project is developed.

## 2.0 METHODS AND RESULTS

On March 6, 2017, CEC biologists visited the Project site to complete a bat habitat assessment. The Project site was dominated by eastern cottonwood (*Populus deltoides*), silver maple (*Acer saccharinum*), and boxelder (*Acer negundo*). There was also green ash (*Fraxinus pennsylvanica*), hackberry (*Celtis occidentalis*), tree-of-heaven (*Ailanthus altissima*), and black locust (*Robinia pseudoacacia*). Below the canopy was moderately cluttered with boxelder and green ash saplings, as well as mixed honeysuckle (*Lonicera sp.*) shrubs, grapevine (*Vitis sp.*), and poison ivy (*Toxicodendron radicans*). Representative photographs of the forested habitat are provided in Attachment A.



Ms. Kristin Watt  
CEC Project 171-071  
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Two (2) low-quality potential roost trees (PRT) were located and identified at the Project site. PRT-1 was a dead green ash with a diameter at breast height (dbh) of 14 inches. PRT-2 was a dead limb sprouted from a 29-inch dbh eastern cottonwood. Photographs of both PRTs are provided in Attachment A.

If this project had a federal nexus, such as needing a Clean Water Act Permit, the US Fish and Wildlife Service would need to offer their opinion on how best to avoid adverse effects to listed bats. However, because the Project does not involve a federal nexus, CEC is providing our professional opinion based on our knowledge of bat biology, as well as our past experience with similar projects.

Owing to the low quality bat habitat found during the habitat assessment, CEC believes that completing tree removal activities at this Project site prior to April 1, 2017 will result in no adverse effect to listed bat species. If a federal nexus does occur, we recommend contacting the US Fish and Wildlife Service for further assistance instead of using this opinion.

### 3.0 CLOSING

If you have any questions or need other information, please call Ryan Slack at 317-655-7777, or e-mail at [rslack@cecinc.com](mailto:rslack@cecinc.com). Thank you for the opportunity to assist with your project.

Sincerely,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.



Jason Damm

Assistant Project Manager



Ryan Slack  
Principal

Attachment: Site Photographs



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**ATTACHMENT A**  
**SITE PHOTOGRAPHS**

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Photo 1: Forest overview, east



Photo 2: Forest overview, south





Photo 3: Forest overview, north



Photo 4: Potential forested wetland (appears regulatory isolated)



