



March 20, 2019

Mr. Mitchell Smith
Indiana Brownfields Program
100 North Senate Avenue, Room 1275
Indianapolis, Indiana 46204

RE: Remediation Work Plan
Chesterfield Homes Property
201 Anderson Road
Chesterfield, Madison County, Indiana
Brownfield Site ID No. 4170207
Revolving Loan Fund (RLF) Cooperative Agreement (CA) # BF-00E48101-B
EPA ACRES ID #230541

Dear Mr. Smith:

Industrial Waste Management Consulting Group, LLC (IWM Consulting) is pleased to submit this Remediation Work Plan (RWP) for the Chesterfield Homes Property located at 201 Anderson Road, Chesterfield, Madison County, IN (Site) to the Indiana Brownfields Program (IBP). **Figure 1** displays a topographic map illustrating the location of the Site. The RWP is broken into two (2) distinct phases: active remediation during the first phase and post remediation monitoring during the second phase.

The first phase will consist of active remediation activities including the excavation and removal of five (5) underground storage tanks (USTs) formerly containing gasoline, two (2) gasoline dispenser islands, 1,500 gallons of petroleum-impacted liquid from the gasoline USTs, and up to 1,500 tons of petroleum-impacted soil. The petroleum-impacted soil will be disposed offsite at Randolph Farms Landfill located in Modoc, Indiana. Confirmatory soil and groundwater samples will be obtained during the remediation activities and IWM Consulting will generate a report documenting the remediation activities.

The second phase, if warranted, will consist of initially installing up to ten (10) soil borings in order to further characterize the subsurface beneath the Site post remediation activities. If it is subsequently determined that the groundwater beneath the Site has been adversely impacted with petroleum hydrocarbons, then IWM Consulting anticipates on installing up to four (4) monitoring wells and injecting up to 1,000-lbs of Oxygen Release Compound (ORC) at the Site in order to remediate residual dissolved petroleum hydrocarbons. IWM Consulting will also complete up to eight (8) quarterly low flow groundwater sampling and reporting events.

The Site background and the tasks to be completed as part of this RWP are described in more detail in the following sections. The RWP will be modified accordingly if it is determined that site conditions are different than originally assumed.

Site History Summary

The Site is located at 201 Anderson Road, Chesterfield, Indiana on the southwest corner of the intersection of Anderson Road and Plum Street (see **Figure 1 – Site Location Map** & **Figure 2 – Site Map**). Additionally, the Site is located in the southeast ¼ of Section 10, Township 19 North, Range 8 East in Madison County, Indiana. The Site is irregular in shape and consists of five (5) parcels, which contain a total of 0.8066 acres. The Site is situated in a mixed residential/commercial area in the center of Chesterfield, Indiana. IWM Consulting performed a Phase I Environmental Site Assessment (ESA) at the Site in June 2016. The Phase I ESA was conducted in accordance with American Society for Testing and Materials (ASTM) E1527-13 “Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process” and the standards and practices set forth in 40 CFR Part 312. At the time of the Phase I ESA, the Site was a vacant asphalt lot with a concrete pad associated with a previous building in the southwest quarter of the Site and former fuel pump dispenser islands located in the north and east sections of the Site. The western portion of the Site supported vegetative cover (trees and grass).

Based on standard historical sources, the Phase I ESA discovered that the Site was used for agricultural purposes or residential prior to 1960s. The Site was developed as a gasoline service station in 1961. A gasoline service station utilized the Site through 1977. The Site was utilized as an auto repair facility from 1977 to 1983. According to Mr. Tom Shepherd, the primary property owner, used oil from the auto repair facility may have been stored in an above ground storage tank (AST) as opposed to an UST; however, he was not completely certain. Gasoline USTs utilized in the northwest quarter of the Site were reportedly emptied and filled with sand in 1977. The Site has remained vacant since 1983. According to Mr. Shepherd, soil and groundwater samples were collected from the median north of the Site when the school playground (located adjacent north of the Site) was developed in 1990 or 1991. One (1) soil sample collected from the median revealed impacted soil.

2017 Phase II ESA

IWM Consulting conducted a Phase II ESA in April 2017 which included the installation of ten (10) soil borings (VP-GP1 through VP-GP10) in order to evaluate the presence of volatile organic compounds (VOCs), poly aromatic hydrocarbons (PAHs) and lead in the subsurface of the Site originating from historical on-site activities/operations. The soil borings were converted into temporary groundwater sampling points to facilitate the collection of low-flow and/or grab groundwater samples. Prior to soil boring installation, IWM Consulting supervised a limited geophysical survey at the Site. The purpose of the survey was to clear the boring locations and to attempt to identify the presence/location of any private utilities, sewer laterals and/or historical USTs. Five (5) USTs with associated vent lines were detected on the west/northwest side of the Site using the ground penetrating radar (GPR). A map displaying the pertinent site features is included as **Figure 2 – Site Map**.

The lithology encountered at the Site generally consists of layers of silty clays and sandy clays down to 17.75 feet below ground surface (bgs). There were also some layers of sand in some areas of the Site starting at 0.5 feet bgs and extending down intermittently to 13.5 feet bgs. Groundwater was generally



encountered at depths ranging between 6.5 feet bgs and 10 feet bgs during the drilling activities. Static water levels within the temporary groundwater sampling points were encountered between 4.93 feet and 15.35 feet below top of casing (TOC).

Subsurface soil samples and one-time groundwater samples were obtained during the Phase II ESA activities and were submitted for laboratory analysis of VOCs, PAHs, lead, and lead scavenger 1,2-dibromoethane (EDB) (groundwater only).

Adsorbed naphthalene was observed in the subsurface soil (8-8.75 feet bgs) in soil boring VP-GP3, located south of the UST pit which is present east of the former building, at concentrations exceeding the Indiana Department of Environmental Management (IDEM) Remediation Closure Guide (RCG) Residential Soil Migration to Groundwater Screening Level (MTGSL). Based upon visual observations and PID readings, the impacts do not appear to extend beyond a depth of 12 feet bgs.

Dissolved n-propylbenzene, naphthalene, and lead were present in two (2) groundwater samples exceeding the RCG Residential Tap Groundwater Screening Levels (GWSLs). Soil boring VP-GP3, located south of the UST pit, exhibited n-propylbenzene, naphthalene, and total lead concentrations exceeding the respective RCG Residential Tap GWSLs. Soil boring VP-GP5, located on the north central portion of the Site, exhibited n-propylbenzene and naphthalene concentrations exceeding the respective RCG Residential Tap GWSLs.

Based upon the results of the Phase II ESA, IWM Consulting recommended that remediation activities include the removal of the USTs and possible piping runs from the Site, along with limited over-excavation of potential petroleum-impacted backfill or soils adjacent to these areas. IWM Consulting also recommended that ORC be added to the open excavation prior to backfilling if groundwater enters into the excavation. Following remediation activities, IWM Consulting recommended the installation of three (3) to five (5) monitoring wells on the Site to monitor petroleum concentrations in groundwater.

Remediation Goals

IWM Consulting understands that the goal of the project is to assess and remediate the Site to levels that allow for future commercial/residential use while achieving a No Further Action (NFA) designation. Consequently, all of the soil and groundwater samples will be compared to the applicable IDEM RCG Commercial/Industrial and Residential Screening Levels. Based upon the online IDEM Wellhead Proximity Determinator, the Site is not located within a wellhead protection area.

Proposed Active Remediation Activities

Based on the IFA RFP and historical environmental data, a minimum of five (5) USTs formerly containing gasoline and two (2) fuel dispenser islands appear to exist at the Site. The Phase II ESA indicated the presence of petroleum contamination beneath the Site. Consequently, IWM Consulting is proposing to remove the fuel dispenser islands, the five (5) gasoline USTs, and up to 1,500 tons of petroleum-impacted backfill/native soil from the Site. If petroleum-impacted groundwater is encountered



during the over-excavation activities, the groundwater will be treated in-situ with up to 1,000-lbs of ORC. A more detailed description of the proposed remediation activities is provided in the following sections.

