



# **Remedial Design/Remedial Action Work Plan Mayer Landfill (3-36-027) Blooming Grove, New York**

*Prepared for*

New York State Department of Environmental Conservation  
625 Broadway  
Albany, New York 12233



*Prepared by*

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EA Science and Technology  
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June 2007  
Revision: DRAFT  
EA Project No. 14474.03

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<u>Number</u>	<u>Title</u>
1	Site location.

## 1. INTRODUCTION

The New York State Department of Environmental Conservation (NYSDEC) tasked EA Engineering, P.C. and its affiliate EA Science and Technology (EA), to perform a remedial design/remedial action (RD/RA) oversight at the Mayer Landfill Site in the Town of Blooming Grove, Orange County, New York (Figure 1).

The primary focus of this Work Assignment is to design and oversee the construction of a remedial action at the Mayer Landfill. Prior to design of the remedial action, additional site characterization will be performed to evaluate existing onsite conditions, groundwater flow direction, the nature and extent of contamination, and possible human exposure to the contaminants. Following completion of the site characterization, EA will design the remedy for the Mayer Landfill, participate in the contractor bidding process, and oversee the construction of the remedial action at the site.

The Work Assignment will be conducted under the NYSDEC State Superfund Standby Contract (Work Assignment No. *D004441-3*). This RD/RA Work Assignment consists of the following five tasks:

- Task 1 – Background review and preparation of work plans
- Task 2 – Additional site characterization
- Task 3 – Completion of plans and specifications for remedial design
- Task 4 – Pre-award services
- Task 5 – Remedial construction management.

A brief summary of Task 1 is discussed below. Tasks 2, 3, 4, and 5 are discussed in Sections 2, 3, 4, and 5, respectively.

### 1.1 BACKGROUND REVIEW AND PREPARATION OF WORK PLANS – TASK 1

A review of available historic and/or background information was conducted in March 2007 as part of Task 1. Based on the information obtained during that review process, two work plans were prepared as part of Task 1 (e.g., a Project Management Work Plan and this RD/RA Work Plan). The Project Management Work Plan was previously submitted to NYSDEC as a stand-alone document and subsequently approved.

A site visit was held at the Mayer Landfill Site and attended by NYSDEC and EA on 15 March 2007. The site characterization activities detailed in this RD/RA Work Plan (Section 2) were developed from discussions during that scoping session, the historical and background review, and information within the original Work Assignment.

In addition, EA has previously generated a Generic Health and Safety Plan (HASP) and Generic Quality Assurance Project Plan (QAPP), which are used for all work conducted under the

NYSDEC State Superfund Standby Contracts (D004438 and D004441). EA then prepared addenda to the HASP and QAPP for each individual work assignment detailing specific activities associated with those projects. The site-specific HASP and QAPP addenda are provided in Appendix A and B, respectively.

## **2. ADDITIONAL SITE CHARACTERIZATION – TASK 2**

Prior to initiating the RD, EA will perform additional site characterization activities in order to evaluate existing onsite conditions, determine the nature and extent of the contamination, verify wetland delineation near the light non-aqueous phase liquid (LNAPL) area of the landfill, and evaluate possible human exposure to the contaminants. These additional studies will include the following:

- Field investigation
- Title search
- Summary of data
- Basis of design report.

### **2.1 FIELD INVESTIGATION ACTIVITIES**

The following field activities will be completed as part of the site characterization portion of the Work Assignment:

- Test trenching/wetland delineation
- Groundwater sampling
- Soil gas sampling
- Site surveying.

Details of each field activity are described below. A site map depicting the Mayer Landfill site is provided on Figure 1.

#### **2.1.1 TEST TRENCHING**

Using existing site data, EA will locate and install several test trenches in the suspected LNAPL area on the northeastern edge of the landfill. EA anticipates that 20 trenches will be installed in the LNAPL area to a depth of at least 15 feet. Up to two samples from each test pit (one soil and one groundwater) will be forwarded to Hampton-Clarke/Veritech of Fairfield, New Jersey for analytical testing. Head space screening techniques will be used to identify the depths to collect soil samples. Each soil sample selected will be analyzed for hazardous waste characteristics and volatile organic compounds (VOCs). Groundwater samples will be analyzed for VOCs only. Excavated soil will remain on site and utilized to backfill the test pits. Sampling and analysis expected is outlined in Table 1 of the QAPP (Appendix B). Sample forms to be completed during test trenching activities are included in Appendix C.

Subsequent to completion of the test pits near the LNAPL area of the landfill, EA will perform a wetland delineation of lands surrounding the LNAPL area. This delineation will allow EA to determine if coordination with NYSDEC Division of Fish and Wildlife and/or Army Corps of Engineers will be needed, or if any permitting is necessary during the RD.



## 2.1.2 GROUNDWATER SAMPLING

Site characterization will include one round of groundwater sampling at the site. Twenty-one wells, including all locatable and functional existing site-related monitoring wells will be sampled. Actual wells to be sampled will be determined following location and inspection of the existing monitoring well network. The wells currently reported onsite and expected to be sampled as part of the groundwater monitoring program are included in the table below:

Monitoring Well Network at Mayer Landfill Site		
MW-1 <sup>1</sup>	MW-7	MW-12
MW-2	MW-7D	MW-13
MW-3	MW-8	MW-14D
MW-4	MW-9	<b>TMW-1</b>
MW-4D	MW-9D	<b>TMW-2</b>
MW-5	MW-10	<b>TMW-3</b>
MW-6	MW-11	<b>TMW-4</b>
<sup>1</sup> . Offsite well		
NOTE: <b>Bold</b> text indicates temporary monitoring wells installed in light non-aqueous phase liquid area.		

Groundwater monitoring well sampling procedures will include water level measurements, well purging, field measurements, and sample collection at each monitoring well location. A copy of the purging and sampling log form used to record well purging, water quality measurements, and sampling flow rates is provided in Appendix B. The objective of the groundwater sampling protocol is to obtain samples that are representative of the aquifer in the well vicinity so that analytical results reflect the composition of the groundwater as accurately as possible. Water level measurements and analytical results will be included in the RD Report.

Groundwater samples will be analyzed for VOCs by United States Environmental Protection Agency (EPA) Method 8260B, semivolatile organic compounds (SVOCs) by EPA Method 8270C, target analyte list Metals by EPA Method 6010, and pesticides/ polychlorinated biphenyl (PCBs) by EPA Method 608, in accordance with the NYSDEC Analytical Services Protocol.

Rapid and significant changes can occur in groundwater samples upon exposure to sunlight, temperature, and pressure changes at ground surface. Therefore, groundwater sampling will be conducted in a manner that will minimize interaction of the sample and the surface environment. The equipment and protocol for collecting groundwater samples by each method are described in Section 2.1.2.1. Groundwater samples will be collected after 3-5 well volumes are purged, water quality measurements are stabilized, and turbidity is recorded below 50 nephelometric turbidity unit. All purge water will be containerized, handled, and disposed of as detailed in Section 6.

### **2.1.2.1 GROUNDWATER SAMPLING BY PURGE METHOD**

#### **Purging and Sampling Equipment**

Well purging may be performed by using submersible pumps or by using dedicated polyethylene bailers. Equipment for sampling may include the following:

- Submersible pumps
- Teflon-lined polyethylene bailers dedicated in each well for well purging
- Electronic water level measurement unit with accuracy of 0.01 ft
- Flow measurement device (containers graduated in milliliters) and stop watch

#### **Field Analytical Equipment**

Field equipment to be used at the site will include a Horiba U-22 water quality meter (or similar) with a flow-through cell, which includes probes for measurement of pH, reduction-oxidation potential (Eh), turbidity, dissolved oxygen, temperature, and conductivity. Additionally, a photoionization detector (PID) will be used to get a headspace reading on the well head. Each piece of equipment will be checked by the EA Site Manager to be in proper working order before its use and calibrated as required by the manufacturer. Prior to each use, field analytical equipment probe(s) will be decontaminated. After each use, the instrument will be checked and stored in an area shielded from weather conditions.

The calibration of each instrument will be checked at the beginning of each day of groundwater sampling.

#### **Groundwater Sampling Purge Method**

Groundwater samples will be analyzed by Hampton-Clark/Veritech for VOCs by EPA Method 8260B, SVOCs by EPA Method 8270C, target analyte list Metals by EPA Method 6010, and pesticides/ polychlorinated biphenyl by EPA Method 608 in accordance with the NYSDEC Analytical Services Protocol during the sampling event. The following procedures will be used for monitoring well groundwater sampling:

- Wear appropriate personal protective equipment as specified in the HASP and the HASP Addendum. In addition, samplers will use new sampling gloves for the collection of each sample.
- Unlock and remove the well cap.
- Obtain PID readings and record them in the field logbook.

- Measure the static water level in the well with an electronic water level indicator. The water level indicator will be washed with Alconox detergent and water, then rinsed with deionized water between individual wells to prevent cross-examination. Decontamination fluids will be containerized.
- Calculate the volume of water in the well.
- Place polyethylene sheeting around the well casing to prevent contamination of sampling equipment in the event sampling equipment is dropped.
- Purge 3-5 well volumes of water from the well, using one of the methods described below. Purged water will be containerized separately from decontamination fluids.
  - Bail with a dedicated, disposable polyethylene bailer.
  - Pump with a submersible pump equipped with: (1) a check valve to avoid backflush and (2) new polyethylene tubing dedicated to each well. Set intake at the surface level of the ground water and start pump; continue to lower the intake line ensuring that all standing water in the well has been purged.
- Allow field parameters of pH, Eh, dissolved oxygen, specific conductivity, and temperature to stabilize before sampling. Purging will be complete if the following conditions are met:
  - Consecutive pH readings are  $\pm 0.2$  pH units of each other
  - Consecutive water temperatures are  $\pm 0.5^{\circ}\text{C}$  of each other
  - Consecutive measured specific conductance is  $\pm 10$  percent of each other.

If these parameters are not met after purging a volume equal to 3-5 times the volume of standing water in the well, the EA Project Manager will be contacted to determine the appropriate action(s).

- If the well goes dry before the required volumes are removed, the well may be sampled when it recovers (recovery period up to 24 hours).
- Obtain the sample from well with a bailer suspended on new, clean nylon twine. The sampling will be performed with a new bailer dedicated to each individual well.
- Collect the sample aliquot for VOC analysis, first by lowering and raising the bailer slowly to avoid agitation and degassing, and then collect sample aliquots for the semi-volatile organic compounds analysis and carefully pour directly into the appropriate sample bottles. Sample bottles containing appropriate preservative for the parameter to be analyzed will be obtained from the laboratory.

- Obtain a field measurement of pH, dissolved oxygen, temperature, and specific conductivity and record in on the purging and sampling form. The instruments will be decontaminated between wells to prevent cross-contamination.
- Place the analytical samples in cooler and chill to 4°C. The samples will be shipped to the analytical laboratories within 24 hours.
- If a submersible pump is used, it will be fully decontaminated, and the polyethylene suction/discharge line will be properly discarded.
- Re-lock well cap.
- Fill out the field logbook, sample log sheet, labels, custody seals, and chain-of-custody forms.

Groundwater samples will be placed in appropriate sample containers, sealed, and submitted to the laboratory for analysis. The samples will be labeled, handled, and packaged following the procedures described in Generic QAPP and QAPP Addendum. Quality assurance/quality control (QA/QC) samples will be collected at the frequency detailed in the Generic QAPP, QAPP Addendum, and Table 1. Sample forms to be completed during groundwater sampling activities are included in Appendix C.

### **2.1.3 SOIL GAS INVESTIGATION**

A soil gas investigation will be performed to evaluate the potential for vapor intrusion in residential structures to the southeast of the site. The results of the soil gas investigation will be forwarded to the New York State Department of Health (NYSDOH) and NYSDEC to determine if additional soil vapor intrusion investigations are needed.

The soil gas monitoring will be performed at specified locations selected by the NYSDEC, in consultation with the NYSDOH, which is expected to include the area southeast of the landfill area and to the west of Peddler Hill Road. Up to 20 soil vapor points will be placed across the site at 10 locations.

Soil vapor points will be installed using direct-push technology to drive stainless steel rods equipped with detachable stainless steel drive points to the desired depth. Once the desired depth is reached, the drive rod will be retracted revealing a 6-in. sampling screen attached to dedicated Teflon tubing which will be used to collect the soil vapor samples. The boreholes will then be backfilled with sand/glass beads to a minimum of 6 in. above the screened interval. Granular bentonite will then be placed from approximately 6 in. above the screen to the ground surface and continuously hydrated. The bentonite will then be allowed to set for a time of at least 24 hours.

If requested by NYSDEC, soil gas samples will be collected at two depths: one equivalent to that of a typical building foundation, approximately 8 ft below ground surface, and one just above the water table interface.

Prior to collection of soil gas samples, the soil gas probes will be purged in accordance with the NYSDOH guidance for evaluating soil vapor intrusion. One to three implant volumes will be purged at a flow rate not to exceed 0.2 L per minute to minimize outdoor air infiltration during sampling. The samples will be collected using laboratory-certified clean SUMMA canisters with 2-hour regulators and dedicated Teflon tubing.

Tracer gas will be used during the soil gas investigation in accordance with the NYSDOH guidance for evaluating soil vapor intrusion in order to verify that the isolated sampling point is not being influenced by the overlying ambient space. At least two soil vapor sampling locations will be evaluated using tracer gas, with use at additional locations to be evaluated based upon the results of the initial sampling locations. Quality assurance/quality control samples will be collected at the frequency detailed in the Generic QAPP, QAPP Addendum, and Table 1. Sample forms to be completed during soil gas investigation activities are included in Appendix C.

Upon completion of the soil gas sampling program, the sample tubing will be removed and the temporary soil gas probe location will be backfilled with bentonite and marked with a stake/flag, which will be labeled with the proper sample identification and illustrated on the site map so that it can be located at a later date.

### **Laboratory Analysis of Soil Gas Samples**

Soil vapor samples will be analyzed by an Environmental Laboratory Analytical Program-certified laboratory for VOCs using EPA Method TO-15. In accordance with the NYSDOH guidance for evaluating soil vapor intrusion, the analysis for the soil gas samples will achieve detection limits of  $1 \mu\text{g}/\text{m}^3$  for each compound. The analytical turnaround time will be 14 days from receipt of sample containers. Analytical results will be provided as an electronic data deliverable.

#### **2.1.4 SITE SURVEY**

A site survey will be performed at the site during site characterization activities. The survey will include all soil vapor point, groundwater monitoring wells, and test pits sampled on site. Further detail regarding site survey activities is included in Section 8.

### **2.2 TITLE SEARCH**

A title search will be conducted to identify all associated tax map designations, property owner names and addresses to properties likely to be affected by the RA.

## **2.3 DATA VALIDATION/DETERMINATION OF USABILITY**

The collection and reporting of reliable data is a primary focus of the sampling and analytical activities. Laboratory and field data will be reviewed to determine the limitations, if any, of the data, and to ensure that the procedures are effective and that the data generated provides sufficient information to achieve the project objectives. An independent qualified third-party will evaluate the analytical data according to NYSDEC Division of Environmental Remediation (DER) Data Usability Summary Report guidelines, as detailed in the Generic QAPP discussed in Section 10.

## **2.4 BASIS OF DESIGN REPORT**

EA will prepare a Basis of Design (BOD) Report, which will evaluate all data collected during the field investigation activities and the remedial investigation/feasibility study previously performed on the site. Additionally, the report will evaluate the conceptual design proposed in the Record of Decision and recommend any changes or additions to the remedy. The report will include at a minimum:

- Summary of task activities with regard to design of the remedy
- Necessary requirements to excavate, manage and properly dispose contaminated soil offsite
- Determine if additional monitoring wells are required for monitoring the remedy
- Identify other concerns which may affect the public health, the environment, or operation of the remedy
- Summary tables of physical and analytical results
- Conclusions and recommendations for the RD.

The findings of the BOD will be reduced by EA, analyzed, and made available to the NYSDEC and the NYSDOH for review. These findings will be used to determine if the collection of additional data is required, or if sufficient data exists to design the remedy.

EA will submit seven hard copies of the draft BOD Report and one copy in Adobe Acrobat® (PDF). Tables and spreadsheets will also be submitted electronically (Microsoft® Excel 2000 or compatible). The final version of the BOD Report will include seven hard copies and one copy in PDF.

### **3. COMPLETION OF PLANS AND SPECIFICATIONS FOR REMEDIAL DESIGN – TASK 3**

The major objective of the RD will be to design the remedy that appears to be the most appropriate, cost effective, and protective of public health and the environment. The RD will be conducted in accordance with the most recent versions of the 1988 EPA publication *Guidance for Conducting Remedial Investigations and Feasibility Studies Under Comprehensive Environmental Response, Compensation, and Liability Act CERCLA* EPA 15401G-891004. If additional areas of concern are located during the site characterization, EA will assess whether they need to be addressed and determine how to address them. In addition to the RD, this task will include development of minimum requirements for the construction quality assurance/health and safety plans and a site construction management plan including an erosion control plan, excavation plan that includes a dewatering contingency, a waste management plan, and a community air monitoring plan. EA will also develop technical contract documents and specifications associated with the implementation of the remedy.

Specifications included in the design are likely to include, but not be limited to, the following:

- Clearing and grubbing
- Dewatering
- Earthwork and waste removal
- Erosion and sedimentation control
- Select fill material
- Soil fill material
- Topsoil, seeding and mulch
- Monitoring well installation
- Monitoring well decommissioning.

Drawings included in the design are likely to include, but not be limited to, the following:

- Existing conditions
- Excavation plan
- Excavation cross-section
- Monitoring well construction
- Final conditions
- Details.

As part of the RD, EA will develop a site management plan that will include the following institutional and engineering controls:

- Long-term groundwater monitoring plan

- Maintenance of the existing cover
- A plan to manage any development of the landfill that would result in excavation into the existing cover and/or water
- Exclusion against future residential use
- Prohibition against the use of groundwater as a source of potable or process water without necessary water quality treatment.

Information collected during implementation of the additional site characterization tasks discussed in Section 2 will be used as appropriate during the design phase. For example, the dense non-aqueous phase liquids delineation and the groundwater table as determined during the site characterization activities will be incorporated into the specifications and drawings accordingly. In addition, during preparation of the intermediate and final designs (discussed in further detail below), EA will use information gathered from the historical documents along with information collected during the site characterization activities to refine the design to focus on site specific contaminants.

EA anticipates providing all relevant site information in the Bid Documents in order to allow the prospective bidders to prepare a Work Plan, which describes their proposed site management methods (excavating of wet conditions, etc.). EA will provide minimum requirements for the Contractor's Work Plan, but the means and methods will be proposed by the Contractor.

### **3.1 INTERMEDIATE DESIGN**

EA will meet with the NYSDEC to present and discuss the proposed 90 percent design plans. EA will revise this design based on comments received at the meeting and will submit three copies of the complete 90 percent design report to the NYSDEC within four weeks of the meeting. The 90 percent design report will include the specifications and drawings outlined above as well as supporting calculations as appropriate. A conceptual site management plan, landfill cover maintenance plan, long-term groundwater monitoring plan, and soils management plan will also be submitted with 90 percent remedial design report.

### **3.2 FINAL DESIGN**

The final design will be completed based on comments received from the NYSDEC from the 90 percent design report submittal. EA will reference the NYSDEC DER's "*June 2006 Standard Construction Contract*" when completing the final design report and ensure consistency between the final design and the contract documents with respect to bid forms, specifications, drawings, etc.

Once completed, five copies of the final design report, including specifications, supporting data and documentation, and design calculations will be submitted to the NYSDEC for review.



Following approval of the final design, EA will submit 75 copies of the plans and specifications for bidding, as well as electronic versions of plans and specifications in PDF and figures in AutoCAD® and PDF formats. The final design report will be stamped by a Professional Engineer licensed in New York State.