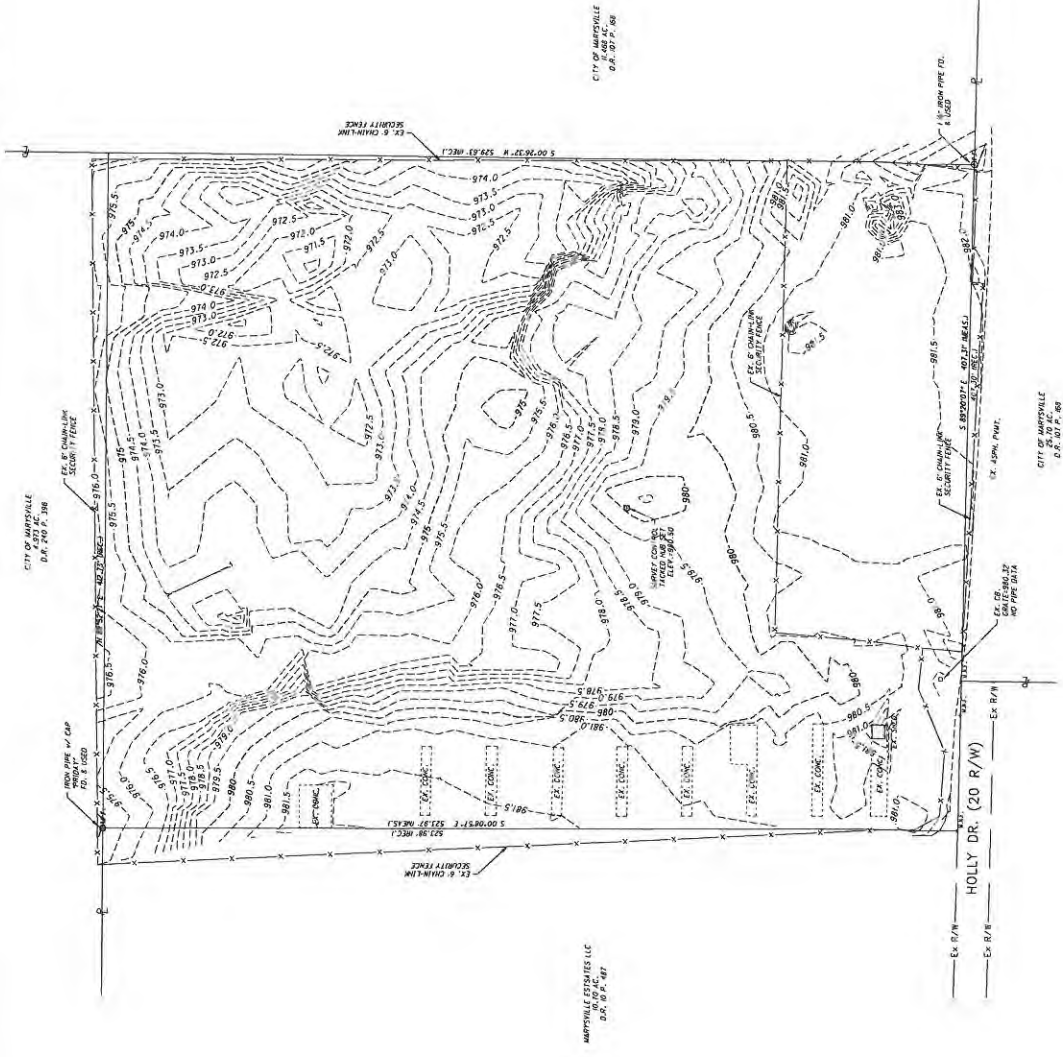
Photo 5: PRT-1, dead green ash



Photo 6: PRT-2, dead eastern cottonwood (limb)

# R.E. Warner Pre-Excavation Topographic Map





- SURVEY NOTES:**
1. ALL SURVEY AND TOPOGRAPHIC DATA, ALONG WITH EXISTING UTILITY INFORMATION SHOWN ON THIS DRAWING WAS TAKEN BY THE MAJOR & ASSOCIATES, INC. IN JUNE, 2017.
  2. ELEVATIONS ARE BASED ON NAVD 83.
  3. ALL INVERTS AND PIPE DIAMETERS ARE APPROXIMATE AND MAY DIFFER FROM THOSE ON RECORD DRAWINGS.
  4. NO LEGAL BOUNDARY SURVEY WORK WAS CONTRACTED.
  5. NO DEED RESEARCH WAS MADE TO ESTABLISH THE POSSIBILITY OF EASEMENTS, EJECTMENTS, EASEMENTS, UTILITIES, EJECTMENTS, OR ANY ENCUMBRANCES THAT COULD AFFECT THE USE OF THIS PARCEL.
  6. THE PROPERTY LINES SHOWN ON THIS PLAT WERE CREATED FROM PROPERTY CORNERS FROM A RECORD SURVEY PLAT OF 1984. SURVEYING WAS MADE JULY 1, 2016.

ISSUED FOR  
REVIEW ONLY  
JUNE 22, 2017  
R.E. Warner & Assoc. Inc.

<b>COX COLVIN</b> TOPOGRAPHIC SURVEY RAY LEWIS LANDFILL MARYSVILLE, OHIO		TOPOGRAPHIC SURVEY DRAWING NUMBER <b>S-1</b>	
JOB NUMBER 09017 LA OFFICE PLAZA B - SUITE 200 25777 DETROIT ROAD CLEVELAND, OHIO 44128 TELEPHONE (440) 835-9400		JOB NO. 09017 DATE 06/22/17 SCALE 1" = 30'-0"	
DESIGN BY: MJC DRAWN BY: MJC CHECKED BY: RAC		DESIGN BY: MJC DRAWN BY: MJC CHECKED BY: RAC	
REVISIONS NO. DATE DESCRIPTION 1 6/22/17 ISSUED FOR REVIEW		REVISIONS NO. DATE DESCRIPTION 1 6/22/17 ISSUED FOR REVIEW	

# Revised Section 5.0 Air Emissions



## **5.0 Air Emissions**

During implementation of the remedy, primarily during excavation, consolidation, backfill/compaction, and grading, fugitive dust emissions may be generated. Procedures and equipment will be in place to both minimize and mitigate fugitive dust emissions. Site-dedicated equipment will be used to apply water as needed to disturbed areas to control fugitive dust. If the generation of fugitive dust is observed, the Site contractor will take the necessary action to control the dust by applying water to the temporary roadways and/or working surfaces of the excavations, consolidated waste, and/or fill areas. The construction entrance/exit will also be watered as necessary to control fugitive dust. Regardless of soil moisture content, if wind speeds exceed 15 knots (approximately 17 mph), earth disturbing activities will temporarily cease.