IWM Consulting has contracted with a certified UST removal contractor (SCS Environmental Contracting, Inc.) to remove the USTs and to conduct the soil excavation activities. IWM Consulting will prepare and submit a RWP Implementation (RWPI) Report, including a summary of the soil excavation/remediation activities in accordance with the IDEM UST Closure Assessment Guidelines, Remediation Program Guide (RPG).

A copy of the Site-specific Health and Safety Plan (HASP) is included in **Appendix A**.

Proposed Soil and Groundwater Analytical Parameters

Based upon the Phase II ESA results, IWM Consulting is utilizing the analytical requirements for gasoline for the remediation, investigation, and monitoring activities. The analytical suite was identified using the IDEM RCG Table of Potential Petroleum Contaminants, as updated June 21, 2012 and the corresponding UST Closure Assessment Guidelines. Consequently, the following analytical methods will be utilized during the course of this project:

Gasoline UST System Confirmation & Monitoring Samples

- VOCs (including methylnaphthalenes, naphthalene, and lead scavengers) using SW-846 Method 8260 (soil and groundwater)
- Lead scavengers EDB & 1,2-Dibromo-3-chloropropane (DBCP), low level analysis using SW-846 Method 8011 (groundwater only)
- Total lead using SW-846 Method 6010 (soil and groundwater)
- Dissolved lead using SW-846 Method 6010 (groundwater only)
- Percent moisture (soil only)

The soil and groundwater samples will be obtained in accordance with the approved Quality Assurance Project Plan (QAPP) dated March 19, 2019. It should be noted that all of the soil samples obtained for VOC analysis will be obtained in general accordance with EPA Sampling Method 5035. The soil and groundwater analytical parameters for the soil boring/monitoring well installation and subsequent groundwater sampling activities may be modified in the future based on the results of the initial compliance soil and groundwater sampling events and discussions with the IBP PM.

Gasoline UST System Removal Activities

IWM Consulting will supervise the removal of the two (2) dispenser islands, five (5) gasoline USTs (anticipated to be approximately 3,000 gallons in capacity), and all associated piping (if present). Confirmatory soil samples will be obtained from the base of each UST, the sidewalls of the UST



excavation, and along the underground piping runs and fuel dispenser islands in accordance with IDEM UST Closure Site Assessment Guidelines, as updated June 21, 2012. IWM Consulting anticipates obtaining ten (10) confirmatory base soil samples, six (6) confirmatory sidewall soil samples, and six (6) confirmatory soil samples from the piping runs and fuel dispenser islands during removal activities. The confirmatory soil samples and groundwater sample (if encountered) will be analyzed per the gasoline UST system analytical suite.

Targeted Source Removal (Soil Excavation) Activities

Up to 1,500 tons of petroleum-impacted soils are anticipated to be over-excavated from within and adjacent to the gasoline UST cavity and fuel dispenser islands and in any other areas beneath the Site which are determined to be adversely impacted with petroleum hydrocarbons. The soil will be excavated, transported, and disposed as special waste at Randolph Farms Landfill located in Modoc, Indiana. The objective of the over-excavation activities is to remove as much of the adsorbed petroleum hydrocarbons beneath the Site in order to obtain an NFA designation from the IDEM and/or to eliminate the possibility of any further leaching of the petroleum-impacted soil into the underlying groundwater table. Due to the fact that limited environmental assessment activities have occurred at the Site to date, the exact dimensions of the excavation area(s) are not known. IWM Consulting will work closely with the IBP PM regarding the excavation limits and the amount of petroleum-impacted soil which requires removal.

Confirmatory soil samples will be obtained at the conclusion of the over-excavation activities at a rate of approximately one (1) sample per every 20 linear feet along the sidewalls and one (1) sample for every 400 square feet along the base of the excavation(s). The confirmatory soil samples will be analyzed in accordance with the associated analytical suites in that area.

The UST cavity and over-excavation area(s) will be backfilled with general fill material (granular fill material such as pit run) compacted to the extent possible with the excavation equipment, and the excavation will be brought up to grade using 4-6-inches of 53-crushed stone.

Groundwater Remediation Activities

If petroleum-impacted groundwater is encountered during the UST removal and/or over-excavation activities some or all of the groundwater may be removed from the excavation(s) by a commercial vacuum truck and disposed offsite at an approved wastewater recycling facility. IWM Consulting may implement an in-situ groundwater remediation program in the area of the Site adversely impacted with dissolved petroleum hydrocarbons via the application of 1,000-lbs of ORC in the over-excavation area(s). The ORC would supply an oxygen source over the next 6-9 months and accelerate the subsurface petroleum attenuation activities. It should be noted that the groundwater removal and ORC remediation program will not be initiated until after the IBP PM has approved this supplemental groundwater remediation approach.



The remediation activities are scheduled to start on April 22, 2019. IWM Consulting will also obtain approval from the IBP PM for this RWP prior to initiating the field work. At the conclusion of the field work, a RWPI Report will be submitted to the IBP PM.

Quality Assurance/Quality Control Sampling

One (1) duplicate sample and one (1) matrix spike/matrix spike duplicate (MS/MSD) sample per matrix and analytical parameter will be obtained during the remediation activities at a rate of one (1) sample per every twenty (20) confirmatory samples. Trip blanks (water) will also be submitted for VOC analysis.

Proposed Post Remediation Assessment and Monitoring

Following the remediation activities, IWM Consulting will work with the IBP PM regarding a limited subsurface investigation in order to delineate any remaining subsurface contamination. The limited subsurface investigation will incorporate the installation of soil borings for collection of one time soil and groundwater samples. Based upon those results, a groundwater monitoring well network may need to be installed to monitor the groundwater beneath the Site post source removal activities.

Soil Boring Installation Activities

Prior to initiation of the limited subsurface investigation, a Sampling and Analysis Plan (SAP) will be prepared and submitted to the IBP PM for review and approval and all onsite and offsite underground utilities will be located and marked via IUPPS.

IWM Consulting anticipates on installing up to ten (10) soil borings (GP-1 through GP-10) and one time soil and groundwater samples will be obtained from each boring location. The soil borings will be installed utilizing the direct push drilling technology, continuously sampled every 2 feet, and extend to depths approximating 16 feet bgs.

Up to two (2) soil samples and one (1) groundwater sample will be obtained and submitted for laboratory analysis from each boring location. The soil and groundwater samples will be analyzed per the gasoline analytical suite. Additionally, the three (3) water samples exhibiting the highest VOC analytical concentration will also be analyzed for low level lead scavengers using SW-846 Method 8011. The VOC soil samples will be obtained in general accordance with EPA Sampling Method 5035M.

Both the soil and groundwater sample analytical results will be compared to the appropriate IDEM RCG Screening Levels. The results of the subsurface investigation will be summarized in a standalone Subsurface Investigation Report or, if feasible and per IBP PM approval, included in the RWPI Report.

Monitoring Well Installation Activities

Upon receipt and review of the limited subsurface investigation results, IWM Consulting will supervise the installation of up to four (4) 2-inch diameter monitoring wells at the Site (MW-1 through MW-4) in



order to monitor the groundwater conditions on a long term basis (8 calendar quarters). The monitoring wells will be installed and developed by an Indiana licensed well driller. All of the monitoring well borings will be advanced with 4.25-inch inside diameter hollow stem augers or 3.5-inch inside diameter direct push rods prior to installing the monitoring wells. Soil cuttings and purge water generated during monitoring well installation and groundwater sampling activities will be containerized onsite for subsequent disposal at an approved facility.

Based upon the Phase II ESA, IWM Consulting has assumed that the monitoring wells will be installed to approximate depths of up to 16 feet bgs or less. The screens of the monitoring wells will intersect the first aquifer encountered and IWM Consulting anticipates that the wells will be constructed with approximately 10-feet of 2-inch diameter PVC factory slotted 0.010-inch screen (potentially pre-packed screen). No. 5 silica sand will be manually installed and extend to at least 1-foot above the well screen interval (pre-packed wells will have the additional 1-foot manually installed only). Then a minimum 2-foot thick bentonite chip seal will be placed immediately above the sand interval. The monitoring wells will be completed with a flush mounted protective cover (locking manhole cover) and associated concrete pad.