As part of the final design, EA will prepare cost estimate detailing the projected construction, operation, and maintenance for the project. These estimates will be used in the development of the unit and lump sum bid forms as provided in Section V of the Standard Construction Contract. This information will also be used to establish a reasonable dollar amount of the liquidated damages for the project as established in Article 6 of the Standard Construction Contract. EA will provide all documentation and calculations that were used to develop the cost estimates.

### **3.3 PROGRESS REPORTS**

Bi-monthly progress reports will be submitted the NYSDEC outlining progress in the RD to date

## **4. PRE-AWARD SERVICES - TASK 4**

### **4.1 PRE-BID CONFERENCE**

EA will attend a pre-bid conference with the NYSDEC and prospective bidders. EA will help prepare for the meeting and will assist the NYSDEC with answering technical questions during the meeting. EA will also take notes and prepare draft minutes of the meeting. Following the pre-bid meeting, EA will assist in the preparation of addenda as necessary based on the pre-bid meeting (discussed further below).

### **4.2 ADDENDA PREPARATION**

EA will prepare all Contract Addenda as required by questions raised at the pre-bid meeting. EA will also revise the pre-bid cost estimate based on changes in the work scope as identified within the contract addenda. The Contract Addenda will be stamped by a Professional Engineer licensed in New York State.

## **5. REMEDIAL CONSTRUCTION MANAGEMENT – TASK 5**

EA will provide professional engineering services to ensure proper management of the remedy and inspection of the remedial construction. EA will work as a liaison between NYSDEC and the contractor on all issues related to the project, will monitor health and safety conditions on-site, complete record keeping of all construction activities, and will provide quality assurance during all aspects of construction.

### **5.1 REVIEW OF CONTRACTOR SUBMISSIONS**

EA will review written submissions and other project-related documents according to project objectives and requirements. Following review submissions, written comments will be distributed to the contractor following NYSDEC review.

### **5.2 PRE-CONSTRUCTION MEETING**

EA will provide a thorough review of the scope of work, HASPs, plans submitted with bid and project schedule with contractors. Contractual and technical issues will be addressed as well, and meeting minutes will be distributed in accordance with contract documents.

### **5.3 REVIEW OF CONTRACTOR SUBMISSIONS**

Following the Contractor's Notice to Proceed, EA will obtain written submissions as required by the contract documents. EA will evaluate these according to project objectives and requirements and send these submissions, along with written recommendations to NYSDEC concerning their suitability. Specifically EA will:

- Obtain and review shop drawings, soil tests, material tests, and as-build drawings for the duration of the project and make recommendations for acceptance/rejection to the NYSDEC
- Review analytical material generated during construction, including the QA/QC of analytical data and review of waste character profile sheets
- Continually monitor the Contractor's progress, review the Contractor's progress schedule biweekly, notify the Contractor of its status, and require contractor's proposed actions to get back on schedule, if needed
- Sign manifests and bills of lading for disposal of hazardous and non-hazardous waste, respectively
- Assure that waste is properly disposed of by the Contractor and provide proper documentation of disposal

- Review and recommend approval of all requests for payment submitted by the Contractor

#### **5.4 PROJECT INSPECTIONS – REMEDIAL CONSTRUCTION**

EA will provide one full-time on-site inspector during all construction activities to document all work performed during construction. EA will notify the Contractor and the NYSDEC in the event that the Contractor fails to perform the work as specified in the contract and recommend to NYSDEC the acceptance, disapproval, or rejection of the Contractor's work. EA will issue instructions, field orders, interpretations, and clarification of contract language to the Contractor. In the event of a change order, EA will negotiate, develop, and submit the change order with an independently developed, detailed cost estimate and other pertinent documentation, as need, to the NYSDEC. EA will document, evaluate, and recommend a course of action for all disputes and claims with the Contractor. EA will attend all meetings required by the NYSDEC, including those with the public, if necessary.

Additionally, EA will complete an inspection upon substantial completion of the work and a final inspection upon project completion. Upon completion, EA will deliver a written notice with regard to the disposition of the project. All files, reports, and documentation will be submitted to NYSDEC upon completion of the project including hard copies and one copy in PDF.

#### **5.5 CONSTRUCTION RECORDS AND REPORTS**

EA will maintain complete and detailed records for all construction related activities during the project duration. All records will be kept during construction at the site project office, and will be forwarded to NYSDEC following completion of the project. These records and reports include, but are not limited to, the following:

- Daily work completed visitors onsite and important conversations
- Contractor's daily use of personnel, material and equipment
- Records documenting Contractor's deviation from work as specified in the contract and any instructions issued regarding deviations
- Unusual circumstances (e.g., weather conditions, labor disputes, health and safety hazards, etc.)
- Assure that the Contractor's site visitor's log, security log, and health and safety log, drum log, air monitoring log, and sampling log are accurate and up-to-date
- Progress record of Contractor in reference to the work schedule submitted by the Contractor

- Security and health and safety logs
- General files including correspondence and other documentation related to the project
- Job meetings
- Records of Contractor's submittals including shop drawings, change orders, soil tests, material tests, and action taken (e.g., approval)
- Digital construction photos submitted daily along with a brief photo log and the daily report
- As-built and record drawings. Weekly and monthly narrative status reports
- Telephone conversations
- Copies of manifests and bills of lading for disposal of wastes
- Copies of certification of disposal.

Sample forms to be completed during inspection activities are included in Appendix C.

## **5.6 REMEDIATION REPORT**

Throughout the remedy construction process, EA will complete a series of reports outlining activities performed to date.

### **5.6.1 FIFTY PERCENT PRELIMINARY REMEDIATION REPORT**

Following the remedial construction NTP date, EA will prepare a report evaluating and certifying the work performed by the Contractor. Additionally, the construction will be verified in accordance with the contract documents, and a description of all variations from the contract documents to date will be included. Approved record drawings and other documents relative to construction activities completed shall be attached to this report. Three copies of this report will be submitted to the NYSDEC for review.

### **5.6.2 NINETY-FIVE PERCENT PRELIMINARY REMEDIATION REPORT**

Following substantial completion of the remedial construction contract, EA will prepare a report evaluating and certifying the work performed by the contractor. Additionally, the construction will be verified in accordance with the contract documents, and a description of all variations from the contract documents to date will be included. Approved record drawings and other documents relative to construction activities completed shall be attached to this report. Three copies of this report will be submitted to the NYSDEC for review.

### **5.6.3 FINAL REMEDIATION REPORT AND SITE MANAGEMENT PLAN**

Following completion of the remedial construction, a final, approvable remediation certification report will be completed by EA. This report will evaluate and certify the work performed by the contractor, verify that all work was constructed in accordance with the contract document, and include a description of variations from the contract documents. Record drawings, digital photos and log, and other pertinent documents will be included with the report. In addition, the site management, landfill cover maintenance and long-term groundwater monitoring plans will be updated for final submission to NYSDEC. EA will submit three hard copies of the Final Remediation Report and one copy in PDF.

## **6. STORAGE AND DISPOSAL OF WASTE**

EA is responsible for the proper storage, handling, and disposal of investigative derived waste; including personal protective equipment, and solids and liquids generated during the well and soil vapor point drilling, test trench excavation, well development, and well sampling activities. All drummed materials will be clearly labeled as to their contents and origin. All investigative derived waste will be managed in accordance with NYSDEC DER Technical and Administrative Guidance Memorandum 4032.

Accordingly, handling and disposal will be as follows:

- Liquids generated from contaminated equipment decontamination that exhibit visual staining, sheen, or discernable odors will be collected in drums or other containers at the point of generation. They will be stored in an appropriate staging area as approved by NYSDEC. A waste subcontractor will then remove the drums and dispose at an offsite location.
- Liquid generated during well purging or a decontamination activity that does not exhibit visible staining, sheen, or discernable odors will be discharged to an unpaved area on the site, where it can percolate into the ground.
- Soil and rock cuttings from drilling operations that do not exhibit visible staining, sheen, or discernable odors will be disposed of onsite.
- Soil and rock cuttings from drilling operations that exhibit visible staining, sheen or discernable odors will be staged onsite until an appropriate treatment/disposal procedure has been determined after the completion of the site characterization.
- Used protective clothing and equipment that is suspected to be contaminated with hazardous waste will be placed in plastic bags, packed in 55-gal ring-top drums, and transported to the drum staging area.
- Non-contaminated trash and debris will be placed in a trash dumpster and disposed of by a local garbage hauler.
- Non-contaminated protective clothing will be packed in plastic bags and placed in a trash dumpster for disposal by a local garbage hauler.

## **7. DATA VALIDATION/DETERMINATION OF USABILITY**

The collection and reporting of reliable data is a primary focus of the sampling and analytical activities. Laboratory and field data will be reviewed to determine the limitations, if any, of the data and to assure that the procedures are effective and that the data generated provide sufficient information to achieve the project objectives. A qualified independent third party will evaluate the soil vapor and groundwater analytical data according to NYSDEC DER Data Usability Summary Report guidelines.



## **8. SITE SURVEY AND MAP PREPARATION**

The Site Survey will involve surveying all monitoring well locations, test pit locations, soil vapor point locations and preparation of a site map based upon a previous basemap. To ensure the collection of consistent elevation data, each of the existing monitoring wells will be included in the Site Survey. A detailed topographic base map of the site and immediate vicinity will be developed. All relevant features of the site and adjacent areas will be plotted. The site map will include all area important features associated with the investigation (i.e., surface water drainage, above and underground storage tanks, buildings, drywells, cesspools). Contours will be plotted at 1-ft intervals. The location and elevation of each monitoring well will be surveyed by a New York State licensed surveyor. The elevations of all monitoring well casings will be established to within 0.01 ft based on the National Geodetic Vertical Datum. A permanent reference point will be placed in all interior Polyvinyl chloride casings to provide a point to collect future groundwater elevation measurements.

As previously mentioned, the consultant will be responsible for placing either survey flags or survey stakes at each of the soil gas sampling locations and test pit locations. Each of the flags/stakes will be marked by the consultant with sample identification information.

With respect to the site survey and map preparation, the following assumptions have been made:

- Three blueline copies of the site maps with topography (1 ft intervals), and three blueline copies of the maps, without topography, will be submitted to the NYSDEC.
- The site map will be provided in AutoCAD, version 12 or higher and ArcMap™ 9.1.

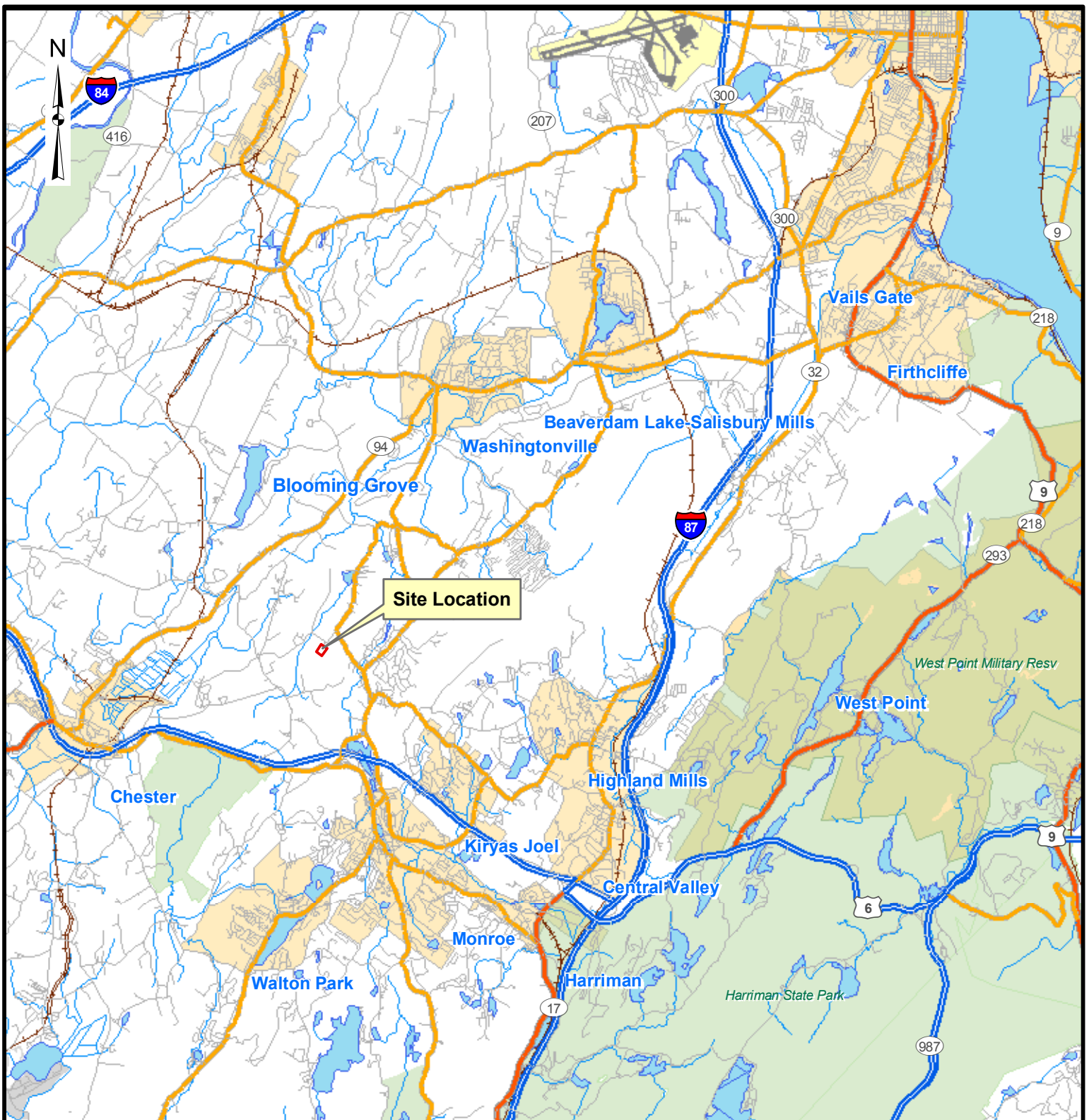
## **9. HEALTH AND SAFETY PLAN**

A Generic HASP was developed for the Work Assignments conducted under the NYSDEC Standby Contracts D004438 and D004441. As previously stated, the Generic HASP was submitted under a separate cover on 11 August 2006 to the NYSDEC. An addendum to the Generic HASP was developed to address site-specific health and safety issues (Appendix A) for the proposed activities to complete the RD/RA.

Additionally, a Community Air Monitoring Plan has been prepared (Appendix D), due to the anticipated intrusive field activities (e.g., test trenching) to be conducted under the site characterization portion of this Work Assignment.

## **10. QUALITY ASSURANCE PROJECT PLAN**

A Generic QAPP has been developed describing sampling, analysis, testing and monitoring that could potentially be conducted during Work Assignments under the NYSDEC Standby Subcontracts D004438 and D004441. As previously stated, the Generic QAPP was submitted under separate cover on 11 August 2006 to the NYSDEC. An addendum to the Generic QAPP was developed to address site-specific quality assurance/quality control issues (Appendix B) for the proposed activities to complete the RD/RA.



### Legend

- |                       |                         |
|-----------------------|-------------------------|
| Urban Areas           | Rivers (Local)          |
| Expressway/Interstate | Water (Local)           |
| Highway               | National Park or Forest |
| Major Road            | State Park or Forest    |
| Local Road            |                         |

0 1 2 4 Miles

Source: ESRI 2005



MAYER LANDFILL SITE (3-36-027)  
BLOOMING GROVE, NEW YORK

FIGURE 1  
SITE LOCATION

PROJECT MGR:  
DWE

DESIGNED BY:  
CJS

CREATED BY:  
CJS

CHECKED BY:  
DWE

SCALE:  
AS SHOWN

DATE:  
April 2007

PROJECT NO:  
14474.03

## **Appendix A**

### **Health and Safety Plan Addendum**

**Health and Safety Plan Addendum  
Mayer Landfill (3-36-027),  
Blooming Grove, New York**

*Prepared for*

New York State Department of Environmental Conservation  
625 Broadway  
Albany, New York 12233



*Prepared by*

EA Engineering, P.C., and Its Affiliate  
EA Science and Technology  
6712 Brooklawn Parkway, Suite 104  
Syracuse, New York 13211  
(315) 431-4610

June 2007  
Revision: DRAFT  
EA Project No. 14474.03

# **Health and Safety Plan Addendum Mayer Landfill (3-36-027), Blooming Grove, New York**

*Prepared for*

New York State Department of Environmental Conservation  
625 Broadway  
Albany, New York 12233



*Prepared by*

EA Engineering, P.C. and Its Affiliate  
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6712 Brooklawn Parkway, Suite 104  
Syracuse, New York 13211  
(315) 431-4610

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Christopher J. Canonica, P.E., Program Manager  
EA Engineering, P.C.

Date

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David W. Eck, P.E., Project Manager  
EA Engineering, P.C.

Date

---

Kurt Ilker, P.G., Site Manager  
EA Science and Technology

Date

June 2007  
Revision: DRAFT  
EA Project No.: 14474.03

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## LIST OF FIGURES

<u>Number</u>	<u>Title</u>
1	Site location.

## 1. INTRODUCTION

### 1.1 GENERAL

A Generic Health and Safety Plan (HASP) (EA 2006)<sup>1</sup> has been developed for field activities performed under the New York State Department of Environmental Conservation (NYSDEC) Standby Contracts D004438 and D004441. This Health and Safety Plan (HASP) Addendum is to supplement the Generic HASP with site-specific information to protect the health and safety of personnel while performing field activities to complete the Remedial Design/Remedial Action Oversight (RD/RAO) Work Assignment for the Mayer Landfill, Orange County, Blooming Grove, New York (NYSDEC Site No. 3-36-027).

This HASP Addendum describes the safety organization, procedures, and protective equipment that have been established based on an analysis of potential physical, chemical, and biological hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential for accidents or injuries to occur. One copy of the Generic HASP and this HASP Addendum will be maintained for use during the scheduled field sampling effort. The copies will be made available for site use and employee review at all times.

This HASP Addendum addresses regulations and guidance practices set forth in the Occupational Safety and Health Administration (OSHA) Standards for Construction Industry, 29 Code of Federal Regulations (CFR) 1926, including 29 CFR 1926.65, *Hazardous Waste Operations and Emergency Response* and 29 CFR 1926.59, *Hazardous Communications*.

The following are provided as attachments:

- Attachment A: Worker Training and Physical Examination Record
- Attachment B: Health and Safety Plan Review Record
- Attachment C: Site Entry and Exit Log
- Attachment D: Accident Investigation Report
- Attachment E: Emergency Telephone Numbers and Hospital Directions
- Attachment F: Emergency Equipment Available Onsite
- Attachment G: Map to Hospital
- Attachment H: Personal Protective Equipment Activity Record
- Attachment I: Material Safety Data Sheets.

**NOTE: This site-specific HASP Addendum should be left open to display Attachment E (Emergency Telephone Numbers and Hospital Directions) and made available to all site personnel in a conspicuous location for the duration of field activities in the event of an emergency.**

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<sup>1</sup> EA Engineering, P.C. 2006. *Generic Health and Safety Plan for Work Assignments under NYSDEC Contracts D004438 and D004441*. June.

## **1.2 SITE AND FACILITY DESCRIPTION**

The Mayer Landfill site is located in a rural/residential area off of Prospect Road in the Town of Blooming Grove, Orange County, New York (Figure 1). The property is approximately 20 acres in size and includes a waste disposal area which covers approximately 10.3 acres. The landfill is overgrown with grasses, brush and small trees, and is surrounded with hardwood forest. Land use in the vicinity of the Mayer Landfill site is a mixture of residential and wooded lands to the north, east, south, and west. The nearest residence is located approximately 750 feet southeast of the site, along Peddler Hill Road.

An intermittent stream runs along the western edge of the landfill and discharges into a pond on Prospect Road, across from the landfill access road. Scrapped vehicles and white goods have been abandoned at various locations along the landfill access road. The area is serviced by private water supplies.