### **5.1 Reduction of Equipment Contact with Contaminated Material**

During site activities, steps will be taken to reduce the contact of truck tires, equipment tracks, etc. with contaminated soil, if possible. It will be necessary for the excavation and consolidation equipment to contact contaminated material, and these pieces of equipment will be decontaminated prior to handling clean soil. The filling operations will be staged in a manner that reduces or eliminates contact of truck tires with contaminated or potentially contaminated soils. If there is a possibility that truck tires contacted contaminated soil, the tires and undercarriages of such trucks will be cleaned on the decontamination pad prior to leaving the site.

### **5.2 Vehicle and Equipment Decontamination**

Section 4.0, “Decontamination” of the IA Work Plan describes the procedures that will be used to ensure that the tires, treads, and undercarriages of vehicles leaving the site will be decontaminated/cleaned prior to leaving the Site. This procedure is intended to eliminate track out of soil onto Holly Drive. If track out does occur, periodic road watering will be used to minimize the generation of fugitive dust from truck traffic, and a street sweeper will be used to clean the roadway.

During the latter stages of the interim action (e.g., covering of the consolidated waste), truck tire contact with contaminated material should not occur. However, to remove the possibility of any track out of soil onto Holly Drive, the soil adhering to truck tires will be removed at the tire wash/decon pad.

## ENVIRONMENTAL COVENANT

This Environmental Covenant is entered into by [*name all Owners of the Property and Holders*] and the Ohio Environmental Protection Agency ("Ohio EPA") pursuant to Ohio Revised Code ("ORC") §§ 5301.80 to 5301.92 for the purpose of subjecting the Property described herein ("the Property") to the activity and use limitations set forth herein.

This Environmental Covenant requires current and future Property owners to meet certain requirements, including, but not limited to:

- Comply with the activity and use limitations given by paragraph 5 that: [*Plain language summary of the activity and use limitations in paragraph 5*].
- Provide an annual compliance report to Ohio EPA by [*enter Day Month*] of each year, as required by paragraph 9, describing that the Property continues to be used in compliance with the activity and use limitations.
- Give notice to new property owners (also known as "transferees") upon conveyance, as required by paragraph 10, of the activity and use limitations and the recorded location of this Environmental Covenant.
- Notify Ohio EPA within 10 days of each conveyance, as required by paragraph 10, of the property that was conveyed and new owner's contact information.

WHEREAS, the Property is owned by [*name of Owner*], who resides or is located at [*address or location of owner*].

WHEREAS, the remedy for the Property includes the activity and use limitations set forth in this Environmental Covenant.

WHEREAS, the activity and use limitations protect against exposure to the [*hazardous substances / petroleum / hazardous substances and petroleum*] in [*soil / ground water / soil and ground water, or describe other affected media*] on or underlying the Property.

[*WHEREAS, the Property is the subject to an operation and maintenance (O&M) agreement that provides for a central management entity to oversee engineering controls to maintain site protectiveness.*]

Now therefore, [name of each Owner and Holder other than Owner, if any] and Ohio EPA agree to the following:

1. Environmental Covenant. This instrument is an environmental covenant developed and executed pursuant to ORC §§ 5301.80 to 5301.92.

2. Property. This Environmental Covenant concerns an approximately \_\_\_\_\_-acre tract of real property located at [Address of Property], in [County], Ohio, and more particularly described in [Attachment #] attached hereto and incorporated by reference herein ("Property").

3. Owner. This Property is owned by [Owner Name] ("Owner"), [with a place of business located] at [Address of Owner].

4. Holder. Pursuant to ORC § 5301.81, the holder of this Environmental Covenant ("Holder") is the Owner listed above [and if applicable [Name of other Holder not the Owner], [with place of business located] at [Address of other Holder]].

5. Activity and Use Limitations. As part of the remedial action described in the Decision Document, Owner[s] hereby impose[s] and agree[s] to comply with the following activity and use limitations: *[Determine the activity and use limitations appropriate for the Property. Several types of restrictions may be appropriate as part of a remedial action, interim action, or closure plan where cleanup to an unrestricted land use is infeasible. These include: land use restrictions; ground water restrictions; disturbance restrictions; and construction restrictions. Each type of restriction must be considered on a site-specific basis to determine which restriction or combination of restrictions is suitable for the particular circumstances of the site or facility. Evaluate the possible use restrictions based on the nature of contamination, the type of affected media and the potential exposures. The restriction categories include: land use, ground water, disturbance and construction.]*

6. Running with the Land. This Environmental Covenant shall be binding upon the Owner, during the time that the Owner owns the Property or any portion thereof, and upon all assigns and successors in interest, including any Transferee, and shall run with the land, pursuant to ORC § 5301.85, subject to amendment or termination as set forth herein. The term "Transferee," as used in this Environmental Covenant, shall mean any future owner of any interest in the Property or any portion thereof, including, but not limited to, owners of an interest in fee simple, mortgagees, easement holders, and/or lessees.