The exact locations of the monitoring wells have not been determined at this point. However, it is likely that the monitoring well(s) may be installed in recently over-excavated areas of the Site or in areas that correspond with the recently installed soil borings (GP-1 through GP-10). Consequently, IWM Consulting has assumed that all of these well borings will be blank drilled during the installation activities. IWM Consulting will gain approval from the IBP PM prior to finalizing the monitoring well locations.

Once the monitoring wells have been installed, IWM Consulting personnel will survey the TOC elevation of each groundwater monitoring well to the nearest one-hundredth (1/100) of a foot in order to assist in developing a Site-specific groundwater flow direction and gradient. Additionally, IWM Consulting personnel will map the exact locations of the monitoring wells with a GPS unit.

Quarterly Groundwater Sampling & Reporting

IWM Consulting personnel will conduct quarterly groundwater sampling activities at the Site for a maximum of (8) calendar quarters. This information will be utilized to determine long term dissolved hydrocarbon trends at the Site. Depth to groundwater measurements and groundwater samples will be obtained from the future monitoring well network during each site visit. The groundwater samples will be collected using low-flow sampling techniques. Purge water generated during groundwater sampling activities will be containerized within 55-gallon steel drums stored onsite for subsequent disposal at an approved facility.

A portable bladder pump in conjunction with an YSI 556 MPS Multi-Probe Field Meter or equivalent will be used to collect groundwater samples from the monitoring wells. The pump is equipped with a disposable bladder sleeve that is exchanged between wells. Dedicated tubing will be used for each well. The Multi-Probe Field Meter included probes for temperature, pH, specific conductance, dissolved



oxygen, and oxidation-reduction potential. Purge rates will be established to insure minimal drawdown. Minimal drawdown is defined as being less than 0.33 feet of drawdown during a purge cycle. Water levels will be monitored continuously in each monitoring well during the purging cycle.

Field parameters will be measured continuously, and groundwater samples will be collected after the field parameters have stabilized or after a maximum of 1 hour of purge time. Care will be taken to ensure that the bladder pump discharge tubing and flow through cell have evacuated several volumes of water before the samples are obtained. Groundwater stabilization criteria which will be utilized during the purging activities are listed below:

- pH ± 0.1 pH units
- Specific Conductance $\pm 3\%$ of reading
- Dissolved Oxygen $\pm 10\%$ of reading or $+ 0.2$ mg/L
- ORP ± 10 millivolts

The groundwater samples will then be collected from the monitoring wells and placed into the appropriate laboratory provided pre-labeled jars. The groundwater samples will be analyzed per the gasoline analytical suite. All of the groundwater samples will be submitted to a certified laboratory utilizing a standard two-week turnaround and Level II QA/QC.

The initial groundwater sampling event will analyze groundwater from each well for low level concentrations of lead scavengers using SW-846 Method 8011. If no lead scavengers are identified during this sampling event, IWM Consulting will request from the IBP PM that no further quarterly sampling and analysis for low level lead scavengers be performed.

Per the QA/QC guidelines outlined in the RCG, one (1) duplicate groundwater sample and one (1) MS/MSD groundwater sample will also be obtained during the first and last quarterly groundwater sampling events and analyzed for each analytical parameter. One (1) trip blank will also be submitted for VOC analysis.

Per the QA/QC guidelines outlined in the RCG, one (1) duplicate groundwater sample will also be obtained during the second through seventh quarterly groundwater sampling events and analyzed for each analytical parameter. One (1) trip blank will also be submitted for VOC analysis.

Reporting

The results of the subsurface investigation, subsequent monitoring well installation activities, and initial quarterly groundwater sampling activities will be summarized in the first quarterly groundwater monitoring report.

IWM Consulting will also prepare up to seven (7) quarterly groundwater sampling reports summarizing the subsequent groundwater sampling activities. The last report is anticipated to request that the IBP PM



assign the Site a NFA designation. IWM Consulting will then contract with an Indiana licensed well driller to perform well abandonment activities once the Site is assigned an NFA designation.

Proposed Timeline

IWM Consulting anticipates the following timeline in relationship to completing this project:

Proposed Timeline Chesterfield Homes Property Chesterfield, IN		
<i>Task</i>	<i>Estimated Timeline</i>	<i>Comments</i>
Submittal of QAPP/RWP/HASP	March 19, 2019	
Initiate field work for UST Removal, Soil Excavation and (if necessary) ORC Injection Activities	April 22, 2019	Estimate 8 days to complete soil excavation. Estimate 1 day to complete ORC injection.
Submittal of SAP	May 1, 2019	
Subsurface Investigation	May 1, 2019	Estimate 1 day to complete the subsurface investigation.
Submittal of RWPI and Subsurface Investigation Reports	August 15, 2019	These reports may be combined if feasible and with IBP PM approval.
Monitoring Well Installation/Quarterly Monitoring Initiated	June 24, 2019	Estimate 1 day to complete the monitoring well installation.

IWM Consulting appreciates the opportunity to provide the Indiana Brownfields Program with this RWP. If you have any questions regarding this transmittal, please contact the undersigned at 317-347-1111.

Sincerely,

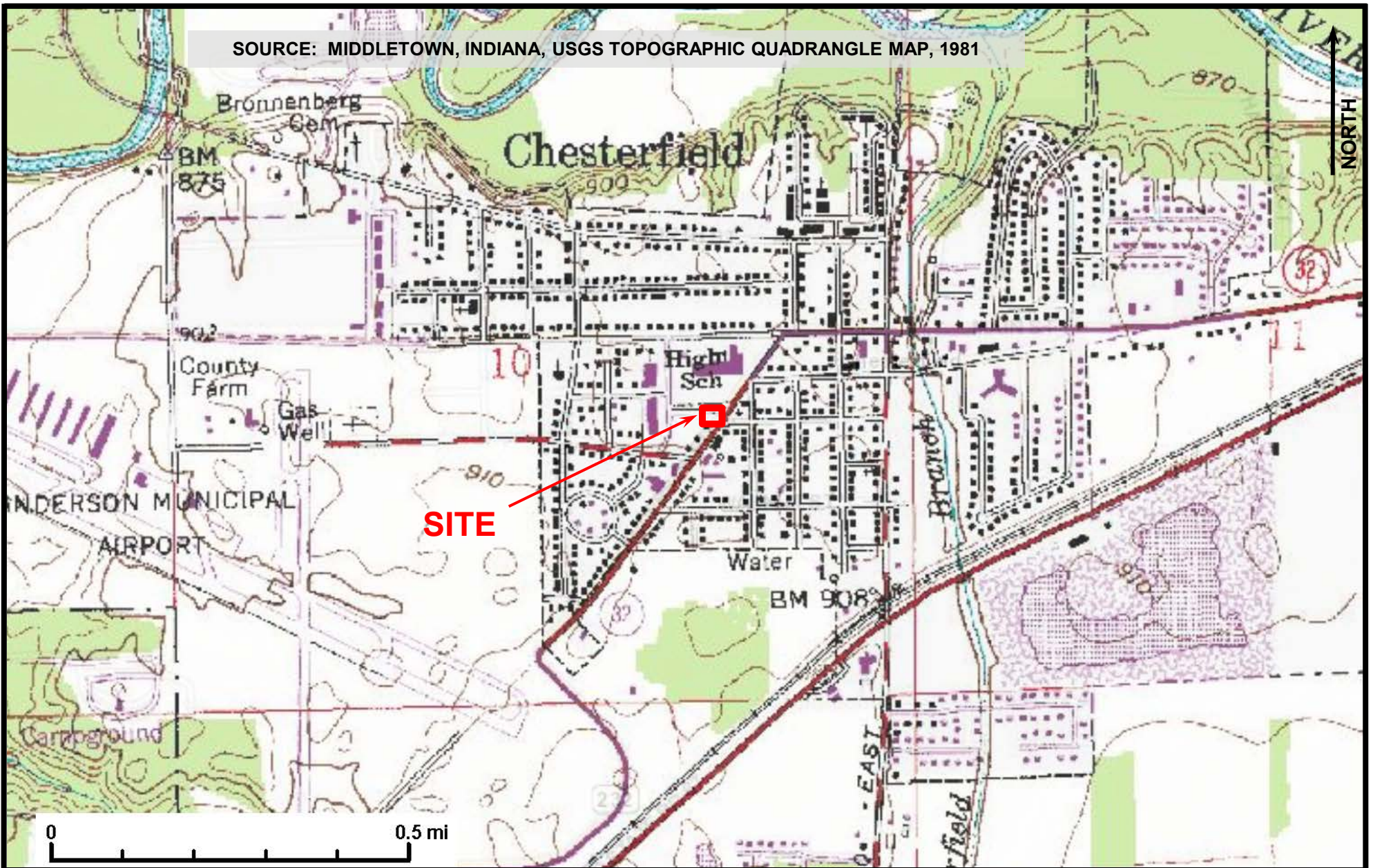
IWM CONSULTING GROUP, LLC

Christopher R. Newell, LPG #2397
 Project Manager



FIGURES

SOURCE: MIDDLETOWN, INDIANA, USGS TOPOGRAPHIC QUADRANGLE MAP, 1981



7428 Rockville Road
Indianapolis, IN 46214
(317) 347-1111
Fax: (317) 347-9326

TITLE **FIGURE 1 – Site Location Map
CHESTERFIELD HOMES PROPERTY
201 Anderson Road
Chesterfield, Madison County, Indiana**