## **1.3 SITE HISTORY**

The landfill operation began at the site in 1940 as an open-face dump, with periodic burning of refuse. Residential, commercial, industrial, demolition and agricultural waste were allegedly disposed of at the landfill. Part of the landfill was designated as a public dump in 1956. In 1965, after being ordered to stop burning, the operator began compacting and covering refuse. The Orange County Department of Health (OCDOH) cited the landfill for mismanagement many times in the early 1970's. Violations included inadequate compacting and covering of wastes, garbage piled too high and steep, and poor use of space. The landfill ceased operations in April 1975 due to failure to comply with state and county regulations.

In 1975, the OCDOH conducted an initial investigation of surface water at the landfill. Analytical results showed elevated levels of zinc in a wet area to the south of the landfill. The NYSDEC listed the site on the New York State Registry of Inactive Hazardous Waste Disposal Sites as a Class 2a site in 1985. Class 2a is a temporary classification assigned to a site that has inadequate and/or insufficient data for inclusion in any of the other classifications. To resolve the Class 2a status, a Phase II investigation was conducted at the site from 1989 through 1991. The Phase II investigation found that groundwater standards for several organic compounds were exceeded in one monitoring well. In 1991, the NYSDEC listed the site as a Class 2 site in the Registry. A site is listed as a Class 2 when a consequential quantity of hazardous waste has been confirmed and the presence of such hazardous waste or its components or breakdown products represent a significant threat to the environment or to health as described in 6 NYCRR Part 375-14.

## **1.4 POLICY STATEMENT**

EA will take every reasonable step to provide a safe and healthy work environment and to eliminate or control hazards in order to minimize the possibility of injuries, illnesses, or accidents to site personnel. EA and EA subcontractor employees will be familiar with the Generic HASP and this HASP Addendum for each of the project activities they perform. Prior

to entering the site, the Generic HASP and this HASP Addendum will be reviewed and an agreement to comply with the requirements will be signed by EA personnel, subcontractors, and visitors (Attachment B).

Operational changes that could affect the health and safety of the site personnel, community, or environment will not be made without approval from EA's Project Manager and Program Health and Safety Officer. This document will be periodically reviewed to ensure that it is current and technically correct. Any changes in site conditions and/or the scope of work will require a review and modification to the HASP Addendum. Such changes will be documented in the form of a revision to this addendum.

## 2. KEY PERSONNEL

The following table contains information on key project personnel:

Title	Name	Telephone No.
Officer-in-Charge	Richard Waterman	508-485-2982
Program Health and Safety Officer	Peter Garger, CIH	410-771-4950
Program Manager/Consulting Engineer	Chris Canonica, P.E.	315-431-4610
Project Manager	David Eck, P.E.	315-431-4610
Site Manager/Quality Assurance/Quality Control	Kurt Ilker, P.G.	845-565-8100
NYSDEC Project Manager	David Chiusano	518-402-9814

### **3. SCOPE OF WORK**

This HASP Addendum was developed to designate and define site-specific health and safety protocols applicable to project activities to be implemented and followed during field activities and consulting work at the Mayer Landfill, Blooming Grove, New York. The scope of work covered by this HASP Addendum includes:

- Test trenching program
- Groundwater sampling
- Soil gas sampling.

Each of these activities is summarized below, additional detail for each activity is provided in the Field Activities Plan.

#### **3.1 TEST TRENCHING PROGRAM**

Using existing site data, EA will locate and install several test trenches in the suspected light non-aqueous phase liquid (LNAPL) area on the northeastern edge of the landfill. It is anticipated that 20 trenches will be installed in the LNAPL area to a depth of at least 15 feet, or until the end of landfill materials. Up to two samples from each test pit (one soil and one groundwater) will be collected for analytical testing. Head space screening techniques will be used to identify the depths to collect soil samples. Each soil sample selected will be analyzed for hazardous waste characteristics and volatile organic compounds (VOCs). Groundwater samples will be analyzed for VOCs. Excavated soil will remain on site and utilized to backfill the test pits.

#### **3.2 GROUNDWATER SAMPLING**

Groundwater samples will be collected during one sampling event, following installation and development of new monitoring wells onsite. In total, 21 wells, in the network of existing monitoring wells, will be included in the groundwater sampling program.

#### **3.3 SOIL GAS SAMPLING**

The soil gas monitoring will be performed at specified locations selected by the NYSDEC, in consultation with the NYSDOH, which is expected to include the area directly east of the landfill area and to the west of Peddler Hill Road. Approximately 10 passive soil gas samplers will be placed across the site. Based on field observations, additional soil gas samplers may be installed.

Soil gas probes will be installed using direct-push technology to drive stainless steel rods equipped with detachable stainless steel drive points to the desired depth. Once the desired depth is reached, the drive rod will be retracted revealing a 6-in. sampling screen attached to a dedicated Teflon or polyethylene tubing which will be used to collect the soil vapor samples. The boreholes will then be backfilled with sand to a minimum of 6 in. above the screened

interval. Bentonite chips or pellets will then be placed from approximately 6 in. above the screen to the ground surface and immediately hydrated. The bentonite will then be allowed to set for a time of at least 24 hours.

Prior to collection of soil gas samples, the soil gas probes will be purged in accordance with the NYSDOH guidance for evaluating soil vapor intrusion. One to three implant volumes will be purged at a flow rate not to exceed 0.2 L per minute to minimize outdoor air infiltration during sampling. The samples will be collected using laboratory-certified clean SUMMA canisters with two-hour regulators and dedicated Teflon or polyethylene tubing.

Tracer gas will be used during the soil gas investigation in accordance with the New York State Department of Health (NYSDOH) guidance for evaluating soil vapor intrusion. At least two soil vapor sampling locations will be evaluated using tracer gas, with use at additional locations to be evaluated based upon the results of the initial sampling locations.

Upon completion of the soil gas sampling program, the sample tubing will be removed and the temporary soil gas probe location will be backfilled with bentonite and marked with a stake/flag which shall be labeled with the property sample identification and illustrated on the site map so that it can be located at a later date.

Direct-push cuttings generated during the soil gas sampling program exhibiting gross contamination will be drummed in accordance with Section 3.5 (Storage and Disposal of Waste).

### **3.4 STORAGE AND DISPOSAL OF WASTE**

EA is responsible for the proper storage, handling, and disposal of investigative derived waste (IDW) including personal protective equipment, and solids and liquids generated during the well drilling, well development, and well sampling activities. Liquids generated during well sampling that exhibit visual staining, sheen, or discernable odors will be collected in drums or other containers at the point of generation. The drums will be stored in the staging area. A waste subcontractor will then remove the drums and dispose at an offsite location. Liquids generated well sampling that exhibit no visual staining, sheen or discernable odor will be discharged to an unpaved area onsite, where it can percolate into the ground. Excess drill cuttings generated from the installation of soil vapor sampling points will also be disposed of onsite if there is no visible staining, sheen or discernable odors. Drill cuttings that do exhibit visible staining, sheen or discernable odors will be staged onsite until an appropriate treatment/disposal procedure has been determined after the completion of the site characterization. All drummed materials will be clearly labeled as to their contents and origin. All IDW will be managed in accordance with NYSDEC Division of Environmental Remediation Technical and Administrative Guidance Memorandum 4032 (NYSDEC, 1989)<sup>2</sup>.

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<sup>2</sup> NYSDEC. 1989. Technical and Administrative Guidance Memorandum #4032, Disposal of Drill Cuttings. 21 November, 1989.

#### 4. POTENTIAL HAZARD ANALYSIS

Based upon the above field activities, the following potential hazard conditions may be anticipated:

- The use of mechanical equipment such as drill rigs, powered augers, and hammer drills can create a potential for crushing and pinching hazards due to movement and positioning of the equipment: movement of lever arms and hydraulics; entanglement of clothing and appendages in exposed drives and augers; and impact of steel tools, masts, and cables should equipment rigging fail, or other structural failures occur during hydraulic equipment operation and drilling mast extension and operation. Heavy equipment work must be conducted only by trained, experienced personnel. If possible, personnel must remain outside the turning radius of large, moving equipment. At a minimum, personnel must maintain visual contact with the equipment operator. When not operational, equipment must be set and locked so that it cannot be activated, released, dropped, etc.
- Equipment can be energized due to contact with overhead or underground electrical lines, utilities impaired by excavation of communication or potable/wastewater lines, or a potential for fire or explosion may occur due to excavation of below ground propane/natural gas lines. Prior to commencement of invasive operations, a drilling/excavation permit will be obtained and the area will be inspected and flagged. Personnel should be aware that although an area may be cleared, it does not mean that unanticipated hazards will not appear. Safe distances will be maintained from live electrical equipment as specified in Generic HASP. Workers should always be alert for unanticipated events such as snapping cables, digging into unmarked underground utilities, etc. Such occurrences should prompt involved individuals to halt work immediately and take appropriate corrective measures to gain control of the situation.
- Work around large equipment often creates excessive noise. Noise can cause workers to be startled, annoyed, or distracted; can cause physical damage to the ear, pain, and temporary and/or permanent hearing loss; and can interfere with communication. If workers are subjected to noise exceeding an 8-hour time-weighted average sound level of 85 dBA, hearing protection will be selected with an appropriate noise reduction rating to comply with 29 CFR 1910.95 and to reduce noise below levels of concern.
- Personnel may be injured during physical lifting and handling of heavy equipment, construction materials, or containers. Additionally, personnel may encounter slip, trip, and fall hazards associated with excavations, manways, and construction debris and materials. Precautionary measures should be taken in accordance with the Generic HASP and this HASP Addendum.



- Field operations conducted during the winter months can impose excessive heat loss to personnel conducting strenuous activities during unseasonably cold weather days and can impose cold-related illness symptoms during unseasonably cold weather days or when wind chill is high. In addition, heavy rains, electrical storms, and high winds may create extremely dangerous situations for employees.
- Entry into a confined space in support of this project is forbidden. However, it is not anticipated that confined space entry will be required during the completion of the field activities.
- Field investigation activities intended to define potential sources of environmental contamination often require employees to be in direct proximity or contact with hazardous substances. Employees may be exposed through inhalation of toxic dusts, vapors, or gases. Normal dust particulates from surficial soil may have adsorbed or absorbed toxic solvents, petroleum compounds, or toxic metal salts or metal particulates. Air monitoring equipment will be used to monitor airborne organic vapors and particulates. Water collected during well development and groundwater sampling activities may also contain toxic vapors, liquids, and gases and be inhaled during normal operations, or may be splashed onto the skin or eyes. Ingestion of toxic materials contained in dusts or particulates can be ingested if eating, smoking, drinking, and gum chewing are permitted prior to personnel washing their hands and face or removing contaminated work clothing and personal protective equipment. Some chemicals may be absorbed directly through the skin. Personal protective equipment, properly designed for the chemicals of concern, will always be provided and worn when a potential for skin contact is present.

The potential constituents of concern that may be present at the site include, but are not limited to, arsenic, chromium, copper, iron, lead, manganese, nickel, selenium, zinc, benzene, chlorobenzene, and xylene. Material safety data sheets for these chemicals are provided in Attachment I.

## **5. PERSONAL PROTECTIVE EQUIPMENT**

Based upon currently available information, it is anticipated that Level D protection will be required for currently anticipated conditions and activities. If at any time the sustained level of total organic vapors in the worker breathing zone exceeds 5 ppm above background, site workers will evacuate the area and the condition will be brought to the attention of the Site Health and Safety Officer. Efforts will then be undertaken to mitigate the source of the vapors. Once the sustained level of total organic vapors has decreased to below 5 ppm above background, site workers will be allowed to continue activities at the direction of the Site Health and Safety Officer.

The personal protective equipment (PPE) components for use during this project are detailed in the Generic HASP. The components of Level D PPE are summarized below.

### **Level D Personal Protective Equipment**

Level D will be worn for initial entry onsite and initially for all activities and will consist of the following:

- Coveralls or appropriate work clothing
- Steel-toe, steel-shank safety boots/shoes
- Hard hats (when overhead hazards are present or as required by the Site Health and Safety Officer)
- Chemical resistant gloves (nitrile/neoprene) when contact with potentially contaminated soil or water is expected
- Safety glasses with side shields
- Hearing protectors (during drilling or other operations producing excessive noise)
- Boot covers (optional unless in contact with potentially contaminated soil or water)
- Polycoated coveralls (when contact with contaminated soil and water is anticipated, e.g., when surging/pumping wells and pressure-washing equipment).

Insulated clothing, hats, etc. must be worn when temperatures or wind chill fall below 40°F.

## **6. SITE CONTROL AND SECURITY**

Only authorized personnel will be permitted to conduct field activities. Authorized personnel include those who have completed hazardous waste operations initial training, as defined under OSHA Regulation 29 CFR 1910.120/29 CFR 1926.65, have completed their training or refresher training within the past 12 months, and have been certified by a physician as fit for hazardous waste operations.

### **6.1 SAFE WORK PRACTICES**

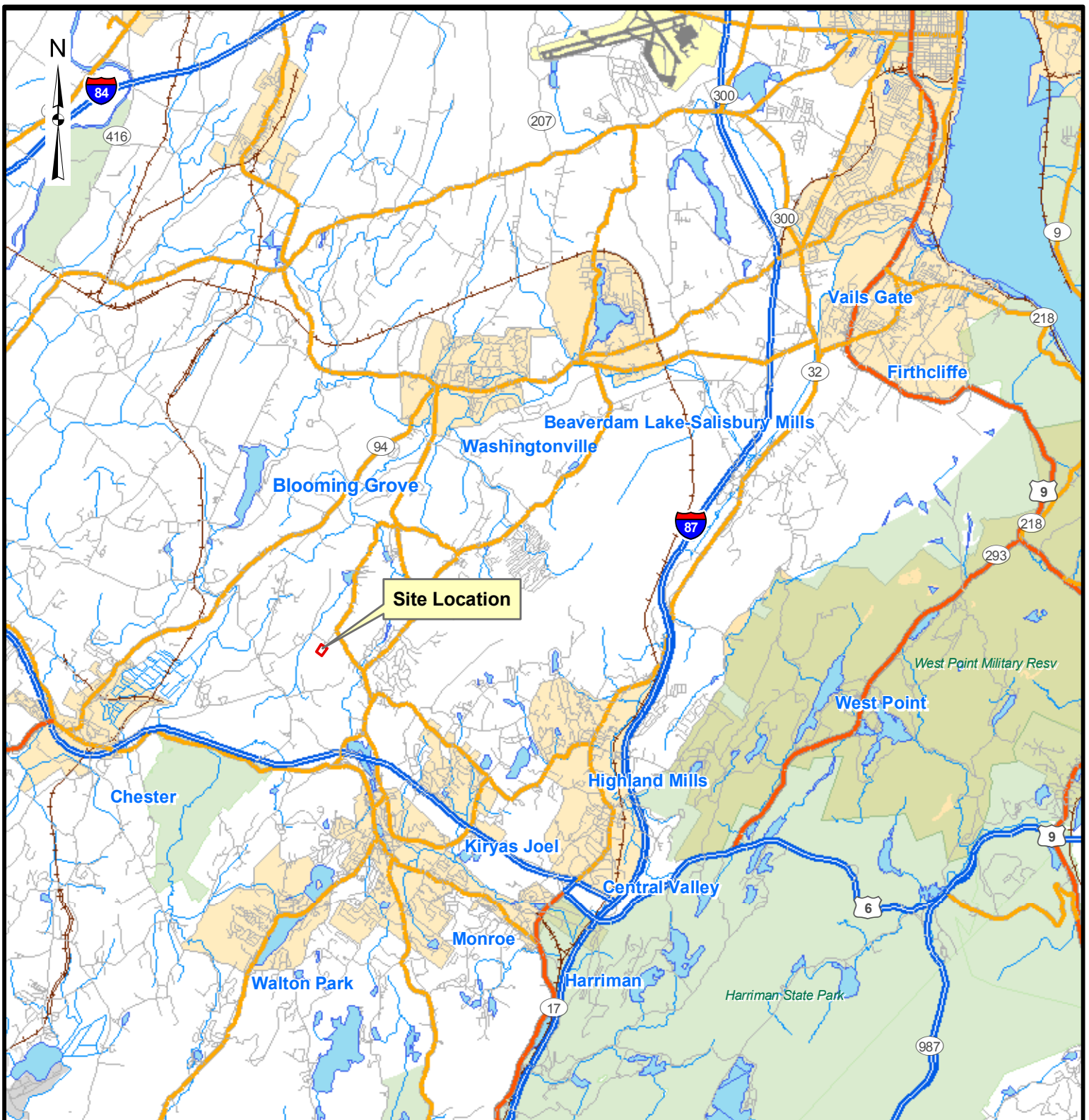
Safe work practices that will be followed by site workers include, but are not limited to, the following rules:

- Working before or after daylight hours without special permission is prohibited
- Do not enter restricted or posted areas without permission from the Site Health and Safety Officer
- Smoking is limited to designated areas
- Possessing, using, purchasing, distributing, or having controlled substances in their system throughout the day or during meal breaks is prohibited
- Consuming or possessing alcoholic beverages is prohibited
- Good housekeeping – employees will be instructed about housekeeping throughout field activities
- Sitting or kneeling in areas of obvious contamination is prohibited
- Avoid overgrown vegetation and tall grass areas

## **6.2 DAILY STARTUP AND SHUTDOWN PROCEDURES**

The following protocols will be followed daily prior to start of work activities:

- The Site Health and Safety Officer will review site conditions to determine if modification of work and safety plans is needed
- Personnel will be briefed and updated on new safety procedures as appropriate
- Safety equipment will be checked for proper function
- The Site Health and Safety Officer will ensure that the first aid kit is adequately stocked and readily available
- The Contractor is responsible for the security of its own equipment. All onsite equipment and supplies will be locked and secure.



### Legend

- |                       |                         |
|-----------------------|-------------------------|
| Urban Areas           | Rivers (Local)          |
| Expressway/Interstate | Water (Local)           |
| Highway               | National Park or Forest |
| Major Road            | State Park or Forest    |
| Local Road            |                         |

0 1 2 4 Miles

Source: ESRI 2005



MAYER LANDFILL SITE (3-36-027)  
BLOOMING GROVE, NEW YORK

FIGURE 1  
SITE LOCATION

PROJECT MGR:  
DWE

DESIGNED BY:  
CJS

CREATED BY:  
CJS

CHECKED BY:  
DWE

SCALE:  
AS SHOWN

DATE:  
April 2007

PROJECT NO:  
14474.03

## **Attachment A**

### **Worker Training and Physical Examination Record**

## ATTACHMENT A

### WORKER TRAINING AND PHYSICAL EXAMINATION RECORD

SITE: Mayer Landfill, Blooming Grove, New York						
Name	OSHA 40-Hour Hazardous Waste Operations Training		OSHA Hazardous Waste Supervisor Training	CPR (date of expiration)	First Aid (date of expiration)	Date of Last Physical Examination
	Initial	Annual				
<b>EA PERSONNEL</b>						
Christopher Canonica, P.E.	10/28/94	11/8/07	3/3/89	---	---	1/3/02
David Eck, P.E.	3/1/96	11/8/06	---	8/07	8/07	4/29/04
Robert Casey	11/1/01	6/12/06	---	5/7/06	5/1/05	10/26/04
Kris Charney	3/17/06	3/1/07	---	---	---	3/1/06
Kurt Ilker			---			
Richard Waterman	8/88	1998	2/94	3/04	3/05	---
<b>SUBCONTRACTOR OR ADDITIONAL PERSONNEL</b>						
---	---	---	---	---	---	---
---	---	---	---	---	---	---
<p>NOTE: Prior to performing work at the site, this Health and Safety Plan must be reviewed and an agreement to comply with the requirements must be signed by all personnel, including contractors, subcontractors, and visitors. Contractors and subcontractors are ultimately responsible for ensuring that their own personnel are adequately protected. In signing this agreement, the contractors and subcontractors acknowledge their responsibility for the implementation of the Health and Safety Plan requirements. All personnel onsite shall be informed of the site emergency response procedures and any potential safety or health hazards of the operations.</p>						

**Attachment B**

**Review Record**



## HEALTH AND SAFETY PLAN REVIEW RECORD

[illegible]

## **Attachment C**

### **Site Entry and Exit Log**

## ATTACHMENT C

## SITE ENTRY AND EXIT LOG

[illegible]

**Attachment D**

**Accident Investigation Report**



## ACCIDENT/LOSS REPORT

THIS REPORT MUST BE COMPLETED BY THE INJURED EMPLOYEE OR SUPERVISOR AND FAXED TO EA CORPORATE HUMAN RESOURCES WITHIN 24 HOURS OF ANY ACCIDENT. THE FAX NUMBER IS (410) 771-1780.