7. Compliance Enforcement. Compliance with this Environmental Covenant may be enforced pursuant to ORC § 5301.91 and other applicable law. Failure to timely enforce compliance with this Environmental Covenant or the activity and use limitations contained herein by any party shall not bar subsequent enforcement by such party and shall not be deemed a waiver of the party's right to take action to enforce against any non-compliance. Nothing in this Environmental Covenant shall restrict the Director of Ohio EPA from exercising any authority under applicable law.

8. Rights of Access. Owner hereby grants to Ohio EPA's authorized representatives *[include, as applicable, name of local government and any Holders other than Owner, etc.; see ORC §§ 5301.82(A)(6) and 5301.91(A)]* the right of access to the Property for implementation or enforcement of this Environmental Covenant and shall require such access as a condition of any transfer of the Property or any portion thereof.

9. Compliance Reporting. Owner or Transferee, if applicable, shall annually submit to Ohio EPA *[include, as applicable, name of local government, any "Holders" other than Owner]* written documentation verifying that the activity and use limitations set forth herein remain in place and are being complied with. Documentation shall be due to Ohio EPA on July 1<sup>st</sup> of each year beginning the year after the effective date of this Environmental Covenant, unless otherwise directed by Ohio EPA.

10. Notice upon Conveyance. Each instrument hereafter conveying any interest in the Property or any portion thereof shall contain a notice of the activity and use limitations set forth in this Environmental Covenant, and provide the recorded location of this Environmental Covenant. The notice shall be substantially in the following form:

THE INTEREST CONVEYED HEREBY IS SUBJECT TO AN ENVIRONMENTAL COVENANT, RECORDED IN THE DEED OR OFFICIAL RECORDS OF [name of County Recorder's Office] ON \_\_\_\_\_, 201\_\_, IN [DOCUMENT \_\_\_\_, or BOOK\_\_\_\_, PAGE \_\_\_\_]. THE ENVIRONMENTAL COVENANT CONTAINS THE FOLLOWING ACTIVITY AND USE LIMITATIONS:

*[List or summarize the type of activity and use limitations in Paragraph 5 of the environmental covenant (i.e., a limitation to commercial or industrial land uses, a prohibition on ground water extraction and use, and a limitation on building occupancy – remedy or demonstration obligation).]*

Owner or Transferee, if applicable, shall notify Ohio EPA *[and "Holders" other than the Owner, if any]* within *[ten (10)]* days after each conveyance of an interest in the

Property or any portion thereof. The notice shall include the name, address, and telephone number of the Transferee, a copy of the deed or other documentation evidencing the conveyance, and a survey map that shows the boundaries of the property being transferred.

11. Representations and Warranties. Owner hereby represents and warrants to the other signatories hereto:

- A. that the Owner is the sole owner of the Property;
- B. that the Owner holds fee simple title to the Property and that the Owner conducted a current title search that shows that the Property [*choose one: is subject to [or] is not subject to any*] interests or encumbrances that conflict with the activity and use limitations set forth in this Environmental Covenant;

*[If other interests or encumbrances on the Property conflict with the activity and use limitations set forth in this Environmental Covenant, add the following provision as a separate subparagraph:*

*To the extent that any other interests in or encumbrances on the Property conflict with the activity and use limitations set forth in this Environmental Covenant, the persons who own such interests or hold such encumbrances have agreed to subordinate such interests or encumbrances to the Environmental Covenant, pursuant to ORC § 5301.86, and the subordination agreement(s) (attached as [Attachment #] to this Environmental Covenant; [or] recorded at [name of County Recorder's Office].)]*

- C. that the Owner has the power and authority to enter into this Environmental Covenant, to grant the rights and interests herein provided and to carry out all obligations hereunder;
- D. that this Environmental Covenant will not materially violate or contravene or constitute a material default under any other agreement, document or instrument to which Owner is a party or by which Owner may be bound or affected;

- E. that the Owner has identified all other persons that own an interest in or hold an encumbrance on the Property, and, if applicable, notified such persons of the Owner's intention to enter into this Environmental Covenant.