CLIENT **INDIANA BROWNFIELDS PROGRAM
INDIANAPOLIS, INDIANA**

Project	Task	Size	Date
IN19013	01	A	03/14/2019

N. FEDERAL WAY

S. FEDERAL WAY

CHESTERFIELD UNION
TOWNSHIP FOOD PANTRY

MILLCREEK PARK

PARKING

COMMERCIAL
PARKING

GRASS

GRASS

PARKING LOT

GRASS

COMMERCIAL

PLUM STREET

GRASS

RESIDENTIAL

GRASS

COMMERCIAL
PARKING

GRASS

VP-GP1

VP-GP5

VP-GP10

FUEL ISLAND

VP-GP2

VP-GP4

VP-GP6

UST AREA

VP-GP3

FUEL ISLAND

VP-GP9

VP-GP8

VP-GP7

POTENTIAL WASTE OIL UST

FORMER BUILDING

FORMER SERVICE BAY

FORMER SERVICE BAY

OPENING

TILES

ANDERSON ROAD

VINE STREET

RESIDENTIAL

RESIDENTIAL

GRASS

RESIDENTIAL

COMMERCIAL

GRASS

LEGEND

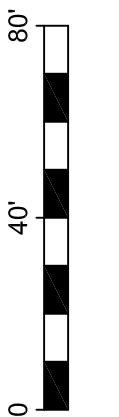
--- PROPERTY LINE
● SOIL BORING



CHESTERFIELD HOMES PROPERTY
201 ANDERSON RD.
CHESTERFIELD, INDIANA

DRAWN BY: C. NEWELL
DATE: 06/14/2016
REVISED: 03/19/2019
INI19013
#SITE MAP.DWG

FIGURE 2
SITE MAP



APPENDIX A
HEALTH AND SAFETY PLAN



SITE HEALTH AND SAFETY PLAN

PREPARED FOR:

**Chesterfield Homes Property
201 Anderson Road
Chesterfield, Madison County, Indiana**

PREPARED BY:

**IWM Consulting Group, LLC
7428 Rockville Road
Indianapolis, Indiana**

Project No. IN 19013

March 19, 2019

(Project Start Date)

Ongoing

(Project End Date)

Approved By:

Mandy Hall

(Print Name)

Office H&S Coordinator

(Title)

Mandy Hall

(Signature)

3/18/2019

(Date)

Chris Newell

(Print Name)

Project Manager

(Title)

Chris Newell

(Signature)

3/18/2019

(Date)

Purpose: This document defines the Health and Safety considerations for the on-site management activities by IWM personnel and contractors. This document is required by IWM policies and programs and OSHA 29 CFR 1910.120. The basic requirements for the health and safety of the project workers are delineated in the IWM Health and Safety procedures. All personnel on-site will be informed about the pertinent sections of the Health and Safety Plan.

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- APPENDIX F HEALTH AND SAFETY PLAN SIGN-OFF LOG**
- APPENDIX G HOSPITAL AND/OR LOCAL MEDICAL PROVIDER MAPS**

I. TYPE OF PROJECT

Check appropriate categories (more than one may apply):

- | | |
|---|--|
| <input type="checkbox"/> Tank Decontamination | <input type="checkbox"/> Geophysical/GPR Survey/Utility Locating |
| <input checked="" type="checkbox"/> Tank Excavation and Removal | <input checked="" type="checkbox"/> ORC Application |
| <input checked="" type="checkbox"/> Soil Excavation | <input checked="" type="checkbox"/> Drilling/Soil Sampling |
| <input type="checkbox"/> Filter Press Operation/Dewatering | <input checked="" type="checkbox"/> Groundwater Gauging/Sampling |
| <input type="checkbox"/> Drum Sampling & Management | <input checked="" type="checkbox"/> Well Abandonment |
| <input checked="" type="checkbox"/> Other | <input type="checkbox"/> Other |

Confirmation soil sampling and
groundwater sample from excavation

A. Scope of Work

(Detailed description of project, including types of major equipment to be used, quantities of material to be managed, contaminants, number of specific job locations, (i.e., number of tanks, number of wells, sumps, etc.).

Underground Storage Tank (UST) Removal, Soil Excavation, and Remediation Activities- UST removal/soil excavation/backfilling/and tank cleaning to be completed by representatives from SCS Environmental Contractors. Application of up to 1,000-lbs of ORC. Equipment used includes backhoe, cutting saw, drilling unit, injection equipment.

- 1) Oversee the removal/excavation/backfilling/tank cleaning activities for five (5) 3,000-gallon gasoline USTs and two (2) dispenser islands
- 2) Collect appropriate number of confirmatory and QA/QC soil samples for the applicable analyses.
- 3) Oversee the over-excavation of up to 1,500 tons of petroleum-impacted soils.

Well Installation and Groundwater Sampling Activities-

- 4) Oversee sub-surface investigation which includes the installation of ten (10) soil borings and up to four (4) monitoring wells.
- 5) Collect appropriate number of confirmatory and QA/QC soil samples for the applicable analyses.
- 6) Conduct quarterly groundwater gauging and sampling activities.

The work activities will be completed on-site. Off-site work is not applicable for this project.

Appendix A contains a site map(s), which indicates the subject site location, facility layout, work zones, evacuation routes, and other pertinent information for this HASP.

B. Site Location Information

The vacant property (former gasoline service station) is a 0.8066-acre site consisting of a former building foundation and two former fuel pump dispenser islands. The western portion of the site consists of vegetative cover (trees and grass). The site is located at 201 Anderson Road on the southwest corner of the intersection of Plum Street and Anderson Road, Chesterfield, Indiana (Madison County). The site can be accessed from the east off of Anderson Road and from the north off of Plum Street. The subject site is broken into five (5) parcels owned by four (4) separate entities. Parcels 266 and 269 are owned by Brent T. Shepherd, parcel 268 is owned by Brent T. Shepherd and Tom Shepherd, parcel 267 is owned by 95 TCI, and parcel 270 is owned by Messiah Samy.

Site History

The subject site is situated in a mixed residential/commercial area in the center of Chesterfield, Indiana. IWM Consulting performed a Phase I Environmental Site Assessment (ESA) at the Site in June 2016. Based on standard historical sources, the Phase I ESA discovered that the subject property was used for agricultural purposes or residential prior to 1960s. The site was developed as a gasoline service station in 1961. A gasoline service station utilized the site through 1977. The site was utilized as an auto repair facility from 1977 to 1983. According to Mr. Tom Shepherd, the property owner, used oil from the auto repair facility may have been stored in an above ground storage tank (AST) as opposed to an UST; however, he was not 100% certain. Gasoline USTs utilized in the northwest quarter of the site were reportedly emptied and filled with sand in 1977. The site has remained vacant since 1983. According to Mr. Shepherd, soil and groundwater samples were collected from the median north of the site when the school playground (located adjacent north of the site) was developed in 1990 or 1991. One soil sample collected from the median revealed impacted soil.

The Phase I ESA identified *Recognized Environmental Conditions (RECs)* in connection with the subject property and recommended that a geophysical survey and soil and groundwater investigations be conducted to further evaluate the aforementioned *RECs*.