**\*NOTE\*** WHENEVER AN EMPLOYEE IS SENT FOR MEDICAL TREATMENT FOR A WORK RELATED INJURY OR ILLNESS, PAGE 4 OF THIS REPORT MUST ACCOMPANY THAT INDIVIDUAL TO ENSURE THAT ALL INVOICES/BILLS/CORRESPONDENCE ARE SENT TO HUMAN RESOURCES FOR TIMELY RESPONSE.

### A. DEMOGRAPHIC INFORMATION:

NAME OF INJURED EMPLOYEE: \_\_\_\_\_  
HOME ADDRESS: \_\_\_\_\_  
HOME PHONE: \_\_\_\_\_ DATE OF BIRTH: \_\_\_\_\_  
AGE: \_\_\_\_\_ SEX: M F  
MARITAL STATUS: \_\_\_\_\_ NAME OF SPOUSE (if applicable) \_\_\_\_\_  
SOCIAL SECURITY NUMBER: \_\_\_\_\_ DATE OF HIRE: \_\_\_\_\_  
NUMBER OF DEPENDENTS: \_\_\_\_\_  
EMPLOYEE'S JOB TITLE: \_\_\_\_\_  
DEPT. REGULARLY EMPLOYED: \_\_\_\_\_  
WAS THE EMPLOYEE INJURED ON THE JOB: Y N  
PRIMARY LANGUAGE OF THE EMPLOYEE: \_\_\_\_\_

### B. ACCIDENT/INCIDENT INFORMATION:

DATE OF ACCIDENT: \_\_\_\_\_ TIME OF ACCIDENT: \_\_\_\_\_  
REPORTED TO WHOM: \_\_\_\_\_ NAME OF  
SUPERVISOR \_\_\_\_\_

EXACT LOCATION WHERE ACCIDENT OCCURRED (including street, city, state and County):

EXPLAIN WHAT HAPPENED (include what the employee was doing at the time of the accident and how the accident occurred): \_\_\_\_\_

DESCRIBE THE INJURY AND THE SPECIFIC PART OF THE BODY AFFECTED (i.e., laceration, right hand, third finger):



OBJECT OR SUBSTANCE THAT DIRECTLY INJURED EMPLOYEE: \_\_\_\_\_

NUMBER OF DAYS AND HOURS EMPLOYEE USUALLY WORKS PER WEEK: \_\_\_\_\_

IS THE EMPLOYEE EXPECTED TO LOSE AT LEAST ONE FULL DAY OF WORK? \_\_\_\_\_

DOES THE EMPLOYEE HAVE A PREVIOUS CLAIM? Y N if yes, STATUS Open Closed

WAS THE EMPLOYEE ASSIGNED TO RESTRICTED DUTY? \_\_\_\_\_

### C. ACCIDENT INVESTIGATION INFORMATION

WAS SAFETY EQUIPMENT PROVIDED? Y N If yes, was it used? Y N

WAS AN UNSAFE ACT BEING FORMED ? Y N If yes, describe \_\_\_\_\_

WAS A MACHINE PART INVOLVED? Y N If yes, describe \_\_\_\_\_

WAS THE MACHINE PART DEFECTIVE? Y N If yes, in what way \_\_\_\_\_

WAS A 3<sup>RD</sup> PARTY RESPONSIBLE FOR THE ACCIDENT/INCIDENT? Y N

If yes, list Name, address and phone number \_\_\_\_\_

WAS THE ACCIDENT/INCIDENT WITNESSED? Y N

If yes, list Name, address and phone number: \_\_\_\_\_

### D. PROVIDER INFORMATION

WAS FIRST AID GIVEN ON SITE? Y N

If yes, what type of medical treatment was given \_\_\_\_\_

PHYSICIAN INFORMATION (if medical attention was administered)

NAME: \_\_\_\_\_

ADDRESS (incl. City, state and zip): \_\_\_\_\_

PHONE: \_\_\_\_\_

HOSPITAL ADDRESS (incl. Name, address, city, state, zip code & phone)

\_\_\_\_\_

WAS THE EMPLOYEE HOSPITALIZED? Y N If yes, on what date \_\_\_\_\_

WAS THE EMPLOYEE TREATED AS AN OUTPATIENT, RECEIVE EMERGENCY  
TREATMENT OR AMBULANCE SERVICE? \_\_\_\_\_

PLEASE ATTACH THE PHYSICIANS WRITTEN RETURN TO WORK SLIP

**\*NOTE\* A PHYSICIANS RETURN TO WORK SLIP IS REQUIRED PRIOR TO ALLOWING  
THE WORKER TO RETURN TO WORK**

### E. AUTOMOBILE ACCIDENT INFORMATION (complete if applicable)

AUTHORITY CONTACTED AND REPORT # \_\_\_\_\_

EA EMPLOYEE VEHICLE YEAR, MAKE AND MODEL \_\_\_\_\_



V.I.N. \_\_\_\_\_ PLATE/TAG # \_\_\_\_\_

OWNER'S NAME AND ADDRESS: \_\_\_\_\_

DRIVER'S NAME AND ADDRESS: \_\_\_\_\_

RELATION TO INSURED: \_\_\_\_\_ DRIVER'S LICENSE # \_\_\_\_\_

DESCRIBE DAMAGE TO YOUR PROPERTY: \_\_\_\_\_

DESCRIBE DAMAGE TO OTHER VEHICLE OR PROPERTY: \_\_\_\_\_

OTHER DRIVER'S NAME AND ADDRESS: \_\_\_\_\_

OTHER DRIVER'S PHONE: \_\_\_\_\_

OTHER DRIVER'S INSURANCE COMPANY AND PHONE: \_\_\_\_\_

LOCATION OF OTHER VEHICLE: \_\_\_\_\_

NAME, ADDRESS AND PHONE OF OTHER INJURED PARTIES: \_\_\_\_\_

#### WITNESSES

NAME: \_\_\_\_\_ PHONE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

STATEMENT: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

NAME: \_\_\_\_\_ PHONE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

STATEMENT: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

#### F. ACKNOWLEDGEMENT

NAME OF SUPERVISOR: \_\_\_\_\_

DATE OF THIS REPORT: \_\_\_\_\_ REPORT PREPARED BY: \_\_\_\_\_

I have read this report and the contents as to how the accident/loss occurred is accurate to the best of my knowledge.

Signature: \_\_\_\_\_

Injured Employee

Date: \_\_\_\_\_



I am seeking medical treatment for a work related injury/illness.

Please forward all bills/invoices/correspondence to:

**EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.**

**11019 McCORMICK ROAD**

**HUNT VALLEY, MD 21031**

**ATTENTION: Michele Bailey  
HUMAN RESOURCES**

**(410) 584-7000**





## **Attachment E**

### **Emergency Telephone Numbers and Hospital Directions**

## ATTACHMENT E

### EMERGENCY TELEPHONE NUMBERS AND HOSPITAL DIRECTIONS

SITE: Mayer Landfill, Prospect Road, Town of Blooming Grove, New York	
<b>Police:</b> Town of Blooming Grove Police Department	9-1-1
<b>Fire:</b> South Blooming Grove Fire Department	9-1-1
<b>Ambulance:</b>	9-1-1
<b>Hostpital:</b> Orange Regional Medical Center – Arden Hill Campus	1-888-321-6762
<b>New York Regional Poison Control Center: 750 East Adams Street, Syracuse, NY</b>	(315) 723-7000 800-222-1222
<b>Directions to Orange Regional Medical Center – Arden Hill Campus, 4 Harriman Drive, Goshen, NY</b>  Starting at Mayer Landfill, travel southeast on Peddler Hill Rd. Turn slight right onto RT-208. Turn left to merge onto RT-17 W/US-6 W. Take exit 125 for RT-17M E toward South St. Turn left at RT-17M toward South St. Turn left at South St and left at Harriman Dr. End at Orange Regional Medical Center – Arden Hill Campus.	
Program Safety and Health Officer <b>Peter Garger, CIH</b>	(410) 771-4950
Program Manager: <b>Christopher Canonica, P.E.</b>	(315) 431-4610
EA Project Manager: <b>David Eck, P.E.</b>	(315) 431-4610
In case of spill, contact <i>Robert Casey</i>	(315) 431-4610
EA Medical Services EMR 4360 Chamblee Dunwoody Road, Suite 202 Atlanta, Georgia 30341 <b>Contact: Dr. Elayne F. Theriault</b>	800-229-3674
Site Manager/Site Health and Safety Officer <b>Kurt Ilker</b>	(845) 527-4471
In case of accident or exposure incident, contact Corporate Health and Safety Officer <b>Peter Garger</b>	(410) 771-4950

## **Attachment F**

### **Emergency Equipment Available Onsite**

## ATTACHMENT F

### EMERGENCY EQUIPMENT AVAILABLE ONSITE

Type of Equipment	Location
<b>Communications Equipment</b>	
Mobile Telephone	In EA vehicle
<b>Medical Support Equipment</b>	
First Aid Kits	In EA vehicle
Eye Wash Station	In EA vehicle
<b>Fire Fighting Equipment</b>	
Fire Extinguishers	In EA vehicle

## **Attachment G**

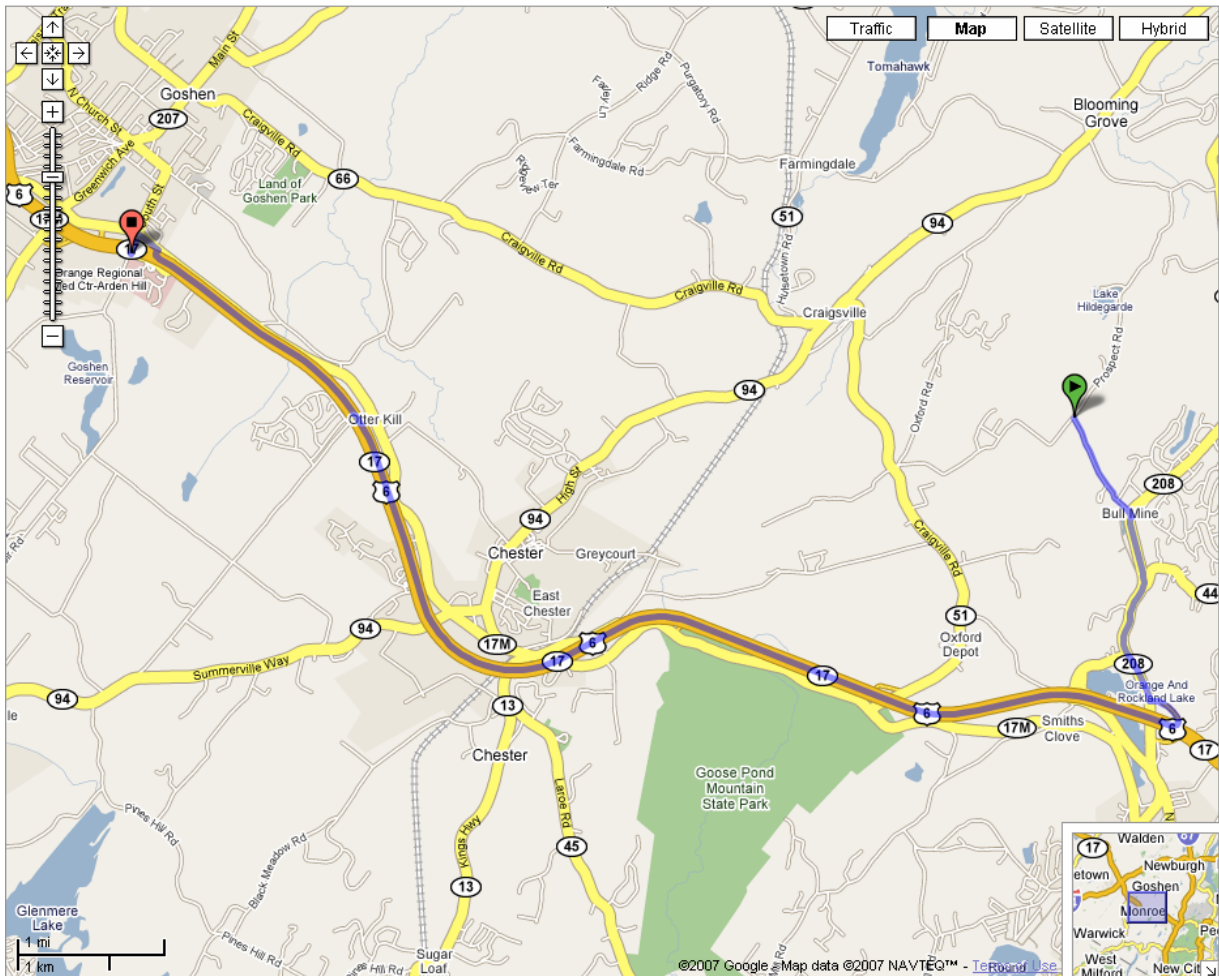
### **Map to Hospital**

## ATTACHMENT G

### MAP TO HOSPITAL

Directions to Orange Regional Medical Center – Arden Hill Campus, 4 Harriman Drive, Goshen, NY

Starting at Mayer Landfill, travel southeast on Peddler Hill Rd. Turn slight right onto RT-208. Turn left to merge onto RT-17 W/US-6 W. Take exit 125 for RT-17M E toward South St. Turn left at RT-17M toward South St. Turn left at South St and left at Harriman Dr. End at Orange Regional Medical Center – Arden Hill Campus. Total trip is 11.5 miles, travel time is approximately 16 minutes.



## **Attachment H**

### **Personal Protective Equipment Activity Record**



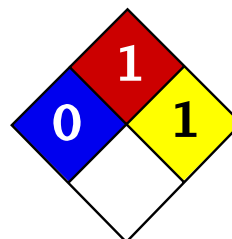
## ATTACHMENT H

### PERSONAL PROTECTIVE EQUIPMENT ACTIVITY RECORD

SITE: Mayer Landfill, Blooming Grove, New York		
Weather Condition:		Onsite Hours: From To
Changes in Personal Protective Equipment Levels <sup>(a)</sup>	Work Operations	Reasons for Change
Site Health and Safety Plan Violations	Corrective Action Specified	Corrective Action Taken (yes/no)
Observations and Comments:		
Completed by: _____		
Site Health and Safety Officer		Date
(a) Only the Site Health and Safety Officer may change personal protective equipment levels, using only criteria specified in the Health and Safety Plan.		

**Attachment I**

**Material Safety Data Sheet**



Health	1
Fire	1
Reactivity	1
Personal Protection	E

## Material Safety Data Sheet

### Zinc Metal MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Zinc Metal

**Catalog Codes:** SLZ1054, SLZ1159, SLZ1267, SLZ1099, SLZ1204

**CAS#:** 7440-66-6

**RTECS:** ZG8600000

**TSCA:** TSCA 8(b) inventory: Zinc Metal

**CI#:** Not applicable.

**Synonym:** Zinc Metal Sheets; Zinc Metal Shot; Zinc Metal Strips

**Chemical Name:** Zinc Metal

**Chemical Formula:** Zn

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.  
Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**  
1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Zinc Metal	7440-66-6	100

**Toxicological Data on Ingredients:** Zinc Metal LD50: Not available. LC50: Not available.

#### Section 3: Hazards Identification

**Potential Acute Health Effects:** Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

Repeated or prolonged exposure is not known to aggravate medical condition.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 480°C (896°F)

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:**

Slightly flammable to flammable in presence of open flames and sparks, of heat, of oxidizing materials, of acids, of alkalis, of moisture.

Non-flammable in presence of shocks.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

Flammable solid.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

**Special Remarks on Fire Hazards:**

Zinc + NaOH causes ignition.

Oxidation of zinc by potassium proceeds with incandescence.

Residues from zinc dust /acetic acid reduction operations may ignite after long delay if discarded into waste bins with paper.

Incandescent reaction when Zinc and Arsenic or Tellurium, or Selenium are combined.

When hydrazine mononitrate is heated in contact with zinc, a flaming decomposition occurs at temperatures a little above its melting point.

Contact with acids and alkali hydroxides (sodium hydroxide, potassium hydroxide, calcium hydroxide, etc.) results in evolution of hydrogen with sufficient heat of reaction to ignite the hydrogen gas.

Zinc foil ignites if traces of moisture are present.

It is water reactive and produces flammable gases on contact with water. It may ignite on contact with water or

moist air.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

### Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

### Large Spill:

Flammable solid that, in contact with water, emits flammable gases.

Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Cover with dry earth, sand or other non-combustible material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

## Section 7: Handling and Storage

### Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not breathe dust. Keep away from incompatibles such as oxidizing agents, acids, alkalis, moisture.

### Storage:

Keep container tightly closed. Keep container in a cool, well-ventilated area. Keep from any possible contact with water. Do not allow water to get into container because of violent reaction.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** Not available.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Lustrous solid. Metal solid.)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 65.39 g/mole

**Color:** Bluish-grey

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 907°C (1664.6°F)

**Melting Point:** 419°C (786.2°F)

**Critical Temperature:** Not available.

**Specific Gravity:** Not available.

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water, hot water, methanol, diethyl ether, n-octanol, acetone.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Excess heat, incompatible materials, moisture

**Incompatibility with various substances:**

Reactive with oxidizing agents, acids, alkalis.

Slightly reactive to reactive with moisture.

The product may react violently with water to emit flammable but non toxic gases.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Incompatible with acids, halogenated hydrocarbons,  $\text{NH}_4\text{NO}_3$ , barium oxide,  $\text{Ba}(\text{NO}_3)_2$ , Cadmium,  $\text{CS}_2$ , chlorates,  $\text{Cl}_2$ ,  $\text{CrO}_3$ ,  $\text{F}_2$ , Hydroxylamine,  $\text{Pb}(\text{N}_3)_2$ ,  $\text{MnCl}_2$ ,  $\text{HNO}_3$ , performic acid,  $\text{KClO}_3$ ,  $\text{KNO}_3$ ,  $\text{N}_2\text{O}_2$ , Selenium,  $\text{NaClO}_3$ ,  $\text{Na}_2\text{O}_2$ , Sulfur, Te, water,  $(\text{NH}_4)_2\text{S}$ ,  $\text{As}_2\text{O}_3$ ,  $\text{CS}_2$ ,  $\text{CaCl}_2$ , chlorinated rubber, catalytic metals, halocarbons, o-nitroanisole, nitrobenzene, nonmetals, oxidants, paint primer base, pentacarbonoyliron, transition metal halides, seleninyl bromide,  $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ,  $(\text{Mg} + \text{Ba}(\text{NO}_3)_2 + \text{BaO}_2)$ , (ethyl acetoacetate +tribromoneopentyl alcohol.

Contact with Alkali Hydroxides(Sodium Hydroxide, Potassium Hydroxide, Calcium Hydroxide, etc) results in evolution of hydrogen.

Ammonium nitrate + zinc + water causes a violent reaction with evolution of steam and zinc oxide.

May react with water.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available.

LC50: Not available.

**Chronic Effects on Humans:** Not available.

**Other Toxic Effects on Humans:** Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects:

Skin: May cause skin irritation. Dermal exposure to zinc may produce leg pains, fatigue, anorexia and weight loss.

Eyes: May cause eye irritation.

Ingestion: May be harmful if swallowed. May cause digestive tract irritation with tightness in throat, nausea, vomiting, diarrhea, loss of appetite, malaise, abdominal pain, fever, and chills. May affect behavior/central nervous system and autonomic nervous system with ataxia, lethargy, staggering gait, mild derangement in cerebellar function, lightheadness, dizziness, irritability, muscular stiffness, and pain. May also affect blood.