12. Amendment or Termination. This Environmental Covenant may be amended or terminated by consent of all of the following: the Owner, or a Transferee, if applicable; [*"Holders" other than Owner, if any;*] and the Director of the Ohio EPA, pursuant to ORC §§ 5301.82 and 5301.90 and other applicable law. The term, "Amendment," as used in this Environmental Covenant, shall mean any changes to the Environmental Covenant, including the activity and use limitations set forth herein, or the elimination of one or more activity and use limitations so long as there is at least one limitation remaining. The term, "Termination," as used in this Environmental Covenant, shall mean the elimination of all activity and use limitations set forth herein and all other obligations under this Environmental Covenant.

This Environmental Covenant may be amended or terminated only by a written instrument duly executed by the Director of Ohio EPA and by the Owner or Transferee, if applicable, of the Property or any portion thereof [, *and "Holders" or their assignees, if any*]. Within thirty (30) days of signature by all requisite parties on any amendment or termination of this Environmental Covenant, the Owner or Transferee, if applicable, shall file such instrument for recording with the [*name of County Recorder's Office*], and shall provide a file- and date-stamped copy of the recorded instrument to Ohio EPA [*and "Holders" or their assignees, if any*].

13. Severability. If any provision of this Environmental Covenant is found to be unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions shall not in any way be affected or impaired.

14. Governing Law. This Environmental Covenant shall be governed by and interpreted in accordance with the laws of the State of Ohio.

15. Recordation. Within [*thirty (30)*] days after the date of the final required signature, Owner shall file this Environmental Covenant for recording, in the same manner as a deed to the Property, with the [*name of County Recorder's Office*].

16. Effective Date. The effective date of this Environmental Covenant shall be the date upon which the fully executed Environmental Covenant has been recorded as a deed record for the Property with the [*name of County Recorder's Office*].

17. Distribution of Environmental Covenant. Owner shall distribute a file- and date-stamped copy of the recorded Environmental Covenant to: Ohio EPA [, *include name other parties to the Environmental Covenant, if any*] and [*include the appropriate governmental entity applicable to property: City / County / Township*].

18. Notice. Unless otherwise notified in writing by any party hereto or Ohio EPA, any document or communication required by this Environmental Covenant shall be submitted to:

As to Ohio EPA:

Ohio EPA – Central Office  
Division of Environmental Response and Revitalization  
50 West Town Street  
Columbus, Ohio 43216  
Attn.: DERR Records Management Officer

Or, send electronically to: [records@epa.ohio.gov](mailto:records@epa.ohio.gov)

And

Ohio EPA - [applicable district office]  
[District office address]  
Attn.: DERR Site Coordinator for [*Site Name*]

As to Owner:

[Name, title, or position]  
[Address]

[As to Holder:]

[Name, title, or position]  
[Address]

The undersigned represents and certifies that the undersigned is authorized to execute this Environmental Covenant.



**[OWNER NAME]**

Printed Name and Title

Before me, a notary public, in and for said county and state, personally appeared \_\_\_\_\_, a duly authorized representative of the Owner, who acknowledged to me the execution of the foregoing instrument on behalf of the Owner.

Notary Public

**[HOLDER NAME]**

\_\_\_\_\_  
Signature of Holder

\_\_\_\_\_  
Printed Name and Title

State of \_\_\_\_\_ )  
County of \_\_\_\_\_ ) ss:

Before me, a notary public, in and for said county and state, personally appeared \_\_\_\_\_, a duly authorized representative of the Holder, who acknowledged to me the execution of the foregoing instrument on behalf of the Holder.

IN TESTIMONY WHEREOF, I have subscribed my name and affixed my official seal this \_\_\_\_\_ day of \_\_\_\_\_, 201\_\_.

\_\_\_\_\_  
Notary Public

**OHIO ENVIRONMENTAL PROTECTION AGENCY**

\_\_\_\_\_  
Craig W. Butler, Director

State of Ohio                    )  
  )  
County of Franklin            )       ss:

Before me, a notary public, in and for Franklin County, Ohio, personally appeared Craig W. Butler, the Director of Ohio EPA, who acknowledged to me that he did execute the foregoing instrument on behalf of Ohio EPA.

IN TESTIMONY WHEREOF, I have subscribed my name and affixed my official seal this \_\_\_\_\_ day of \_\_\_\_\_, 201\_\_.

\_\_\_\_\_  
Notary Public