Area of Concern

The Phase I ESA identified the following *RECs* in connection with the subject property:

1. A gasoline filling station was located on the site from the 1960s to the 1970s. Details of the operations at the filling station were not available, and no documentation is available concerning the disposition of USTs associated with the filling station. Mr. Tom Shepherd, the primary site owner, said the USTs (reportedly only containing gasoline) were emptied and filled with sand in the late 1970s, but he has no documentation regarding the UST closure. Furthermore, Mr. Shepherd said a soil sample collected from the median north of the site on Plum Street in approximately 1990 or 1991, revealed petroleum impacted soil just north of the site. Additional investigation is necessary to determine the current status of the USTs from the filling station and to determine if the operations at the filling station adversely impacted soil and groundwater beneath the site.
2. An auto repair facility occupied the site from the late 1970s through 1983. Additional investigation is necessary to determine if soil and/or groundwater were adversely impacted by *hazardous substances* and/or *petroleum products* typically utilized in auto repair operations.

The Phase I ESA recommended that soil and groundwater investigations be conducted to further evaluate the aforementioned *RECs*. The Phase I ESA also recommended that a geophysical survey be conducted to identify whether additional USTs, sumps, or other features are present on the subject property, and that

the existing identified UST system(s) be properly closed in accordance with applicable regulations. No subsurface investigations are known to have been performed at the subject site. IWM Consulting subsequently performed a Phase II ESA in order to evaluate the presence of volatile organic compounds (VOCs), poly aromatic hydrocarbons (PAHs) and lead in the subsurface of the site. The objective of the Phase II ESA was to determine whether the subject property had been impacted by historical on-site activities/operations.

Based upon the historical information obtained regarding the subject site, the following potential contaminants of concern were characterized during the Phase II site assessment activities:

- Gasoline (leaded/unleaded), diesel and/or oil { VOCs and PAHs }
- Lead

Based upon the analytical results from the Phase II investigation, it appears historical releases of petroleum hydrocarbons from the USTs have adversely impacted limited areas of the site, predominantly located in the areas near the UST cavity and northern most fuel dispenser. Because of these results, IWM Consulting recommends that the USTs and associated piping runs be removed from the site, along with limited over-excavation of potential petroleum-impacted backfill or soils adjacent to these areas.

Neighborhood Description

The area surrounding the subject site can be characterized as a mixture of residential/commercial setting.

North of site:	Chesterfield Union Township Food Pantry and Millcreek Park north of Plum Street
East of site:	Residential homes east of Anderson Road
South of site:	Residential homes
West of site:	Commercial and Residential homes

Topography and Site Access

The subject site and surrounding area is relatively flat. The primary access points to access the site are from the north off of Plum Street and from the east off of Anderson Road.

Additional Information

The following key documents are available for the subject site:

- *Phase I Environmental Site Assessment Report*, IWM Consulting Group, LLC, June 29, 2016
- *Phase II Environmental Site Assessment Report*, IWM Consulting Group, LLC, June 9, 2017

II. HAZARD EVALUATION

A. **Physical Hazards** (trenches, utilities, noise, biological, etc.) Check appropriate categories (more than one may apply):

- | | |
|---|--|
| <input type="checkbox"/> Auto and Plant Traffic | <input checked="" type="checkbox"/> Uneven Terrain |
| <input checked="" type="checkbox"/> Slip and Fall | <input type="checkbox"/> Trenches |
| <input checked="" type="checkbox"/> Overhead Utilities | <input checked="" type="checkbox"/> Noise |
| <input checked="" type="checkbox"/> Underground Utilities | <input type="checkbox"/> Explosion |
| <input type="checkbox"/> Biological | <input checked="" type="checkbox"/> Drilling Equipment |
| <input type="checkbox"/> Other: (Describe below) | |

Appendix B contains copies a hazard evaluation for each task that summarizes work tasks, associated risks and hazards, and control measures.

B. Chemical Hazards

Based upon the site history and the Phase II ESA completed in 2017, the most likely contaminants to be present on-site would be gasoline, diesel, oil and/or lead. Based upon investigations of sites with similar histories the most likely chemicals to be encountered from these groups of contaminants (VOCs, PAHs, and lead) are listed below along with the primary hazards of each chemical. The primary hazard of each are identified below.

Tasks: Soil and Ground-Water Sampling, Well Installation, And Similar Tasks					
Potential Chemicals of Concern	Possible Affected Media	Exposure Routes ¹	PELs ² (ppm)	IDLHs ³ (ppm)	Simple Risk Analysis
Common VOCs					
Benzene	Soil, Groundwater	Inh, Ing, Con	1	500	Low
Ethylbenzene	Soil, Groundwater	Inh, Ing, Con	100	800	Low
Toluene	Soil, Groundwater	Inh, Ing, Con	200	500	Low
Xylenes (Total)	Soil, Groundwater	Inh, Ing, Con	100	900	Low
Methyl-tert-butyl ether (MTBE)	Soil, Groundwater	Inh, Ing, Con	50	NE	Low
sec-Butylbenzene	Soil, Groundwater	Inh, Ing, Con	NE	NE	Low
n-Propylbenzene	Soil, Groundwater	Inh, Ing, Con	NE	NE	Low
1,2,4-Trimethylbenzene	Soil, Groundwater	Inh, Ing, Con	25	NE	Low
1,3,5-Trimethylbenzene	Soil, Groundwater	Inh, Ing, Con	25	NE	Low
Common PAHs					
Naphthalene	Soil, Groundwater	Inh, Ing, Con	10	250	Low
1-Methylnaphthalene	Soil, Groundwater	Inh, Ing, Con	NE	NE	Low
2-Methylnaphthalene	Soil, Groundwater	Inh, Ing, Con	NE	NE	Low
Anthracene	Soil, Groundwater	Inh, Ing, Con	0.2 ⁴	80 ⁴	Low
Benzo(a)anthracene	Soil, Groundwater	Inh, Ing, Con	0.2 ⁴	80 ⁴	Low
Benzo(a)pyrene	Soil, Groundwater	Inh, Ing, Con	0.2 ⁴	80 ⁴	Low
Benzo(g,h,i)perylene	Soil, Groundwater	Inh, Ing, Con	0.2 ⁴	80 ⁴	Low

Tasks: Soil and Ground-Water Sampling, Well Installation, And Similar Tasks					
Potential Chemicals of Concern	Possible Affected Media	Exposure Routes ¹	PELs ² (ppm)	IDLHs ³ (ppm)	Simple Risk Analysis
Common Heavy Metals					
Lead	Soil, Groundwater	Inh, Ing, Con	0.05 ⁴	100 ⁴	Low

NE denotes not established/not available.

- 1 Inhalation (Inh), ingestion (Ing), and dermal and/or eye contact (Con).
- 2 OSHA Permissible Exposure Limits (PELs) in ambient air per 8-hour work day per 40-hour week, unless otherwise noted. PELs obtained from MSDS and/or online sources. Recommended Exposure Limits (REL), or Threshold Limit Value (TLV) values used where noted.
- 3 NIOSH Immediately Dangerous to Life or Health Concentration (IDLH).
- 4 TWA in mg/m³.

Common Symptoms of exposure include: Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; and/or liver injury.

First aid step following exposure include: irrigate and/or water flush immediately, soap wash immediately, seek medical attention immediately, move to fresh air and/or artificial respiration (as applicable).

Appendix C contains copies of Material Safety Data Sheets (MSDSs) and/or other public health statements for the expected Contaminants of Concern (COC).

C. Medical Monitoring

Has the entire crew received baseline physicals? YES NO

If No, why not? Not applicable.

List any special tests required and frequency: None required.

III. MANPOWER

A. IWM Personnel Requirements

Crew Personnel	Crew Size	Names
Project Manager	1	Chris Newell
H&S Officer	1	Mandy Hall
Geologist/Engineer	1	Chris Newell or Chris Parks
Field Technicians	1-3	IWM - Various
Other	NA	

B. Subcontractor Requirements

Repeat section B as necessary for each subcontractor to be utilized.