Inhalation: Inhalation of zinc dust or fumes may cause respiratory tract and mucous membrane irritation with cough and chest pain. It can also cause "metal fume fever", a flu-like condition characterized appearance of chills, headachefever, malaise, fatigue, sweating, extreme thirst, aches in the legs and chest, and difficulty in breathing. A sweet taste may also be present in metal fume fever, as well as a dry throat, aches, nausea, and vomiting, and pale grey cyanosis.

The toxicological properties of this substance have not been fully investigated.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** Not available.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

New York release reporting list: Zinc Metal  
Rhode Island RTK hazardous substances: Zinc Metal  
Pennsylvania RTK: Zinc Metal  
Florida: Zinc Metal  
Michigan critical material: Zinc Metal  
Massachusetts RTK: Zinc Metal  
New Jersey: Zinc Metal  
California Director's List of Hazardous Substances: Zinc Metal  
TSCA 8(b) inventory: Zinc Metal  
TSCA 12(b) one time export: Zinc Metal  
SARA 313 toxic chemical notification and release reporting: Zinc Metal  
CERCLA: Hazardous substances.: Zinc Metal: 1000 lbs. (453.6 kg)

**Other Regulations:** EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** Not Available

**DSCL (EEC):**

R15- Contact with water liberates extremely flammable gases.  
R17- Spontaneously flammable in air.  
S7/8- Keep container tightly closed and dry.

**HMIS (U.S.A.):**

**Health Hazard:** 1

**Fire Hazard:** 1

**Reactivity:** 1

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 0

**Flammability:** 1

**Reactivity:** 1

**Specific hazard:**

**Protective Equipment:**

Gloves.  
Lab coat.  
Dust respirator. Be sure to use an approved/certified respirator or equivalent.  
Safety glasses.

## Section 16: Other Information

**References:** Not available.

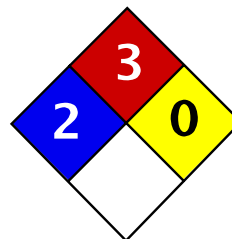
**Other Special Considerations:** Not available.

**Created:** 10/10/2005 12:18 AM



**Last Updated:** 10/10/2005 12:18 AM

*The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.*



Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Xylenes MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Xylenes

**Catalog Codes:** SLX1075, SLX1129, SLX1042, SLX1096

**CAS#:** 1330-20-7

**RTECS:** ZE2100000

**TSCA:** TSCA 8(b) inventory: Xylenes

**CI#:** Not available.

**Synonym:** Xylenes; Dimethylbenzene; xylol; methyltoluene

**Chemical Name:** Xylenes (o-, m-, p- isomers)

**Chemical Formula:** C<sub>6</sub>H<sub>4</sub>(CH<sub>3</sub>)<sub>2</sub>

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Xylenes	1330-20-7	100

**Toxicological Data on Ingredients:** Xylenes: ORAL (LD50): Acute: 4300 mg/kg [Rat]. 2119 mg/kg [Mouse]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit].

#### Section 3: Hazards Identification

**Potential Acute Health Effects:** Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

**Skin Contact:**

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 464°C (867.2°F)

**Flash Points:** CLOSED CUP: 24°C (75.2°F). (Tagliabue.) OPEN CUP: 37.8°C (100°F).

**Flammable Limits:** LOWER: 1% UPPER: 7%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>).

**Fire Hazards in Presence of Various Substances:**

Highly flammable in presence of open flames and sparks, of heat.

Non-flammable in presence of shocks.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available.

Slightly explosive in presence of open flames and sparks, of heat.

**Fire Fighting Media and Instructions:**

Flammable liquid, soluble or dispersed in water.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

**Special Remarks on Fire Hazards:** Vapors may travel to source of ignition and flash back.

**Special Remarks on Explosion Hazards:**

Vapors may form explosive mixtures with air.

Containers may explode when heated.

May polymerize explosively when heated.  
An attempt to chlorinate xylene with 1,3-Dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin) caused a violent explosion

## Section 6: Accidental Release Measures

**Small Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal.

**Large Spill:**

Flammable liquid.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

**Storage:**

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

TWA: 100 (ppm) [Canada]

TWA: 435 (mg/m<sup>3</sup>) [Canada]

TWA: 434 STEL: 651 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States]

TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States]

Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Sweetish.

**Taste:** Not available.

**Molecular Weight:** 106.17 g/mole

**Color:** Colorless. Clear

**pH (1% soln/water):** Not available.

**Boiling Point:** 138.5°C (281.3°F)

**Melting Point:** -47.4°C (-53.3°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.864 (Water = 1)

**Vapor Pressure:** 0.9 kPa (@ 20°C)

**Vapor Density:** 3.7 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 1 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil;  $\log(\text{oil/water}) = 3.1$

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:**

Insoluble in cold water, hot water.

Miscible with absolute alcohol, ether, and many other organic liquids.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources, incompatibles

**Incompatibility with various substances:** Reactive with oxidizing agents, acids.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Store away from acetic acid, nitric acid, chlorine, bromine, and fluorine.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact. Inhalation.

**Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 2119 mg/kg [Mouse].

Acute dermal toxicity (LD50): >1700 mg/kg [Rabbit].  
Acute toxicity of the vapor (LC50): 5000 4 hours [Rat].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.

May cause damage to the following organs: blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

**Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:**

Lowest Lethal Dose:

LDL [Human] - Route: Oral; Dose: 50 mg/kg

LCL [Man] - Route: Oral; Dose: 10000 ppm/6H

**Special Remarks on Chronic Effects on Humans:**

Detected in maternal milk in human. Passes through the placental barrier in animal. Embryotoxic and/or foetotoxic in animal.

May cause adverse reproductive effects (male and female fertility (spontaneous abortion and fetotoxicity)) and birth defects based animal data.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects:

Skin: Causes skin irritation. Can be absorbed through skin.

Eyes: Causes eye irritation.

Inhalation: Vapor causes respiratory tract and mucous membrane irritation. May affect central nervous system and behavior (General anesthetic/CNS depressant with effects including headache, weakness, memory loss, irritability, dizziness, giddiness, loss of coordination and judgement, respiratory depression/arrest or difficulty breathing, loss of appetite, nausea, vomiting, shivering, and possible coma and death). May also affects blood, sense organs, liver, and peripheral nerves.

Ingestion: May cause gastrointestinal irritation including abdominal pain, vomiting, and nausea. May also affect liver and urinary system/kidneys. May cause effects similar to those of acute inhalation.

Chronic Potential Health Effects:

Chronic inhalation may affect the urinary system (kidneys) blood (anemia), bone marrow (hyperplasia of bone marrow) brain/behavior/Central Nervous system. Chronic inhalation may also cause mucosal bleeding.

Chronic ingestion may affect the liver and metabolism (loss of appetite) and may affect urinary system (kidney damage)

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** CLASS 3: Flammable liquid.

**Identification:** : Xylenes UNNA: 1307 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Connecticut hazardous material survey.: Xylenes  
Illinois chemical safety act: Xylenes  
New York acutely hazardous substances: Xylenes  
Rhode Island RTK hazardous substances: Xylenes  
Pennsylvania RTK: Xylenes  
Minnesota: Xylenes  
Michigan critical material: Xylenes  
Massachusetts RTK: Xylenes  
Massachusetts spill list: Xylenes  
New Jersey: Xylenes  
New Jersey spill list: Xylenes  
Louisiana spill reporting: Xylenes  
California Director's List of Hazardous Substances: Xylenes  
TSCA 8(b) inventory: Xylenes  
SARA 302/304/311/312 hazardous chemicals: Xylenes  
SARA 313 toxic chemical notification and release reporting: Xylenes  
CERCLA: Hazardous substances.: Xylenes: 100 lbs. (45.36 kg)

### Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).  
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

### Other Classifications:

### WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).  
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

### DSCL (EEC):

R10- Flammable.  
R21- Harmful in contact with skin.  
R36/38- Irritating to eyes and skin.  
S2- Keep out of the reach of children.  
S36/37- Wear suitable protective clothing and gloves.  
S46- If swallowed, seek medical advice immediately and show this container or label.

### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

### National Fire Protection Association (U.S.A.):

**Health:** 2

**Flammability:** 3

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves.

Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

## Section 16: Other Information

**References:** Not available.

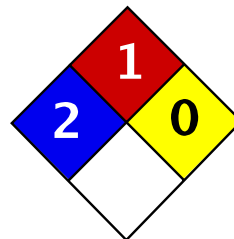
**Other Special Considerations:** Not available.

**Created:** 10/11/2005 12:54 PM

**Last Updated:** 10/11/2005 12:54 PM

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Health	2
Fire	1
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet Selenium MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Selenium

**Catalog Codes:** SLS2629

**CAS#:** 7782-49-2

**RTECS:** VS7700000

**TSCA:** TSCA 8(b) inventory: Selenium

**CI#:** Not available.

**Synonym:**

**Chemical Name:** Not available.

**Chemical Formula:** Se

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**  
1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

### Section 2: Composition and Information on Ingredients

#### Composition:

Name	CAS #	% by Weight
Selenium	7782-49-2	100

**Toxicological Data on Ingredients:** Selenium: ORAL (LD50): Acute: 6700 mg/kg [Rat].

### Section 3: Hazards Identification

#### Potential Acute Health Effects:

Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

#### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

Repeated or prolonged exposure is not known to aggravate medical condition.

### Section 4: First Aid Measures

**Eye Contact:** Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

**Skin Contact:**

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

**Serious Skin Contact:** Not available.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not available.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:** Material in powder form, capable of creating a dust explosion.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:** Use appropriate tools to put the spilled solid in a convenient waste disposal container.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label.

**Storage:**

Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:**

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

TWA: 0.2 (mg/m<sup>3</sup>)

Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Solid metallic powder.)

**Odor:** Odorless.

**Taste:** Not available.

**Molecular Weight:** 78.96 g/mole

**Color:** Not available.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 684.9°C (1264.8°F)

**Melting Point:** 217°C (422.6°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 4.81 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Not available.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

### Section 11: Toxicological Information

**Routes of Entry:** Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 6700 mg/kg [Rat].

**Chronic Effects on Humans:** Not available.

**Other Toxic Effects on Humans:**

Hazardous in case of ingestion, of inhalation.

Slightly hazardous in case of skin contact (irritant).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Passes through the placental barrier in animal. Excreted in maternal milk in human.

**Special Remarks on other Toxic Effects on Humans:** Not available.

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are more toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

### Section 14: Transport Information

**DOT Classification:** CLASS 6.1: Poisonous material.

**Identification:** : Selenium powder : UN2658 PG: III

**Special Provisions for Transport:** Not available.

### Section 15: Other Regulatory Information

**Federal and State Regulations:**

Pennsylvania RTK: Selenium

Massachusetts RTK: Selenium

TSCA 8(b) inventory: Selenium

SARA 313 toxic chemical notification and release reporting: Selenium

CERCLA: Hazardous substances.: Selenium

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:**

**WHMIS (Canada):** CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

**DSCL (EEC):** R36- Irritating to eyes.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 1

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves.

Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

### Section 16: Other Information

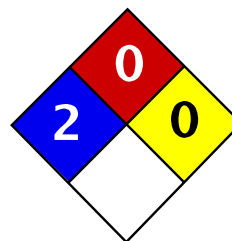
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 06:24 PM

**Last Updated:** 10/09/2005 06:24 PM

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Health	2
Fire	0
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet

### Nickel metal MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Nickel metal

**Catalog Codes:** SLN2296, SLN1342, SLN1954

**CAS#:** 7440-02-0

**RTECS:** QR5950000

**TSCA:** TSCA 8(b) inventory: Nickel metal

**CI#:** Not applicable.

**Synonym:** Nickel Metal shot; Nickel metal foil.

**Chemical Name:** Nickel

**Chemical Formula:** Ni

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Nickel metal	7440-02-0	100

**Toxicological Data on Ingredients:** Nickel metal LD50: Not available. LC50: Not available.

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion.

##### Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung sensitizer).

**CARCINOGENIC EFFECTS:** Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP.

**MUTAGENIC EFFECTS:** Not available.

**TERATOGENIC EFFECTS:** Not available.

**DEVELOPMENTAL TOXICITY:** Not available.

The substance is toxic to skin.

The substance may be toxic to kidneys, lungs, liver, upper respiratory tract.

Repeated or prolonged exposure to the substance can produce target organs damage.

## Section 4: First Aid Measures

### Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

### Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

**Serious Skin Contact:** Not available.

### Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

### Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

### Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

### Fire Fighting Media and Instructions:

Flammable solid.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

**Special Remarks on Fire Hazards:** Material in powder form, capable of creating a dust explosion. This material is flammable in powder form only.

### Special Remarks on Explosion Hazards:

Material in powder form, capable of creating a dust explosion.

Mixtures containing Potassium Perchlorate with Nickel & Titanium powders & infusorial earth can explode.

Adding 2 or 3 drops of approximately 90% peroxyformic acid to powdered nickel will result in explosion.

Powdered nickel reacts explosively upon contact with fused ammonium nitrate at temperatures below 200 deg. C.

## Section 6: Accidental Release Measures



**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Keep locked up.. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, combustible materials, metals, acids.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

TWA: 1 (mg/m3) from ACGIH (TLV) [United States] Inhalation Respirable.

TWA: 0.5 (mg/m3) [United Kingdom (UK)]

TWA: 1 (mg/m3) from OSHA (PEL) [United States] Inhalation Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Metal solid. Lustrous solid.)

**Odor:** Odorless.

**Taste:** Not available.

**Molecular Weight:** 58.71 g/mole

**Color:** Silvery.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 2730°C (4946°F)

**Melting Point:** 1455°C (2651°F)

**Critical Temperature:** Not available.

**Specific Gravity:** Density: 8.908 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:**

Insoluble in cold water, hot water.

Insoluble in Ammonia.

Soluble in dilute Nitric Acid.

Slightly soluble in Hydrochloric Acid, Sulfuric Acid.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents, combustible materials, metals, acids.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Incompatible with strong acids, selenium, sulfur, wood and other combustibles, nickel nitrate, aluminum, aluminum trichloride, ethylene, p-dioxan, hydrogen, methanol, non-metals, oxidants, sulfur compounds, aniline, hydrogen sulfide, flammable solvents, hydrazine, and metal powders (especially zinc, aluminum, and magnesium), ammonium nitrate, nitryl fluoride, bromine pentafluoride, potassium perchlorate + titanium powder + industrial earth.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available.

LC50: Not available.

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP.

Causes damage to the following organs: skin.

May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

**Other Toxic Effects on Humans:**

Hazardous in case of inhalation.  
Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.

**Special Remarks on Toxicity to Animals:**

Lowest Published Lethal Dose/Conc:

LDL [Rat] - Route: Oral; Dose: 5000 mg/kg

LDL [Guinea Pig] - Route: Oral; Dose: 5000 mg/kg

**Special Remarks on Chronic Effects on Humans:** May cause cancer based on animal test data

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects:

Skin: Nickel dust and fume can irritate skin.

Eyes: Nickel dust and fume can irritate eyes.

Inhalation: Inhalation of dust or fume may cause respiratory tract irritation with non-productive cough, hoarseness, sore throat, headache, vertigo, weakness, chest pain, followed by delayed effects, including tachypnea, dyspnea, and ARDS. Death due to ARDS has been reported following inhalation of high concentrations of respirable metallic nickel dust. Later effects may include pulmonary edema and fibrosis.

Ingestion: Metallic nickel is generally considered not to be acutely toxic if ingested. Ingestion may cause nausea, vomiting, abdominal , and diarrhea. Nickel may damage the kidneys(proteinuria), and may affect liver function. It may also affect behavior (somnolence), and cardiovascular system (increased coronary artery resistance, decreased myocardial contractility, myocardial damage, regional or general arteriolar or venus dilation).

Chronic Potential Health Effects:

Skin: May cause skin allergy. Nickel and nickel compounds are among the most common sensitizers inducing allergic contact dermatitis.

Inhalation: Chronic inhalation nickel dust or fume can cause chronic hypertrophic rhinitis, sinusitis, nasal polyps, perforation of the nasal septum, chronic pulmonary irritation, fibrosis, pulmonary edema, pulmonary eosinophilia, Pneumoconiosis, allergies (asthma-like allergy), and cancer of the nasal sinus cavities, lungs, and possibly other organs. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness. Chronic inhalation of nickel dust or fume may also affect the liver (impaired liver function tests), and blood (changes in red blood cell count).

Ingestion: Prolonged or repeated ingestion of nickel can be a source chronic urticaria and other signs of allergy. Chronic ingestion of Nickel may also affect respiration and cause pneumoconiosis or fibrosis.

Note: In the general population, sensitization occurs from exposure to nickel-containing coins, jewelry, watches,

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are as toxic as the original product.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Nickel metal

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Nickel metal

Connecticut hazardous material survey.: Nickel metal

Illinois toxic substances disclosure to employee act: Nickel metal

Illinois chemical safety act: Nickel metal

New York release reporting list: Nickel metal

Rhode Island RTK hazardous substances: Nickel metal

Pennsylvania RTK: Nickel metal

Michigan critical material: Nickel metal

Massachusetts RTK: Nickel metal

Massachusetts spill list: Nickel metal

New Jersey: Nickel metal

New Jersey spill list: Nickel metal

Louisiana spill reporting: Nickel metal

California Director's List of Hazardous Substances: Nickel metal

TSCA 8(b) inventory: Nickel metal

### Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

### Other Classifications:

**WHMIS (Canada):** CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

### DSCL (EEC):

R40- Possible risks of irreversible effects.

R43- May cause sensitization by skin contact.

S22- Do not breathe dust.

S36- Wear suitable protective clothing.

### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** E

### National Fire Protection Association (U.S.A.):

**Health:** 2

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves.  
Lab coat.  
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.  
Safety glasses.

**Section 16: Other Information**

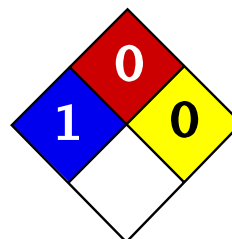
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:42 PM

**Last Updated:** 10/10/2005 08:42 PM

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Health	1
Fire	0
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet Manganese MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Manganese

**Catalog Codes:** SLM2245

**CAS#:** 7439-96-5

**RTECS:** OO9275000

**TSCA:** TSCA 8(b) inventory: Manganese

**CI#:** Not available.

**Synonym:**

**Chemical Name:** Manganese

**Chemical Formula:** Mn

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**  
1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

### Section 2: Composition and Information on Ingredients

#### Composition:

Name	CAS #	% by Weight
Manganese	7439-96-5	100

**Toxicological Data on Ingredients:** Manganese: ORAL (LD50): Acute: 9000 mg/kg [Rat].

### Section 3: Hazards Identification

#### Potential Acute Health Effects:

Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion.

#### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to blood, lungs, brain, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage.

### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:**

Moderate fire potential, in the form of dust or powder, when exposed to flame.

When manganese is heated in the vapor of phosphorus at a very dull red heat, union occurs with incandescence.

Concentrated nitric acid reacts with powdered manganese with incandescence and explosion.

Powdered manganese ignites in chlorine.

**Special Remarks on Explosion Hazards:** Moderate explosion potential, in the form of dust or powder, when exposed to flame.

## Section 6: Accidental Release Measures

**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water

on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, reducing agents.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 0.1 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States]

TWA: 5 (mg/m<sup>3</sup>) [Canada]

TWA: 1 STEL: 3 (mg/m<sup>3</sup>) from NIOSH [United States]

TWA: 5 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid.

**Odor:** Odorless.

**Taste:** Not available.

**Molecular Weight:** 54.94 g/mole

**Color:** Grayish white.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 2095°C (3803°F)

**Melting Point:** 1244°C (2271.2°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 7.44 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.



**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water, hot water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents, reducing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Superficially oxidized on exposure to air.

Reacts with aqueous solutions of sodium or potassium bicarbonate.