Subcontractor Information:

Name: SCS Environmental Contracting
 Address: 7120 Venture Lane, Fort Wayne, Indiana 46818
 Contact Info: Corey Fogle (260) 497-9006

Scope of Work: UST Removal and Excavation
 Training Required: 40-Hour HAZWOPER; Annual 8-Hour Refreshers

Each subcontractor must provide documentation of training at a minimum.

Has the contractor been pre-qualified? YES NO N/A

If the subcontractor is not pre-qualified, has a pre-qualification package and contract approval been submitted to the regional manager? Yes No N/A

If NO, who has authorized the use of the subcontractor? Not Applicable

Has subcontractor received training? Yes No N/A

Has training been documented? Yes No N/A

If NO, why? Not Applicable

Subcontractor Information:

Name: Strata Environmental Contractors
Address: 3445 West 250 North, Anderson, Indiana 46011
Contact Info: Michael Todd (765) 602-3334

Scope of Work: Geoprobe drilling
Training Required: 40-Hour HAZWOPER; Annual 8-Hour Refreshers

Each subcontractor must provide documentation of training at a minimum.

Has the contractor been pre-qualified? YES NO N/A

If the subcontractor is not pre-qualified, has a pre-qualification package and contract approval been submitted to the regional manager? Yes No N/A

If NO, who has authorized the use of the subcontractor? Not Applicable

Has subcontractor received training? Yes No N/A

Has training been documented? Yes No N/A

If NO, why? Not Applicable

Subcontractor Information:

Name: Seratech Drilling & Exploration, LLC
Address: 3410 Mishawaka Avenue, South Bend, IN 46615
Contact Info: Nivas Vijay (574) 360-0961

Scope of Work: Geoprobe drilling
Training Required: 40-Hour HAZWOPER; Annual 8-Hour Refreshers

Each subcontractor must provide documentation of training at a minimum.

Has the contractor been pre-qualified? YES NO N/A

If the subcontractor is not pre-qualified, has a pre-qualification package and contract approval been submitted to the regional manager? Yes No N/A

If NO, who has authorized the use of the subcontractor? Not Applicable

Has subcontractor received training? Yes No N/A

Has training been documented? Yes No N/A

If NO, why? Not Applicable



IV. EQUIPMENT

A. Check Equipment Needed Below. More than one may apply.

- Drill Rig
 Excavators
 Skid Loaders
 Vacuum Tanker
 Torches
 Jackhammer
 Pumps
 Other: (Describe below)
Geophysical/GPR Survey equipment
- Geoprobe Rig
 Dump Trucks
 Fork Trucks
 Man Lift
 Chop Saws/Chain Saws
 Compressor/Compressed Air

Is any special training required? 40-Hour OSHA

Is any task being performed for which an SOP is in place? Yes No N/A

If YES, list SOP training below:

Task	Applicable?	Training Required?	Training Completed?
Locating Utilities	Yes	Yes	Yes
Trenching & Excavating	Yes	Yes	Yes
Confined Space Entry	No		
Grounding & Bonding	No		
Line Breaking	No		
Lockout/Tagout/Tryout	No		
Labelling	No		
Pressure Washer Operation	No		
Container Management	No		
Heavy Equipment Decontamination	No		
Scrap Metal Decontamination	No		
PCB Wipe Sampling	No		
Manifesting Procedures	No		

Task	Applicable?	Training Required?	Training Completed?
Vacuum Truck Operation	No		
Operation of Squeeze Filter Presses	No		
Project File Management	No		
Scaffolding	No		
Mundutank Setup	No		

V. LEVELS OF PERSONAL PROTECTION

A. Special protective equipment for each level of protection is as follows:

Level A

- Fully-encapsulating chemical resistant suit
- Pressure demand atmosphere supplying respirator
- Inner chemical resistant gloves
- Radio communications
- Chemical resistant safety boots/shoes
- Disposable gloves and boot covers
- Cooling Unit¹
- Coveralls¹
- Hard hat¹

Level B

- Chemical resistant, protective clothing
- Pressure demand atmosphere supplying respirator
- Inner and outer chemical resistant gloves
- Radio communications
- Chemical resistant safety boots/shoes
- Disposable and boot covers¹
- Long cotton underwear¹
- Coveralls¹
- Hard hat, face shield¹

Level C

- Chemical resistant, protective clothing
- Full face piece air purifying respirator
- Inner and outer chemical resistant gloves
- Chemical resistant safety boots/shoes
- Disposable gloves and boot covers¹
- Escape mask¹
- Long cotton underwear¹
- Coveralls¹
- Hard hat, Face shield¹

Level D

- Inner and outer chemical resistant gloves
- Chemical resistant safety boots/shoes
- Safety glasses or goggles
- Hard hat
- Ear plugs¹
- Escape mask¹
- Coveralls¹
- Face shield¹

¹ Optional.

Safety boots are required on all sites, without respect to the work being performed. Hardhats are required during well installation, construction, drilling and when other overhead hazards are present. Earplugs are required during drilling, jackhammering, and during other such loud activities. In addition, safety glasses and safety vests are advised (and may be required) during gauging and/or sampling activities.

B. Check equipment needed below.

Complete the following form for each work task. Note: this page may be duplicated for separate work tasks.

1. Task Description: UST Removal and Excavation Oversight

2. Level of Protecting Required: Level A Level B Level C Level D

3. Respiratory Protection Required:

Air Purifying

Supplied Air

- | | |
|---|--|
| <input type="checkbox"/> Full/Half Mask (circle one if applicable) | <input type="checkbox"/> SCBA |
| Cartridge Type (e.g., magenta for asbestos) | <input type="checkbox"/> Airline |
| <input type="checkbox"/> Dust Mask | <input type="checkbox"/> Escape Bottle |
| <input checked="" type="checkbox"/> Respiratory Protection Not Required For This Task | |

Breathing air certificate on file? Yes No N/A

If No, breathing air tested? Yes No N/A

Explain: _____

4. Protective Clothing Required:

- | | | |
|---|---|--|
| <input type="checkbox"/> Tyvek | <input type="checkbox"/> Hooded | <input type="checkbox"/> Sewn Seam |
| <input type="checkbox"/> Polytyvek | <input type="checkbox"/> Hooded | <input type="checkbox"/> Sealed Seam |
| <input type="checkbox"/> Saranex/CPF | <input type="checkbox"/> Hooded | <input type="checkbox"/> Strapped Seam |
| <input type="checkbox"/> Proshield (polypropylene) | <input type="checkbox"/> Rain Gear (PVC) | <input checked="" type="checkbox"/> Reflective Safety Vest |
| <input type="checkbox"/> Chemical Resistant Goggles | <input type="checkbox"/> Face Shield | <input checked="" type="checkbox"/> Safety Glasses |
| <input type="checkbox"/> Tyvek Booties | <input type="checkbox"/> PVC Booties | <input type="checkbox"/> Poly Booties |
| <input type="checkbox"/> Latex (Nuke) Booties | <input type="checkbox"/> Rubber Slush Booties | <input type="checkbox"/> Leather Boots |
| <input checked="" type="checkbox"/> Steel Toed Footwear | <input type="checkbox"/> Silvershield Gloves | <input type="checkbox"/> Viton Gloves |
| <input type="checkbox"/> Butyl Rubber Gloves | <input type="checkbox"/> PVC Gloves | <input type="checkbox"/> Neoprene Gloves |
| <input checked="" type="checkbox"/> Nitrile Gloves | <input type="checkbox"/> Latex Gloves | <input type="checkbox"/> Cotton Gloves |
| <input checked="" type="checkbox"/> Leather Gloves (For Manual Handling of Equipment) | | <input checked="" type="checkbox"/> Ear Plugs/Ear Muffs |
| <input checked="" type="checkbox"/> Other (e.g., Outer Gloves): | Hardhat | |

1. Task Description: Geoprobe soil and groundwater sampling

2. Level of Protecting Required: Level A Level B Level C Level D

3. Respiratory Protection Required:

Air Purifying

Supplied Air

- | | |
|--|--|
| <input type="checkbox"/> Full/Half Mask (circle one if applicable) | <input type="checkbox"/> SCBA |
| Cartridge Type (e.g., magenta for asbestos) | <input type="checkbox"/> Airline |
| <input type="checkbox"/> Dust Mask | <input type="checkbox"/> Escape Bottle |

■ Respiratory Protection Not Required For This Task

Breathing air certificate on file? Yes No N/A
 If No, breathing air tested? Yes No N/A

Explain: _____

4. Protective Clothing Required:

- | | | |
|---|--|--|
| <input type="checkbox"/> Tyvek | <input type="checkbox"/> Hooded | <input type="checkbox"/> Sewn Seam |
| <input type="checkbox"/> Polytyvek | <input type="checkbox"/> Hooded | <input type="checkbox"/> Sealed Seam |
| <input type="checkbox"/> Saranex/CPF | <input type="checkbox"/> Hooded | <input type="checkbox"/> Strapped Seam |
| <input type="checkbox"/> Proshield (polypropylene) | <input type="checkbox"/> Rain Gear (PVC) | <input checked="" type="checkbox"/> Reflective Safety Vest |
| <input type="checkbox"/> Chemical Resistant Goggles | <input type="checkbox"/> Face Shield | <input checked="" type="checkbox"/> Safety Glasses |
| <input type="checkbox"/> Tyvek Booties | <input type="checkbox"/> PVC Booties | <input type="checkbox"/> Poly Booties |
| <input type="checkbox"/> Latex (Nuke) Booties | <input type="checkbox"/> Rubber Slush Booties | <input type="checkbox"/> Leather Boots |
| <input checked="" type="checkbox"/> Steel Toed Footwear | <input type="checkbox"/> Silvershield Gloves | <input type="checkbox"/> Viton Gloves |
| <input type="checkbox"/> Butyl Rubber Gloves | <input type="checkbox"/> PVC Gloves | <input type="checkbox"/> Neoprene Gloves |
| <input checked="" type="checkbox"/> Nitrile Gloves | <input type="checkbox"/> Latex Gloves | <input type="checkbox"/> Cotton Gloves |
| <input checked="" type="checkbox"/> Leather Gloves (For Manual Handling of Equipment) | | <input checked="" type="checkbox"/> Ear Plugs/Ear Muffs |
| <input checked="" type="checkbox"/> Other (e.g., Outer Gloves): | Hardhat; however, hardhat is only required if working in the immediate vicinity of a drill rig (i.e. within 5 or 10 feet). | |

VI. CONTAMINATION REDUCTION AND DECONTAMINATION

A. Work Zones

Describe how work zone will be set up and maintained. In high traffic areas traffic cones and/or work vehicle will be used to delineate the work area. During the UST removal and excavation, the entire site will be considered the work area. The work area for geoprobe soil and groundwater sampling will be defined as the immediate area in the vicinity of the boring location.

B. Decontamination Procedures

Personnel and equipment leaving an identified Exclusion Zone (see section VI. A. above), shall be thoroughly decontaminated.

The standard Level "C" decontamination protocol shall be used with the following decontamination approach:

- a. Wash equipment, gloves, and/or boot covers using decon wash and water rinse
- b. Remove securing tape from wrists and ankles
- c. Remove disposable Tyvek/or coverall (without boots)
- d. Remove boot covers and/or outer gloves
- e. Remove respirator face mask
- f. Remove inner gloves

For Level "D" dress-down, follow steps a, d, and f (as applicable to the equipment used/worn).

Describe personnel/equipment decontamination procedures if the procedures described above are not used or do not apply. Disposable sampling equipment and/or gloves will be removed and disposed of in a plastic trash bag.

Describe equipment decontamination procedure. Non-disposable equipment will be cleaned with analconox wash, followed by a water rinse and/or followed by a DI water rinse (if applicable).

Describe how contaminated equipment is disposed. Disposable sampling equipment and/or gloves will be removed and disposed of in a plastic trash bag.

Describe storage of usable protective equipment. Stored in gear bags.

Describe laundering procedure for uniforms. Not Applicable.

Is a locker room facility provided? Yes No

Will a decon trailer be on-site? Yes No If NO, how will crew change clothing and shower?
At home after shift.

Describe provisions for drinking water. Available locally or brought on-site in a cooler.

Describe provisions for restrooms. If not available on-site, will use local vendors.

Note: Respirator cleaning and inspection procedures may be found in the Respiratory Protection Program.

VII. SAFETY EQUIPMENT

Check the safety equipment items that will be available for, or on, the project.

- | | | |
|---|--|---|
| <input type="checkbox"/> Safety Showers | <input type="checkbox"/> Emergency Oxygen Mask | <input type="checkbox"/> Portable Eyewash |
| <input checked="" type="checkbox"/> First Aid Kit | <input checked="" type="checkbox"/> Barriers/Cones | <input type="checkbox"/> Fume Hood |
| <input type="checkbox"/> Warning Signs | <input type="checkbox"/> Air Horns | <input type="checkbox"/> Barrier Tape |
| <input type="checkbox"/> Lifeline/Harness | <input type="checkbox"/> Decon Trailer | <input checked="" type="checkbox"/> Decon Equipment |
| <input type="checkbox"/> Extraction Device | <input type="checkbox"/> Portable Lighting | <input type="checkbox"/> Ladders |
| <input type="checkbox"/> Portable Ventilation Units | <input type="checkbox"/> Air Horns | <input type="checkbox"/> Ground/Bonding Cables |
| <input type="checkbox"/> Spill Control Supplies (list): | | |
| <input checked="" type="checkbox"/> Fire Extinguishers (types & sizes): | 5 – 10 lb. ABC (In Vehicle) | |
| <input type="checkbox"/> Other (list): | | |

VIII. COMMUNICATION SYSTEMS

Describe on-site communication systems. Telephone and/or beeper, verbal communications and hand signals.

IX. AMBIENT AIR MONITORING

The following equipment will be used on-site for air monitoring.

- | | | |
|---|--|--|
| <input type="checkbox"/> Radiation Meter | <input type="checkbox"/> Combustible Gas | <input type="checkbox"/> Oxygen Meter |
| <input type="checkbox"/> Colorimetric Tubes | <input type="checkbox"/> Photo-Ionization Detector | <input type="checkbox"/> Flame-Ionization Detector |
| <input type="checkbox"/> OVA/FID | <input type="checkbox"/> H ₂ S Monitor | <input type="checkbox"/> CO Monitor |
| <input type="checkbox"/> Dust Monitor (type): | | |
| <input type="checkbox"/> Personal Monitors (describe): | | |
| <input checked="" type="checkbox"/> Ambient Air Monitoring Not Required For This Task | | |

Frequency of air monitoring. Continuously Hourly Twice daily N/A

Describe methodology and frequency of air monitoring. Not applicable

Calibration. Not applicable

List of air permits required. Not applicable

Guidelines for Air Monitoring Hazards			
Monitoring Instrument	Potential Hazards	Measurement Level	Action
GCI ¹ - % LEL ² of Combustible Gases	Explosive atmosphere in immediate work area	< 10% LEL	Investigate with caution
		> 10% LEL	Explosion hazard, leave area immediately
GCI ¹ - % Oxygen	Oxygen Concentration	< 19.5% ³	Monitor while wearing SCBA ³
		19.5% - 23.0%	Continue investigation with caution
		> 23.0%	Discontinue investigation monitoring, fire hazard potential, consult H&S Coordinator
Photo-ionization (Hnu)/ Flame-ionization (OVA) meter readings of breathing zone	Volatile Contaminants	Background to 100 ppm	Level D protection ^{4,5}
		100 to 300 ppm over background	Level C protection ^{4,5}
		300 to 500 ppm over background	Level B protection ^{4,5}
		> 500 ppm over background	Evaluate exposure source, consult H&S Coordinator ^{4,5}

¹ GCI denotes Combustible Gas Indicator.

² LEL denotes Lower Explosive Limit.

³ Note: combustible gas readings are not valid in atmospheres with < 19.5% oxygen.

⁴ Meter readings are not the sole criteria for selecting the level of protection. These are only generalized guidelines and are project specific.

⁵ Action taken are based upon sustained and/or frequent readings.

Appendix D contains site specific monitoring results (if applicable).