Reacts with dilute mineral acids with evolution of hydrogen and formation of divalent manganous salts.

Reacts with fluorine and chlorine to produce di or tri fluoride, and di and tri chloride, respectively.

In the form of powder, it reduces most metallic oxides on heating.

On heating, it reacts directly with carbon, phosphorus, antimony, or arsenic.

Also incompatible with hydroxides, cyanides, carbonates.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 9000 mg/kg [Rat].

**Chronic Effects on Humans:** May cause damage to the following organs: blood, lungs, brain, central nervous system (CNS).

**Other Toxic Effects on Humans:**

Hazardous in case of inhalation.

Slightly hazardous in case of skin contact (irritant), of ingestion.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**

Manganese can cross the placenta.

May cause cancer (tumorigenic) based on animal data.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects:

Skin: May cause skin irritation

Eyes: Dust may cause mechanical irritation.

Inhalation: Dust may cause respiratory tract irritation. May cause "Metal Fume Fever" which may include flu-like symptoms (fever, chills, upset stomach, vomiting, weakness, headache, body aches, muscle pains, dry mouth and throat, coughing, tightness of the chest). May affect behavior/Central Nervous system (change in motor activity, torpor, nervousness, tremor, yawning, mood swings, irritability, restlessness, fatigue, headache, apathy, languor, insomnia than somnolence, hallucinations, delusions, uncontrollable laughter followed by crying, compulsions, aggressiveness, weakness in legs, memory loss, decreased libido, impotence, salivation, hearing loss, slow gait, ), and respiration (dyspnea, shallow respiration, cyanosis, alveolar inflammation).

Ingestion: Repeated or prolonged exposure from ingestion may affect brain (degenerative changes), blood and metabolism.

Ingestion: May cause digestive tract irritation. There is a low gastrointestinal absorption of manganese.

Chronic Potential Health Effects:

Inhalation: Repeated or prolonged exposure from inhalation may affect brain (degenerative changes), behavior/Central Nervous system with symptoms to acute exposure. May also affect liver (chronic liver disease, jaundice)

Ingestion: Repeated or prolonged exposure from ingestion may affect brain, blood and metabolism

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The product itself and its products of degradation are not toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

Illinois toxic substances disclosure to employee act: Manganese

Rhode Island RTK hazardous substances: Manganese

Pennsylvania RTK: Manganese

Minnesota: Manganese

Massachusetts RTK: Manganese

New Jersey: Manganese

New Jersey spill list: Manganese

Louisiana spill reporting: Manganese

California Director's List of Hazardous Substances: Manganese

TSCA 8(b) inventory: Manganese

SARA 313 toxic chemical notification and release reporting: Manganese

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** Not controlled under WHMIS (Canada).

**DSCL (EEC):** Not applicable.

**HMIS (U.S.A.):**

**Health Hazard:** 1

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 1

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves.

Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent.

Safety glasses.

## Section 16: Other Information

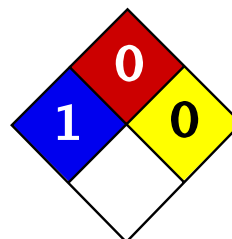
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 06:03 PM

**Last Updated:** 10/09/2005 06:03 PM

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Health	1
Fire	0
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet

### Lead MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Lead

**Catalog Codes:** SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

**CAS#:** 7439-92-1

**RTECS:** OF7525000

**TSCA:** TSCA 8(b) inventory: Lead

**CI#:** Not available.

**Synonym:** Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

**Chemical Name:** Lead

**Chemical Formula:** Pb

#### Contact Information:

**Sciencelab.com, Inc.**  
14025 Smith Rd.  
Houston, Texas 77396

US Sales: **1-800-901-7247**  
International Sales: **1-281-441-4400**

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1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Lead	7439-92-1	100

**Toxicological Data on Ingredients:** Lead LD50: Not available. LC50: Not available.

#### Section 3: Hazards Identification

**Potential Acute Health Effects:** Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

##### Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (permeator).

**CARCINOGENIC EFFECTS:** Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC.

**MUTAGENIC EFFECTS:** Not available.

**TERATOGENIC EFFECTS:** Not available.

**DEVELOPMENTAL TOXICITY:** Not available.

The substance may be toxic to blood, kidneys, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

#### Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:** Non-flammable in presence of open flames and sparks, of shocks, of heat.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:** When heated to decomposition it emits highly toxic fumes of lead.

**Special Remarks on Explosion Hazards:** Not available.

#### Section 6: Accidental Release Measures

**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not

present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 0.05 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States]

TWA: 0.05 (mg/m<sup>3</sup>) from OSHA (PEL) [United States]

TWA: 0.03 (mg/m<sup>3</sup>) from NIOSH [United States]

TWA: 0.05 (mg/m<sup>3</sup>) [Canada] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Metal solid.)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 207.21 g/mole

**Color:** Bluish-white. Silvery. Gray

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 1740°C (3164°F)

**Melting Point:** 327.43°C (621.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 11.3 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials, excess heat

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Can react vigorously with oxidizing materials.

Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available.

LC50: Not available.

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC.

May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

**Other Toxic Effects on Humans:** Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential:

Skin:

Lead metal granules or dust: May cause skin irritation by mechanical action.

Lead metal foil, shot or sheets: Not likely to cause skin irritation

Eyes:

Lead metal granules or dust: Can irritate eyes by mechanical action.

Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation.

**Inhalation:**

In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes.

Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungs by mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually absorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, delirium, convulsions/seizures, coma, and death.

Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count.

**Ingestion:**

Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead colic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases.

Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead  
California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead  
California prop. 65: This product contains the following ingredients for which the State of California has found to



cause reproductive harm (male) which would require a warning under the statute: Lead  
California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value)  
California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead  
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead  
Connecticut hazardous material survey.: Lead  
Illinois toxic substances disclosure to employee act: Lead  
Illinois chemical safety act: Lead  
New York release reporting list: Lead  
Rhode Island RTK hazardous substances: Lead  
Pennsylvania RTK: Lead

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).  
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**

R20/22- Harmful by inhalation and if swallowed.  
R33- Danger of cumulative effects.  
R61- May cause harm to the unborn child.  
R62- Possible risk of impaired fertility.  
S36/37- Wear suitable protective clothing and gloves.  
S44- If you feel unwell, seek medical advice (show the label when possible).  
S53- Avoid exposure - obtain special instructions before use.

**HMIS (U.S.A.):**

**Health Hazard:** 1

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 1

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves.  
Lab coat.  
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Safety glasses.

## Section 16: Other Information

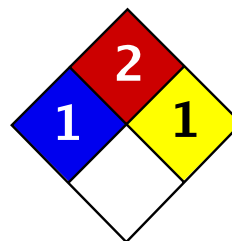
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:21 PM

**Last Updated:** 10/10/2005 08:21 PM

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Health	1
Fire	2
Reactivity	1
Personal Protection	E

## Material Safety Data Sheet

### Iron Metal MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Iron Metal

**Catalog Codes:** SLI2047, SLI1996

**CAS#:** 7439-89-6

**RTECS:** NO4565500

**TSCA:** TSCA 8(b) inventory: Iron Metal

**CI#:** Not applicable.

**Synonym:**

**Chemical Name:** Iron

**Chemical Formula:** Fe

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**  
1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Iron Metal, powder	7439-89-6	100

**Toxicological Data on Ingredients:** Not applicable.

#### Section 3: Hazards Identification

**Potential Acute Health Effects:** Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to liver, cardiovascular system, upper respiratory tract, pancreas.

Repeated or prolonged exposure to the substance can produce target organs damage.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:** Flammable in presence of heat.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available.

Explosive in presence of open flames and sparks, of heat.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:**

Chlorine Trifluoride reacts with iron with incandescence.

Powdered iron reacts with fluorine below redness with incandescence.

Reduced iron decomposes with nitrogen dioxide @ ordinary temperature with incandescence.

Reacting mass formed by mixture of phosphorus and iron can become incandescent when heated. This material is flammable in powder form only.

**Special Remarks on Explosion Hazards:** Material in powdered form can explode when exposed to heat or flame

## Section 6: Accidental Release Measures

**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water

on the contaminated surface and allow to evacuate through the sanitary system.

## Section 7: Handling and Storage

### Precautions:

Do not ingest. Do not breathe dust. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area. Moisture sensitive.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** Not available.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Solid metallic powder.)

**Odor:** Odorless.

**Taste:** Tasteless.

**Molecular Weight:** 55.85 g/mole

**Color:** Black to Grey.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 3000°C (5432°F)

**Melting Point:** 1535°C (2795°F)

**Critical Temperature:** Not available.

**Specific Gravity:** Density: 7.86 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water, hot water, diethyl ether.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Excess heat, ignition sources, incompatible materials, water/moisture, air, dust generation.

**Incompatibility with various substances:**

Reactive with oxidizing agents, acids.

Slightly reactive to reactive with moisture.

**Corrosivity:** Not considered to be corrosive for metals and glass.

**Special Remarks on Reactivity:**

Hot iron(wire) burns in Chlorine gas.

Violent decomposition of hydrogen peroxide (53% by weight or greater) may be caused by contact with iron.

Readily oxidizes in moist air forming rust.

Reactive with halogens.

Incompatible with acetaldehyde, ammonium peroxodisulfate, chloroformamidinum, chloric acid, ammonium nitrate, dinitrogen tetroxide, nitryl fluoride, polystyrene, sodium acetylide, potassium dichromate, peroxyformic acid, sulfuric acid, sodium carbide.

Readily attacked by dilute mineral acids and or attacked or dissolved by organic acids.

Not appreciably attacked by cold sulfuric acid, or nitric acid, but is attacked by hot acids.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 30000 mg/kg [Rat].

**Chronic Effects on Humans:** May cause damage to the following organs: liver, cardiovascular system, upper respiratory tract, pancreas.

**Other Toxic Effects on Humans:** Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects:

Skin:

Iron metal filings or dust: May cause skin irritation by mechanical action.

Iron metal wire: Not likely to cause skin irritation

Eyes:

Iron metal filings or dust: Can irritate eyes by mechanical action.

Iron metal wire: No hazard. Will not cause eye irritation.

Inhalation:

Iron dust: Can irritate the respiratory tract by mechanical action.

Iron metal wire or filings: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count.

Ingestion:

Iron metal wire: Not an ingestion hazard:

Iron metal filings or dust: The amount of ingested iron which constitutes a toxic dose is not well defined. Proposed toxic doses of elemental iron are 20 mg/kg for gastrointestinal irritation to greater than 60 mg/kg for systemic toxicity. Gastrointestinal effects are the first signs to appear, with hemorrhagic vomiting and diarrhea, hematochezia, abdominal pain, lethargy, metabolic acidosis, coagulaopathy, shock, coma and convulsions developing from 0 to 6 hours after ingestion. Leukocytosis may also occur. An asymptomatic phase may ensue at 6 to 12 hours postingestion, followed by hypoglycemia or hyperglycemia, hepatic and renal failure, severe acidosis, cyanosis, fever, CNS depression (lethargy, restlessness and/or confusion seizures), hypotension, and cardiovascular collapse/cardiac failure in 12 to 48 hours. Hepatic cirrhosis, gastrointestinal scarring and/or strictures may arise in 2 to 6 weeks. It may also cause an anaphylactoid reaction. Non-cardiogenic pulmonary edema also develop in severe cases of iron intoxication.

Chronic Potential Health Effects:

Inhalation: Chronic inhalation of iron dust can lead to accumulation in the lungs and a characteristic stippled appearance on X-rays. This condition, called SIDEROSIS, is considered benign in that it does not interfere with lung function and does not predispose to other disease. Chronic inhalation of iron dust may also cause fibrosis in the lungs.

Ingestion: Clinical signs of iron overload appear when the total body iron is 5 to 10 times higher than normal. Neurobehavioral defects including depression, decreased activity, habituation, reflex startle, and conditioned avoidance response performance may occur. However, similiar effects were also seen in iron deficiency. It is therefore likely that these behavioral effects are secondary to general toxicity. High serum iron levels may be associated with an increased risk of fatal acute myocardial infarction (MI).

Skin: Prolonged or repeated contact may cause hypersensitivity.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The product itself and its products of degradation are not toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** CLASS 4.1: Flammable solid.

**Identification:** : Metal powder, flammable, n.o.s. (Iron metal powder) UNNA: 3089 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

California Director's List of Hazardous Substances: Iron Metal

TSCA 8(b) inventory: Iron Metal

**Other Regulations:** EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

### Other Classifications:

**WHMIS (Canada):** CLASS B-4: Flammable solid.

### DSCL (EEC):

R11- Highly flammable.

S16- Keep away from sources of ignition - No smoking.

S22- Do not breathe dust.

### HMIS (U.S.A.):

**Health Hazard:** 1

**Fire Hazard:** 2

**Reactivity:** 1

**Personal Protection:** E

### National Fire Protection Association (U.S.A.):

**Health:** 1

**Flammability:** 2

**Reactivity:** 1

**Specific hazard:**

### Protective Equipment:

Gloves

Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Safety glasses.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

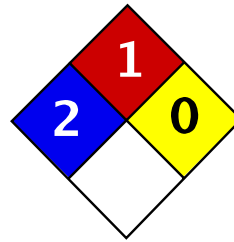
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Health	2
Fire	1
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet

### Copper MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Copper

**Catalog Codes:** SLC4939, SLC2152, SLC3943, SLC1150, SLC2941, SLC4729, SLC1936, SLC3727, SLC5515

**CAS#:** 7440-50-8

**RTECS:** GL5325000

**TSCA:** TSCA 8(b) inventory: Copper

**CI#:** Not available.

**Synonym:**

**Chemical Name:** Not available.

**Chemical Formula:** Cu

#### Contact Information:

**Sciencelab.com, Inc.**  
14025 Smith Rd.  
Houston, Texas 77396

US Sales: **1-800-901-7247**  
International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**  
1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Copper	7440-50-8	100

**Toxicological Data on Ingredients:** Copper LD50: Not available. LC50: Not available.

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant).

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance is toxic to lungs, mucous membranes.

Repeated or prolonged exposure to the substance can produce target organs damage.

#### Section 4: First Aid Measures

**Eye Contact:** Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

**Skin Contact:**

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

**Serious Skin Contact:** Not available.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:** Not available.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible.

### Storage:

Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

### Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 1 (mg/m<sup>3</sup>) from ACGIH [1990]

Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 63.54 g/mole

**Color:** Not available.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 2595°C (4703°F)

**Melting Point:** 1083°C (1981.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 8.94 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Not available.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

### Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available.

LC50: Not available.

**Chronic Effects on Humans:** The substance is toxic to lungs, mucous membranes.

**Other Toxic Effects on Humans:**

Very hazardous in case of ingestion.

Hazardous in case of inhalation.

Slightly hazardous in case of skin contact (irritant).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Human: passes through the placenta, excreted in maternal milk.

**Special Remarks on other Toxic Effects on Humans:** Not available.

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are as toxic as the original product.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

### Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Marine Pollutant

### Section 15: Other Regulatory Information

**Federal and State Regulations:**

Pennsylvania RTK: Copper

Massachusetts RTK: Copper

TSCA 8(b) inventory: Copper

CERCLA: Hazardous substances.: Copper

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:**

**WHMIS (Canada):** CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):** R36- Irritating to eyes.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 1

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves.

Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator

when ventilation is inadequate.  
Splash goggles.

## Section 16: Other Information

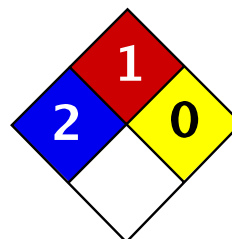
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 04:58 PM

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Health	2
Fire	1
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet

### Chromium MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Chromium

**Catalog Codes:** SLC4711, SLC3709

**CAS#:** 7440-47-3

**RTECS:** GB4200000

**TSCA:** TSCA 8(b) inventory: Chromium

**CI#:** Not applicable.

**Synonym:** Chromium metal; Chrome; Chromium Metal Chips 2" and finer

**Chemical Name:** Chromium

**Chemical Formula:** Cr

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**  
1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Chromium	7440-47-3	100

**Toxicological Data on Ingredients:** Chromium LD50: Not available. LC50: Not available.

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to kidneys, lungs, liver, upper respiratory tract.

Repeated or prolonged exposure to the substance can produce target organs damage.



## Section 4: First Aid Measures

### Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

### Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

### Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

### Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

### Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 580°C (1076°F)

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

### Fire Hazards in Presence of Various Substances:

Slightly flammable to flammable in presence of open flames and sparks, of heat.

Non-flammable in presence of shocks.

### Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

### Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

### Special Remarks on Fire Hazards:

Moderate fire hazard when it is in the form of a dust (powder) and burns rapidly when heated in flame.

Chromium is attacked vigorously by fused potassium chlorate producing vivid incandescence.

Pyrophoric chromium unites with nitric oxide with incandescence.

Incandescent reaction with nitrogen oxide or sulfur dioxide.

### Special Remarks on Explosion Hazards:

Powdered Chromium metal +fused ammonium nitrate may react violently or explosively.

Powdered Chromium will explode spontaneously in air.

## Section 6: Accidental Release Measures

### Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

### Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

### Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 0.5 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States]

TWA: 1 (mg/m<sup>3</sup>) from OSHA (PEL) [United States]

TWA: 0.5 (mg/m<sup>3</sup>) from NIOSH [United States]

TWA: 0.5 (mg/m<sup>3</sup>) [United Kingdom (UK)]

TWA: 0.5 (mg/m<sup>3</sup>) [Canada] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Metal solid.)

**Odor:** Odorless.

**Taste:** Not available.

**Molecular Weight:** 52 g/mole

**Color:** Silver-white to Grey.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 2642°C (4787.6°F)

**Melting Point:** 1900°C (3452°F) +/- 10 deg. C

**Critical Temperature:** Not available.

**Specific Gravity:** 7.14 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:**

Insoluble in cold water, hot water.

Soluble in acids (except Nitric), and strong alkalis.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Excess heat, incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents, acids, alkalis.

**Corrosivity:** Not available.

**Special Remarks on Reactivity:**

Incompatible with molten Lithium at 180 deg. C, hydrogen peroxide, hydrochloric acid, sulfuric acid, most caustic alkalis and alkali carbonates, potassium chlorate, sulfur dioxide, nitrogen oxide, bromine pentafluoride.

It may react violently or ignite with bromine pentafluoride.

Chromium is rapidly attacked by fused sodium hydroxide + potassium nitrate.

Potentially hazardous incompatibility with strong oxidizers.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available.

LC50: Not available.

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for

human.) by IARC.

May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

**Other Toxic Effects on Humans:**

Hazardous in case of skin contact (irritant), of inhalation.

Slightly hazardous in case of ingestion.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**

May cause cancer based on animal data. There is no evidence that exposure to trivalent chromium causes cancer in man.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects:

May cause skin irritation.

Eyes: May cause mechanical eye irritation.

Inhalation: May cause irritation of the respiratory tract and mucous membranes of the respiratory tract.

Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea.

Chronic Potential Health Effects:

Inhalation: The effects of chronic exposure include irritation, sneezing, redness of the throat, bronchospasm, asthma, cough, polyps, chronic inflammation, emphysema, chronic bronchitis, pharyngitis, bronchopneumonia, pneumoconiosis. Effects on the nose from chronic chromium exposure include irritation, ulceration, and perforation of the nasal septum. Inflammation and ulceration of the larynx may also occur.

Ingestion or Inhalation: Chronic exposure may cause liver and kidney damage.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The product itself and its products of degradation are not toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

Connecticut hazardous material survey.: Chromium  
Illinois toxic substances disclosure to employee act: Chromium  
Illinois chemical safety act: Chromium  
New York release reporting list: Chromium  
Rhode Island RTK hazardous substances: Chromium  
Pennsylvania RTK: Chromium  
Minnesota: Chromium  
Michigan critical material: Chromium  
Massachusetts RTK: Chromium  
Massachusetts spill list: Chromium  
New Jersey: Chromium  
New Jersey spill list: Chromium  
Louisiana spill reporting: Chromium  
California Director's List of Hazardous Substances: Chromium  
TSCA 8(b) inventory: Chromium  
SARA 313 toxic chemical notification and release reporting: Chromium  
CERCLA: Hazardous substances.: Chromium: 5000 lbs. (2268 kg)

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).  
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** Not controlled under WHMIS (Canada).

**DSCL (EEC):**

R40- Limited evidence of carcinogenic effect  
S36/37/39- Wear suitable protective clothing, gloves and eye/face protection.  
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 1

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves.  
Lab coat.  
Dust respirator. Be sure to use an approved/certified respirator or equivalent.  
Splash goggles.

## Section 16: Other Information

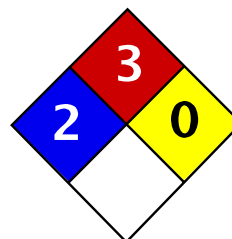
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:16 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Chlorobenzene MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Chlorobenzene

**Catalog Codes:** SLC1654

**CAS#:** 108-90-7

**RTECS:** CZ0175000

**TSCA:** TSCA 8(b) inventory: Chlorobenzene

**CI#:** Not available.

**Synonym:** Monochlorobenzene

**Chemical Name:** Not available.

**Chemical Formula:** C<sub>6</sub>H<sub>5</sub>Cl

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Chlorobenzene	108-90-7	100

**Toxicological Data on Ingredients:** Chlorobenzene: ORAL (LD<sub>50</sub>): Acute: 1110 mg/kg [Rat]. 2300 mg/kg [Mouse].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, sensitizer, permeator). Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

##### Potential Chronic Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, sensitizer, permeator).

**CARCINOGENIC EFFECTS:** Not available.

**MUTAGENIC EFFECTS:** Not available.

**TERATOGENIC EFFECTS:** Not available.

**DEVELOPMENTAL TOXICITY:** Not available.

The substance is toxic to kidneys, lungs, the nervous system, liver, mucous membranes.

Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

## Section 4: First Aid Measures

### Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

### Skin Contact:

If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

### Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:** Not available.

### Ingestion:

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 638°C (1180.4°F)

**Flash Points:** CLOSED CUP: 29.44°C (85°F).

**Flammable Limits:** LOWER: 1.3% UPPER: 7.1%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>).

**Fire Hazards in Presence of Various Substances:** Flammable in presence of open flames and sparks.

### Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

### Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal.



**Large Spill:**

Flammable liquid.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Keep container dry. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

**Storage:**

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

TWA: 10 (ppm)

TWA: 46 (mg/m<sup>3</sup>)

Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Almond-like.

**Taste:** Not available.

**Molecular Weight:** 112.56 g/mole

**Color:** Colorless.

**pH (1% soln/water):** Not available.

**Boiling Point:** 132°C (269.6°F)

**Melting Point:** -45.6°C (-50.1°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.1058 (Water = 1)

**Vapor Pressure:** 8.8 mm of Hg (@ 20°C)

**Vapor Density:** 3.88 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.2 ppm

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, methanol, diethyl ether.

**Solubility:**

Soluble in methanol, diethyl ether.

Very slightly soluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Not available.

**Corrosivity:** Not available.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

## Section 11: Toxicological Information

**Routes of Entry:** Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 1110 mg/kg [Rat].

**Chronic Effects on Humans:** The substance is toxic to kidneys, lungs, the nervous system, liver, mucous membranes.

**Other Toxic Effects on Humans:**

Very hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Hazardous in case of skin contact (corrosive, sensitizer, permeator).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are more toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

## Section 14: Transport Information

**DOT Classification:** Class 3: Flammable liquid.

**Identification:** : Chlorobenzene : UN1134 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

Pennsylvania RTK: Chlorobenzene

Massachusetts RTK: Chlorobenzene

TSCA 8(b) inventory: Chlorobenzene

SARA 313 toxic chemical notification and release reporting: Chlorobenzene

CERCLA: Hazardous substances.: Chlorobenzene

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:**

**WHMIS (Canada):**

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

CLASS D-2B: Material causing other toxic effects (TOXIC).

**DSCL (EEC):**

R10- Flammable.

R22- Harmful if swallowed.

R38- Irritating to skin.

R41- Risk of serious damage to eyes.

R43- May cause sensitization by skin contact.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 3

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves.

Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

## Section 16: Other Information

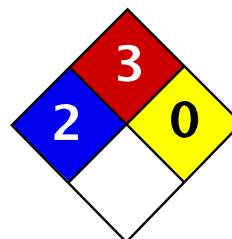
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:16 PM

**Last Updated:** 10/10/2005 08:16 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Benzene MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Benzene

**Catalog Codes:** SLB1564, SLB3055, SLB2881

**CAS#:** 71-43-2

**RTECS:** CY1400000

**TSCA:** TSCA 8(b) inventory: Benzene

**CI#:** Not available.

**Synonym:** Benzol; Benzine

**Chemical Name:** Benzene

**Chemical Formula:** C<sub>6</sub>-H<sub>6</sub>

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Benzene	71-43-2	100

**Toxicological Data on Ingredients:** Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

##### Potential Chronic Health Effects:

**CARCINOGENIC EFFECTS:** Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC.

**MUTAGENIC EFFECTS:** Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

**TERATOGENIC EFFECTS:** Not available.

**DEVELOPMENTAL TOXICITY:** Classified Reproductive system/toxin/female [POSSIBLE].

The substance is toxic to blood, bone marrow, central nervous system (CNS).

The substance may be toxic to liver, Urinary System.

Repeated or prolonged exposure to the substance can produce target organs damage.

## Section 4: First Aid Measures

### Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

### Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

### Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

### Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

### Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

### Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 497.78°C (928°F)

**Flash Points:** CLOSED CUP: -11.1°C (12°F). (Setaflash)

**Flammable Limits:** LOWER: 1.2% UPPER: 7.8%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>).

### Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat.  
Slightly flammable to flammable in presence of oxidizing materials.  
Non-flammable in presence of shocks.

### Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.  
Risks of explosion of the product in presence of static discharge: Not available.  
Explosive in presence of oxidizing materials, of acids.

### Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water.  
SMALL FIRE: Use DRY chemical powder.  
LARGE FIRE: Use alcohol foam, water spray or fog.

### Special Remarks on Fire Hazards:

Extremely flammable liquid and vapor. Vapor may cause flash fire.  
Reacts on contact with iodine heptafluoride gas.

Dioxygenyl tetrafluoroborate is as very powerful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition.  
Contact with sodium peroxide with benzene causes ignition.  
Benzene ignites in contact with powdered chromic anhydride.  
Virgorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

**Special Remarks on Explosion Hazards:**

Benzene vapors + chlorine and light causes explosion.  
Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate.  
Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion.  
Interaction of nitryl perchlorate with benzene gave a slight explosion and flash.  
The solution of permanganic acid ( or its explosive anhydride, dimanganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene.  
Peroxydisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion.  
Mixtures of peroxomonosulfuric acid with benzene explodes.

## Section 6: Accidental Release Measures

**Small Spill:** Absorb with an inert material and put the spilled material in an appropriate waste disposal.

**Large Spill:**

Flammable liquid.  
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

**Storage:**

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

TWA: 0.5 STEL: 2.5 (ppm) from ACGIH (TLV) [United States]  
TWA: 1.6 STEL: 8 (mg/m3) from ACGIH (TLV) [United States]  
TWA: 0.1 STEL: 1 from NIOSH  
TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States]  
TWA: 10 (ppm) from OSHA (PEL) [United States]  
TWA: 3 (ppm) [United Kingdom (UK)]  
TWA: 1.6 (mg/m3) [United Kingdom (UK)]  
TWA: 1 (ppm) [Canada]  
TWA: 3.2 (mg/m3) [Canada]  
TWA: 0.5 (ppm) [Canada] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:**

Aromatic. Gasoline-like, rather pleasant.  
(Strong.)

**Taste:** Not available.

**Molecular Weight:** 78.11 g/mole

**Color:** Clear Colorless. Colorless to light yellow.

**pH (1% soln/water):** Not available.

**Boiling Point:** 80.1 (176.2°F)

**Melting Point:** 5.5°C (41.9°F)

**Critical Temperature:** 288.9°C (552°F)

**Specific Gravity:** 0.8787 @ 15 C (Water = 1)

**Vapor Pressure:** 10 kPa (@ 20°C)

**Vapor Density:** 2.8 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 4.68 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil; log(oil/water) = 2.1

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, diethyl ether, acetone.

**Solubility:**

Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether, acetone.

Very slightly soluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.



**Conditions of Instability:** Heat, ignition sources, incompatibles.

**Incompatibility with various substances:** Highly reactive with oxidizing agents, acids.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Benzene vapors + chlorine and light causes explosion.

Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate.

Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion.

Interaction of nitryl perchlorate with benzene gave a slight explosion and flash.

The solution of permanganic acid ( or its explosive anhydride, dimanganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene.

Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion.

Mixtures of peroxomonsulfuric acid with benzene explodes.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Dermal contact. Eye contact. Inhalation.

**Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 930 mg/kg [Rat].

Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit].

Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC.

MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE].

Causes damage to the following organs: blood, bone marrow, central nervous system (CNS).

May cause damage to the following organs: liver, Urinary System.

**Other Toxic Effects on Humans:**

Very hazardous in case of inhalation.

Hazardous in case of skin contact (irritant, permeator), of ingestion.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**

May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects.

May affect genetic material (mutagenic).

May cause cancer (tumorigenic, leukemia))

Human: passes the placental barrier, detected in maternal milk.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects:

Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism, and urinary system.

Eyes: Causes eye irritation.

Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and

other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** CLASS 3: Flammable liquid.

**Identification:** : Benzene UNNA: 1114 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene

California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value)

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Benzene

Connecticut carcinogen reporting list.: Benzene

Connecticut hazardous material survey.: Benzene

Illinois toxic substances disclosure to employee act: Benzene

Illinois chemical safety act: Benzene

New York release reporting list: Benzene

Rhode Island RTK hazardous substances: Benzene

Pennsylvania RTK: Benzene

Minnesota: Benzene

Michigan critical material: Benzene

Massachusetts RTK: Benzene

Massachusetts spill list: Benzene

New Jersey: Benzene

New Jersey spill list: Benzene

Louisiana spill reporting: Benzene

California Director's list of Hazardous Substances: Benzene

TSCA 8(b) inventory: Benzene  
SARA 313 toxic chemical notification and release reporting: Benzene  
CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

**Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).  
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):**

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).  
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**

R11- Highly flammable.  
R22- Harmful if swallowed.  
R38- Irritating to skin.  
R41- Risk of serious damage to eyes.  
R45- May cause cancer.  
R62- Possible risk of impaired fertility.  
S2- Keep out of the reach of children.  
S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
S39- Wear eye/face protection.  
S46- If swallowed, seek medical advice immediately and show this container or label.  
S53- Avoid exposure - obtain special instructions before use.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 3

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves.  
Lab coat.  
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.  
Splash goggles.

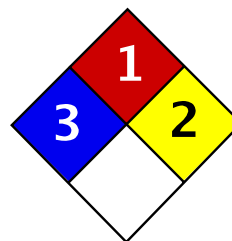
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:35 PM

**Last Updated:** 10/10/2005 08:35 PM

*The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.*



Health	3
Fire	1
Reactivity	2
Personal Protection	E

## Material Safety Data Sheet

### Arsenic MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Arsenic

**Catalog Codes:** SLA1006

**CAS#:** 7440-38-2

**RTECS:** CG0525000

**TSCA:** TSCA 8(b) inventory: Arsenic

**CI#:** Not applicable.

**Synonym:**

**Chemical Name:** Arsenic

**Chemical Formula:** As

#### Contact Information:

**Sciencelab.com, Inc.**

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: [ScienceLab.com](http://ScienceLab.com)

**CHEMTREC (24HR Emergency Telephone), call:**  
1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

**Toxicological Data on Ingredients:** Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance is toxic to kidneys, lungs, the nervous system, mucous membranes.

Repeated or prolonged exposure to the substance can produce target organs damage.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin Contact:** Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

**Serious Skin Contact:** Not available.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:** Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:**

Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

**Special Remarks on Explosion Hazards:** Not available.

## Section 6: Accidental Release Measures

**Small Spill:** Use appropriate tools to put the spilled solid in a convenient waste disposal container.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not

present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

### Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:** Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

### Exposure Limits:

TWA: 0.01 from ACGIH (TLV) [United States] [1995]  
Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Lustrous solid.)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 74.92 g/mole

**Color:** Silvery.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** Not available.

**Melting Point:** Sublimation temperature: 615°C (1139°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 5.72 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water, hot water.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Reactive with oxidizing agents, acids, moisture.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

### Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 145 mg/kg [Mouse].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.

Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

**Other Toxic Effects on Humans:**

Very hazardous in case of ingestion, of inhalation.

Slightly hazardous in case of skin contact (irritant).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.



**Toxicity of the Products of Biodegradation:** The products of degradation are as toxic as the original product.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

### Section 14: Transport Information

**DOT Classification:** CLASS 6.1: Poisonous material.

**Identification:** : Arsenic UNNA: UN1558 PG: II

**Special Provisions for Transport:** Not available.

### Section 15: Other Regulatory Information

**Federal and State Regulations:**

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic  
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic

Pennsylvania RTK: Arsenic

Massachusetts RTK: Arsenic

TSCA 8(b) inventory: Arsenic

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:**

**WHMIS (Canada):**

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).

CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**

R22- Harmful if swallowed.

R45- May cause cancer.

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 1

**Reactivity:** 2

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 3

**Flammability:** 1

**Reactivity:** 2

**Specific hazard:**

**Protective Equipment:**

Gloves.

Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Safety glasses.

**Section 16: Other Information****References:**

- Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
- Liste des produits purs tératogènes, mutagènes, cancérigènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec.
- Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec.
- SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
- The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
- Guide de la loi et du règlement sur le transport des marchandises dangereuses au Canada. Centre de conformité international Ltée. 1986.

**Other Special Considerations:** Not available.

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## **Appendix B**

### **Quality Assurance Project Plan Addendum**

**Quality Assurance Project Plan Addendum  
Mayer Landfill Site (3-36-027),  
Blooming Grove, New York**

*Prepared for*

New York State Department of Environmental Conservation  
625 Broadway  
Albany, New York 12233



*Prepared by*

EA Engineering, P.C., and Its Affiliate  
EA Science and Technology  
6712 Brooklawn Parkway, Suite 104  
Syracuse, New York 13211  
(315) 431-4610

June 2007  
Revision: DRAFT  
EA Project No. 14474.03

# **Quality Assurance Project Plan Addendum Mayer Landfill Site (3-36-027), Blooming Grove, New York**

*Prepared for*

New York State Department of Environmental Conservation  
625 Broadway  
Albany, New York 12233



*Prepared by*

EA Engineering, P.C. and Its Affiliate  
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6712 Brooklawn Parkway, Suite 104  
Syracuse, New York 13211  
(315) 431-4610

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Christopher J. Canonica, P.E., Program Manager  
EA Engineering, P.C.

Date

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David W. Eck, P.E., Project Manager  
EA Engineering, P.C.

Date

---

Kurt Ilker, P.G., Site Manager  
EA Science and Technology

Date

June 2007  
Revision: DRAFT  
Project No.: 14474.03

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<u>Number</u>	<u>Title</u>
1	Remedial investigation analytical program.
2	Sample containers, preservation, and holding times.

## **1. PURPOSE AND OBJECTIVES**

### **1.1 PURPOSE**

A Generic Quality Assurance Project Plan (QAPP) (EA 2006)<sup>1</sup> has been developed for field activities performed under the New York State Department of Environmental Conservation (NYSDEC) Standby Contracts D004438 and D004441. This QAPP Addendum is for the Remedial Design/Remedial Action Oversight Work Assignment for the Mayer Landfill Site, Orange County, Blooming Grove, New York (NYSDEC Site No. 3-36-027). The QAPP Addendum is to supplement the Generic QAPP with site-specific procedures for the collection, analysis, and evaluation of data that will be legally and scientifically defensible.

### **1.2 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES**

This QAPP Addendum provides site-specific information and standard operating procedures applicable to all work performed at the site that is not included in the Generic QAPP. The information includes definitions and generic goals for data quality and required types and quantities of quality assurance/quality control (QA/QC) samples. The procedures address sampling and decontamination protocols; field documentation; sample handling, custody, and shipping; instrument calibration and maintenance; auditing; data reduction, validation, and reporting; corrective action requirements; and QA reporting. The Work Plan contains a site description and information on site field activities, such as sample locations, sampling procedures, analytical methods, and reporting limits.

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<sup>1</sup> EA Engineering, P.C. 2006. *Generic Quality Assurance Project Plan for Work Assignments under NYSDEC Contracts D004438 and D004441*. June.



## 2. PROJECT ORGANIZATION AND RESPONSIBILITIES

While all personnel involved in an investigation and the generation of data are implicitly a part of the overall project management and QA/QC program, certain members of the Project Team have specifically designated responsibilities. Project personnel responsibilities are summarized below.

### 2.1 EA ENGINEERING, P.C. AND ITS AFFILIATE EA SCIENCE AND TECHNOLOGY

EA will provide oversight, coordination, health and safety, field support, and evaluation of analytical data. Field support will be provided during subsurface soil sampling. EA also will be responsible for evaluation of analytical test results, which will be submitted to NYSDEC. The EA staff involved in this project are as follows:

- ***Chris Canonica, P.E., Certifying Engineer***—The Certifying Engineer will provide guidance on technical matters and review technical documents relating to the project. He will evaluate information relative to the site, make recommendations for plan modifications when applicable and delegate technical guidance to specially trained individuals under his direction. Additionally, he will provide professional engineer certification on all reports issued as part of this work assignment.
- ***David Eck, P.E., EA Project Manager***—The Project Manager provides overall coordination and preparation of the project within EA. This includes coordination with NYSDEC and New York State Department of Health, budget control, subcontractor performance, implementation of the Quality Assurance Project Plan, and allocation of resources and staffing to implement both the QA/QC program and the site Health and Safety Plan.
- ***Kurt Ilker, P.G., EA Site Manager and QA/QC Coordinator***—The Site Manager and QA/QC Coordinator will serve as the onsite contact person for field investigations, tests, and construction activities. He will be responsible for coordinating the field activities and providing construction oversight. Additionally, he will be responsible for project-specific supervision and monitoring of the QA/QC program. The Site Manager and QA/QC Coordinator will ensure that field personnel are familiar with and adhere to proper sampling procedures, field measurement techniques, sample identification and chain-of-custody procedures. He will coordinate receipt of samples and reporting of analytical results with the analytical laboratories and prepare QA/QC reports for management review.

The Program Health and Safety Officer is also an integral part of the project implementation team.

- ***Peter Garger, EA Program Health and Safety Officer***—The Program Health and Safety Officer will be responsible for the development, final technical review, and approval of the Health and Safety Plan. In addition, he will provide authorization, if warranted, to modify personal protective equipment requirements based on field conditions. He will also provide final review of all safety and health monitoring records and personal protective equipment changes to ensure compliance with the provisions of the Health and Safety Plan.

## **2.2 LABORATORY**

Laboratory analyses for this project will be performed by Hampton-Clarke/Veritech in Fairfield, New Jersey and Con-Test Analytical Labs in East Longmeadow, Massachusetts under a subcontract agreement with EA. Environmental Data Services will have sample analysis and review responsibilities on this project. The laboratories will have their own provisions for conducting an internal QA/QC review of the data before they are released to EA. The laboratories' contract supervisors will contact EA's Project Manager with any sample discrepancies or data concerns.

Hardcopy and electronic data deliverable formatted QA/QC reports will be filed by the analytical laboratories when data are submitted to EA. Corrective actions will be reported to the EA Project Manager along with the QA/QC report (Section 9 of the Generic QAPP). The laboratories may be contacted directly by EA or NYSDEC personnel to discuss QA concerns. EA will act as laboratory coordinator on this project, and all correspondence from the laboratories will be coordinated with EA's Project Manager.

### 3. SAMPLING RATIONALE, DESIGNATION, AND CONTAINERS

#### 3.1 SAMPLING RATIONALE

The sampling rationale is presented for each planned field activity is detailed in the Field Activities Plan (EA 2007)<sup>2</sup>. The rationale and frequency of the QC samples collected is discussed in the Generic QAPP. The site characterization laboratory program, illustrated in Table 1 includes the number of samples for each sample location, as well as QA/QC samples. The frequency of QA/QC samples are expressed as a percentage of the total number of samples collected for that matrix. The Generic QAPP also includes analytical methods and reporting limits.

#### 3.2 SAMPLE DESIGNATION

Field samples collected from the site will be assigned a unique sample tracking number. Sample designation will be an alpha-numeric code, which will identify each sample by the site identification, matrix sampled, location number, sequential sample number (or depth of top-of-sample interval for excavation soil samples), and date of collection. Each sampling location will be identified with a two-digit number. Sequential sample numbers at each location for samples will begin with 01 and increase accordingly. For soil borings, the top depth of the sample interval will be used as the sample number. The final portion of the sample tracking number will be the sample date.

The following terminology will be used for the sample identification:

- **Soil Gas Samples**
  - SITE ID<sup>3</sup>-SV-xx (for subsurface soil vapor samples)
- **Soil Samples**
  - SITE ID-TP-xx (for test pit soil samples)
- **Groundwater Samples**
  - SITE ID-GW-xx (for test pit groundwater samples))
  - SITE ID-MW-01 through 14-D (for existing monitoring wells)
  - SITE ID-TMW-01 through 04 (for existing temporary monitoring wells)

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<sup>2</sup> EA Engineering, P.C. 2007. *Field Activities Plan for Mayer Landfill Facility (Site No. 3-36-027) in Blooming Grove, New York*. April.

<sup>3</sup> Site ID No. 3-36-027

### **3.3 SAMPLE CONTAINERS**

Table 2 outlines the types of sample containers and preservatives required for sample collection. It should be noted that liquid waste samples, which exhibit an oily characteristic, do not require acid preservation.

#### **4. ANALYTICAL LABORATORY**

The data collected during this investigation will be used to determine the presence and concentration of certain analytes in soil vapor, soil, and groundwater.

All soil vapor samples collected during execution of the Generic QAPP and this QAPP Addendum will be submitted to Con-Test Analytical Labs in East Longmeadow, Massachusetts. All groundwater and soil samples will be submitted to Hampton-Clarke/Veritech in Fairfield, New Jersey. All of the labs are New York State Department of Health (NYSDOH) Environmental Laboratory Analytical Program-certified, meeting specifications for documentation, data reduction, and reporting.

## **5. ANALYTICAL TEST PARAMETERS**

This QAPP Addendum will require the analysis of groundwater samples using U.S. Environmental Protection Agency (EPA) Method 8260B for volatile organic compounds (VOCs), EPA Method 8270C for semivolatile organic compounds (SVOCs), EPA Method 608 for pesticides/polychlorinated biphenyls (PCBs), and EPA Method 6010 for TAL Metals. Soil vapor samples will be analyzed using EPA Method TO-15 for VOCs. Soil samples will be analyzed using EPA Method 8260B for VOCs and for toxicity Characteristic Leaching Procedure waste characterization. Compound lists for each analytical method are included in the Generic QAPP.

## **6. ANALYTICAL DATA VALIDATION**

The laboratories will review data prior to its release from the laboratories. Objectives for review are in accordance with the QA/QC objectives stated in the Generic QAPP. The laboratories are required to evaluate their ability to meet these objectives. Outlying data will be flagged in accordance with laboratory standard operating procedures, and corrective action will be taken to rectify the problem.

In order to ensure the validity of analytical data generated by a project, it will be validated by Environmental Data Services, who is independent from the analysts and the project. The Generic QAPP addresses implementation of independent validation.

TABLE 1 SITE CHARACTERIZATION ANALYTICAL PROGRAM

	Sample Matrix	VOC TO-15	VOC 8260	SVOC 8270	TAL Metals 6010	Pesticides/PCBs 608	Full TCLP for Waste Characteristics
SOIL AND GROUNDWATER SAMPLING (TEST TRENCHING PROGRAM)							
No. of Samples	Soil	---	20	---	---	---	20
Field Duplicate		---	1	---	---	---	---
Trip and/or Rinsate Blank <sup>(a)</sup>		---	1	---	---	---	---
Matrix Spike/ Duplicate		---	1	---	---	---	---
No. of Samples	Aqueous	---	20	---	---	---	---
Field Duplicate		---	1	---	---	---	---
Trip and/or Rinsate Blank <sup>(a)</sup>		---	1	---	---	---	---
Matrix Spike/ Duplicate		---	1	---	---	---	---
Total No. of Analyses		---	46	---	---	---	20
GROUNDWATER SAMPLING (MONITORING WELL PROGRAM)							
No. of Samples	Aqueous	---	21	21	21	21	---
Field Duplicate		---	1	1	1	1	---
Trip Blank <sup>(b)</sup>		---	1	---	---	---	---
Matrix Spike/ Duplicate		---	1	1	1	1	---
Total No. of Analyses		---	24	23	23	23	---
SOIL VAPOR SAMPLING							
No. of Samples	Air	20	---	---	---	---	---
Field Duplicate		2	---	---	---	---	---
Trip and/or Rinsate Blank <sup>(a)</sup>		---	---	---	---	---	---
Matrix Spike/ Duplicate		---	---	---	---	---	---
Total No. of Analyses		22	---	---	---	---	---
(a) One rinsate blank per day of sampling with a field device that requires field decontamination. (b) Trip blanks are required for VOC sampling of aqueous media at a rate of one per sample shipment.							
NOTE: VOC = Volatile organic compound. SVOC = Semi-volatile organic compound. Dashes (---) indicate no sample taken. Laboratory quality control samples will be collected at a rate of 1 per 20 samples, per matrix, with the exception of Full TCLP for Waste Characterization.							



TABLE 2 SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Parameter	Matrix	Container Type/Size	Sample Volume	Preservation	Maximum Holding Time from Verifiable Time of Sample Receipt
Target Compound List volatile organic compounds	Soil	One 125-mL wide-mouth glass vial with Teflon-lined cap	125 mL	Minimize headspace, cool 4°C	7 days
	Water	Two 40-mL glass vials with Teflon-lined Septa	80 mL	No headspace, cool 4°C HCl	7 days
Target Compound List semi-volatile organic compounds	Water	One 1-L amber glass with Teflon-lined Septa	1 L	Cool 4°C	14 days
TAL Metals	Water	One 500-mL plastic with Teflon lined cap	500 mL	Cool 4°C HNO <sub>3</sub>	6 months
Pesticides/ Polychlorinated Biphenyls	Water	Two 1-L amber glass with Teflon-lined cap	2 L	Cool 4°C	Extract within 7 days, analyze within 40 days following the start of extraction
TCLP Waste Characterization	Soil	Three 8-oz wide-mouth glass jars with Teflon-lined cap	24 oz.	Cool 4°C	14 days
TO-15	Air	One 6-L Summa® Canister	6 L	None	14 days

# **Appendix C**

## **Sample Forms**



EA Engineering P.C. and Its Affiliate,  
EA Science and Technology



## HTRW Test Pit Log

<b>Project:</b>	<b>Site Location:</b>	<b>Date:</b>
<b>Drilling Company:</b>	<b>Driller:</b>	<b>Geologist:</b>
<b>Size and Types of Drilling and Sampling Equipment:</b>		<b>Hole ID:</b>
<b>Date Started:</b>	<b>Date Completed:</b>	<b>Total Depth of Hole (ft bgs):</b>
<b>Groundwater Encountered (ft bgs):</b>		<b>Depth to Bedrock (ft bgs):</b>
<b>Total Depth of Hole (ft bgs):</b>		<b>Disposition of Hole:</b>

Depth	PID Reading (ppm)	Description of Material	Samples Collected	Recovery

<b>Comments and Notes:</b>
----------------------------



EA Engineering, P.C.  
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## FIELD RECORD OF AIR SAMPLING

Project Name:	Site Location:
EA Personnel:	Weather:

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Location: \_\_\_\_\_

Canister ID:	Regulator ID:	
Sample ID	Sample Point:	
Purge Method:	Purge Volume:	
Sample Start:	Sample End:	
Initial Vacuum:	Final Vacuum:	
PID Reading:	Sample Depth:	Screen Intervals:
Comments: _____		
_____		
_____		

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Location: \_\_\_\_\_

Canister ID:	Regulator ID:	
Sample ID	Sample Point:	
Purge Method:	Purge Volume:	
Sample Start:	Sample End:	
Initial Vacuum:	Final Vacuum:	
PID Reading:	Sample Depth:	Screen Intervals:
Comments: _____		
_____		
_____		

## DAILY OBSERVATION REPORT



NYSDEC

Day: \_\_\_\_\_ Date: \_\_\_\_\_

Temperature: (F) (am) (pm)

Wind Direction: (am) (pm)

Weather: (am)

(pm)

Arrive at site (am)

Leave site: (pm)

**Project Name**

**NYSDEC Site #**

**Contract #**

**Location, New York**

### **HEALTH & SAFETY:**

Are there any changes to the Health & Safety Plan?  
(If yes, list the deviation under items for concern)

Yes ( ) No ( )

Are monitoring results at acceptable levels?

Soil

Yes ( ) n/a ( ) \* No ( )

Waters

Yes ( ) n/a ( ) \* No ( )

Air

Yes ( ) n/a ( ) \* No ( )

- If No, provide comments

### **OTHER ITEMS:**

Site Sketch Attached: Yes ( ) No ( )

Photos Taken: Yes ( ) No ( )

### **DESCRIPTION OF DAILY WORK PERFORMED:**

### **PROJECT TOTALS:**

#### **SAMPLING (Soil/Water/Air)**

Contractor Sample ID:

DEC Sample ID:

Description:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

## DAILY OBSERVATION REPORT

Day: \_\_\_\_\_ Date: \_\_\_\_\_

### **CONTRACTOR/SUBCONTRACTOR EQUIPMENT AND PERSONNEL ON SITE:**

*(Name of contractor) personnel:*

*(Name of Subcontractor) personnel:*

*(Name of contractor) equipment:*

*(\*Indicates active equipment)*

*Other Subcontractors:*

### **VISITORS TO SITE:**

1.

### **PROJECT SCHEDULE ISSUES:**

### **PROJECT BUDGET ISSUES:**

None.

### **ITEMS OF CONCERN:**

### **COMMENTS:**

### **ATTACHMENT(S) TO THIS REPORT:**

### **SITE REPRESENTATIVE:**

Name: *(signature)*

cc:

## DAILY OBSERVATION REPORT

Day: \_\_\_\_\_ Date: \_\_\_\_\_

## DAILY PHOTOLOG

EA Engineering PC and its Affiliate,  
EA Science and Technology

## GROUNDWATER SAMPLING PURGE FORM

Well I.D.:	EA Personnel:	Client:
Location:	Well Condition:	Weather:
Sounding Method:	Gauge Date:	Measurement Ref:
Stick Up/Down (ft):	Gauge Time:	Well Diameter (in):

Purge Date:	Purge Time:
Purge Method:	Field Technician:

Well Volume		
A. Well Depth (ft):	D. Well Volume (ft):	Depth/Height of Top of PVC:
B. Depth to Water (ft):	E. Well Volume (gal) C*D):	Pump Type:
C. Liquid Depth (ft) (A-B):	F. Five Well Volumes (gal) (E3):	Pump Designation:

[illegible]

Total Quantity of Water Removed (gal): \_\_\_\_\_  
 Samplers: \_\_\_\_\_  
 Sampling Date: \_\_\_\_\_

Sampling Time: \_\_\_\_\_  
Split Sample With: \_\_\_\_\_  
Sample Type: \_\_\_\_\_

COMMENTS AND OBSERVATIONS: \_\_\_\_\_





FIELD WORK ORDER: \_\_\_\_\_

DATE: \_\_\_\_\_

To Contractor: \_\_\_\_\_

Reason for Change Order

- ( ) Error/Omission CM  
( ) Differing Condition  
( ) Field Resolution  
( ) Owner Request (User or other) circle one  
( ) Value Engineering  
( ) Other

Project No.: \_\_\_\_\_

Contract Days Changed \_\_\_\_\_

Project Name: \_\_\_\_\_

Revised Completion Date \_\_\_\_\_

Location: \_\_\_\_\_

You are authorized to proceed with the following work:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Justification: \_\_\_\_\_

\_\_\_\_\_

The compensation or time extension provided by this Field Work Order constitute satisfaction for all direct and indirect costs, and interest related thereto, which have incurred in connection with this change to the work.

Cost Basis: \$ \_\_\_\_\_ or \$ \_\_\_\_\_  
Fixed Price Time and Material  
Not to Exceed Estimate

\_\_\_\_\_  
Recommended by Construction Manager DATE: \_\_\_\_\_

Approval By: \_\_\_\_\_ DATE: \_\_\_\_\_  
NYSDEC Representative

Accepted By: \_\_\_\_\_ DATE: \_\_\_\_\_  
Contractor



EA Engineering P.C. and Its Affiliate,  
EA Science and Technology



## HTRW Boring/Well Log

<b>Project:</b>		<b>Site Location:</b>		<b>Date:</b>
<b>Drilling Company:</b>		<b>Driller:</b>	<b>Geologist:</b>	
<b>Size and Types of Drilling and Sampling Equipment:</b>			<b>Hole ID:</b>	
<b>Date Started:</b>	<b>Date Completed:</b>		<b>Total Depth of Hole (ft bgs):</b>	
<b>Groundwater Encountered (ft bgs):</b>			<b>Depth to Bedrock (ft bgs):</b>	
<b>Total Depth of Hole (ft bgs):</b>			<b>Disposition of Hole:</b>	

Depth	PID Reading (ppm)	Description of Material	Samples Collected	Recovery

<b>Comments and Notes:</b>
----------------------------

**Appendix D**

**Community Air Monitoring Plan**

**Community Air Monitoring Plan  
Mayer Landfill Site (3-36-027)  
Blooming Grove, New York**

*Prepared for*

New York State Department of Environmental Conservation  
625 Broadway  
Albany, New York 12233



*Prepared by*

EA Engineering, P.C., and Its Affiliate  
EA Science and Technology  
6712 Brooklawn Parkway, Suite 104  
Syracuse, New York 13211  
(315) 431-4610

June 2007  
Revision: DRAFT  
EA Project No. 14474.03

# **Community Air Monitoring Plan Mayer Landfill Site (3-36-027) Blooming Grove, New York**

*Prepared for*

New York State Department of Environmental Conservation  
625 Broadway  
Albany, New York 12233



*Prepared by*

EA Engineering, P.C. and Its Affiliate  
EA Science and Technology  
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Christopher J. Canonica, P.E., Program Manager  
EA Engineering, P.C.

Date

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David W. Eck, P.E., Project Manager  
EA Engineering, P.C.

Date

June 2007  
Revision: DRAFT  
EA Project No. 14474.03

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## 1. INTRODUCTION

The New York State Department of Environmental Conservation (NYSDEC) tasked EA Engineering, P.C. and its affiliate EA Science and Technology (EA) to perform a remedial design/remedial action (RD/RA) oversight project at the Mayer Landfill site (NYSDEC Site No. 3-36-027).

The Work Assignment will be conducted under the NYSDEC State Superfund Standby Contract (Work Assignment No. D004441-3). This Community Air Monitoring Plan (CAMP) was prepared as a requirement of the RD/RA Work Plan. The elements of this CAMP were prepared in accordance with the NYSDEC *Draft DER-10 Technical Guidance for Site Investigation and Remediation* (NYSDEC 2002)<sup>1</sup>.

### 1.1 SITE DESCRIPTION

The site is located in a rural/residential area off of Prospect Road in the Town of Blooming Grove, Orange County, New York (Figure 1). The Property is an approximately 20 acres in size and includes an approximate 10.3 acre landfill.

The site is surrounded with hardwood forest and the nearest residence is located about 750 feet southeast of the site, along Peddler Hill Road. An intermittent stream runs along the western edge of the landfill and discharges into a pond on Prospect Road, across from the landfill access road.

### 1.2 SITE BACKGROUND

The landfill operation began at the site in 1940 and ceased operations in April 1975 due to failure to comply with state and county regulation. In 1975 the Orange County Department of Health conducted an initial investigation of surface water at the landfill and detected elevated levels of zinc in a wet area to the south of the landfill. In 1985, the NYSDEC listed the site on the New York State Registry of Inactive Hazardous Waste Disposal Sites as a Class 2a site. Following a Phase II investigation that found groundwater standards for several organic compounds were exceeded in one monitoring well, the NYSDEC listed the site as a Class 2 site in 1991.

A remedial investigation/feasibility study (RI/FS) as conducted between 1999 and 2001 and determined that the main categories of contaminants of concern on site are volatile organic compounds and inorganic metals. The completion of the RI/FS led to a Record of Decision to be issued by the NYSDEC in January, 2005.

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<sup>1</sup> NYSDEC. 2002. *Draft DER-10 Technical Guidance for Site Investigation and Remediation*. December.

## **1.3 MONITORING**

Real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the work area will be necessary. Monitoring activities will consist of a combination of continuous and periodic monitoring, which will be performed dependent upon the type of activity being conducted at the site, as discussed below.

### **1.3.1 Continuous Air Monitoring**

Continuous monitoring for VOCs and particulates will be required for all ground intrusive activities associated with the Mayer Landfill RD/RA Work Assignment. Ground intrusive activities are anticipated to include the installation of test pits, soil borings and groundwater monitoring wells.

VOCs will be monitored at the downwind perimeter of the immediate work area on a continuous basis. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using a MiniRAE 2000 or equivalent, which is appropriate to measure the types of contaminants known or suspected to be present at the site. The MiniRAE 2000 will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The MiniRAE 2000 is capable of calculating 15-minute running average concentrations, which will be compared to the levels specified in Section 1.4.1.

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the work area at temporary particulate monitoring stations. The particulate monitoring will be performed using a Thermo MIE pDR-1000 DataRam or equivalent. The Thermo MIE pDR-1000 DataRam is a real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size [PM-10] and capable of integrating over a period of 15 minutes for comparison to the airborne particulate action level. The Thermo MIE pDR is equipped with an audible alarm to indicate exceedance of the action level. In addition to using the Thermo MIE pDR-1000 DataRam, fugitive dust migration will be visually assessed during all work activities. If particulate concentrations are recorded at higher or equivalent concentrations at the upwind station during investigation activities then continuous air monitoring will be discontinued, as approved by NYSDEC representative.



### **1.3.2 Periodic Air Monitoring**

Periodic monitoring for VOCs will be required during non-intrusive activities associated with the Mayer Landfill RD/RA Work Assignment. Non-intrusive activities are anticipated to include the collection of soil and sediment samples, the collection of groundwater samples from existing monitoring wells, and the collection of indoor air and soil vapor samples. Periodic monitoring during sample collection will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location.

## **1.4 ACTION LEVELS AND RESPONSE**

This subsection identifies the action levels and corresponding responses for concentrations of VOCs and particulates detected during the field activities associated with the RD/RA for the Mayer Landfill Site.

### **1.4.1 Volatile Organic Compounds**

If the ambient air concentration of total organic vapors at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be stopped, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 ft downwind of the work zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less (but in no case less than 20 ft), is below 5 ppm over background for the 15-minute average.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

All 15-minute readings will be recorded and be available for NYSDEC and New York State Department of Health (NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

### **1.4.2 Particulates**

If the downwind PM-10 particulate level is 100 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust

suppression techniques provided that downwind PM-10 particulate levels do not exceed  $150 \mu\text{g}/\text{m}^3$  above the upwind level and provided that no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than  $150 \mu\text{g}/\text{m}^3$  above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within  $150 \mu\text{g}/\text{m}^3$  of the upwind level and in preventing visible dust migration.

Similar to the VOC readings, all particulate readings will be recorded and be available for NYSDEC and NYSDOH personnel to review.