X. HAZARDOUS WASTE OPERATION CONTINGENCY PLAN

Generator's/Site Name: Indiana Brownfields Program (IBP)/Chesterfield Homes Property

Location, description, and route to the site: Irregular shaped lot with former building foundation and former pump dispenser islands currently unoccupied, located at 201 Anderson Road, Chesterfield, Indiana

From Interstate I-69 take exit 234 and proceed onto IN-67 North towards IN-32 North/Anderson/Muncie for 0.4 miles. Turn left on IN-67/West Commerce Road and follow Commerce Road for 0.5 miles. Turn right onto South 1000W/N 500 E. and then turn immediately left onto East SR 32/IN-32 and continue for 1.2 miles. Turn left onto Veterans Boulevard which becomes Anderson Road and continue for 0.2 miles. The site is on the southwest corner of Plum Street and Anderson Road.

Site Contact/Address: Mitchell Smith for IBP (317) 234-8833 / 100 North Senate Avenue, Room 1275

Client Project Manager: Mitchell Smith (317) 234-8833

A. Emergency Information

Police: 911 Alternate Number: Not applicable
Fire: 911 Alternate Number: Not applicable
Ambulance: 911 Alternate Number: Not applicable

Hospital Name: **Saint Vincent Anderson Regional Hospital**
Hospital Address: **2015 Jackson Street, Anderson, IN 46016**
Hospital Phone: **(765) 649-2511**

Route to Hospital: From the Chesterfield Homes Property site:

Proceed northeast (left) on Anderson Road (which becomes Veterans Boulevard) for approximately 0.2 miles.
Turn left (west) onto West Main Street (IN-32) for approximately 3 miles.
Turn left (south) onto South Scatterfield Road (IN-32/IN-109/IN-9) for approximately 1 mile.
Turn right (west) onto E. 18th Street (which becomes Ohio Avenue/IN-32) for approximately 1 mile.
Turn slightly left onto E. 14th Street/IN-32 for approximately 0.3 miles.
Turn left (south) onto Meridian for approximately 0.5 miles.
Turn right (east) just past West 20th Street.
Turn right onto Jackson Street.
Destination will be on the left.

Appendix G depicts a map to the local hospital and/or local medical providers.

Office Resources: Key Personnel Phone Numbers		
Name	Position	Phone
IWM Fort Wayne Office		260-497-9620
IWM Indianapolis Office		317-347-1111
Christopher Newell	IWM Project Manager	Ext.: 132 Direct: 317-968-9265 Cell: 765-729-4978
Mandy Hall	H&S Coordinator	Ext.: 136 Direct: 317-565-1618 Cell: 317-441-7839
Brad Gentry	Operations Manager	Ext.: 123 Direct: 317-968-9256 Cell: 317-435-8877
Mitchell Smith	IBP Project Manager	317-234-8833
IDEM Emergency Response	24 Hour Action Hotline	317-233-7745



Office Resources: Key Personnel Phone Numbers		
Name	Position	Phone
Poison Information Center		(800) 962-1253

Has a copy of the contingency plan been received by the hospital? Yes No NA

If NO, explain. Not required for the proposed work activities.

Is receipt of the contingency plan by local authorities documented? Yes No NA

If NO, explain. Not required for the proposed work activities.

Has the hospital been notified of job site activities and chemical hazards? Yes No NA

If NO, explain. Not required for the proposed work activities.

B. Evacuation Route/Emergency Procedures

See attached map in **Appendix A.**

Describe evacuation alarm procedure. Verbal warning to all immediate personnel. Follow with phone call(s) to key personnel.

Evacuation route description. Away from area of danger. See Site Map in **Appendix A.**

Assembly Area description. Assemble on west portion of the site (Site Map **Appendix A.**)

C. Safety Plan Amendments

Amendments to this HASP and Contingency Plan are maintained in **Appendix E.**

D. HASP and Contingency Plan Sign-Off

All site personnel (employees and their subcontractors) will review this HASP and Contingency Plan. This plan provides site personnel with an orientation to the job task including:

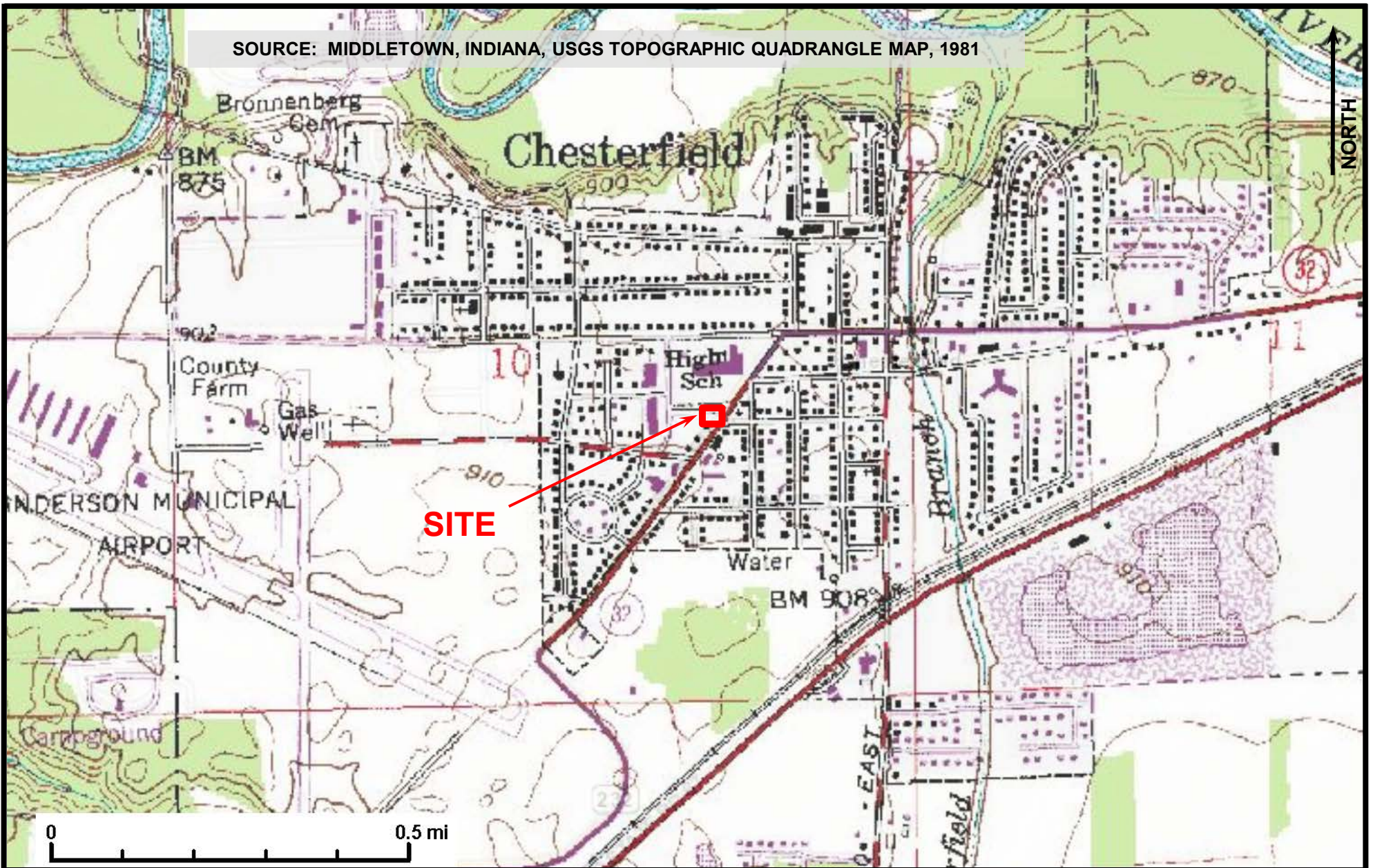
- Site Overview
- Emergency Response Procedures
- Potential Physical & Health Hazards of on-site hazardous materials
- PPE Requirements
- Site Security
 - Hazards of Confined Spaces
 - Site-specific environmental regulatory requirements

Appendix F contains a plan sign-off sheet.

APPENDIX A

SITE MAP(S)

SOURCE: MIDDLETOWN, INDIANA, USGS TOPOGRAPHIC QUADRANGLE MAP, 1981



7428 Rockville Road
Indianapolis, IN 46214
(317) 347-1111
Fax: (317) 347-9326

TITLE

**FIGURE 1 – Site Location Map
CHESTERFIELDS HOMES PROPERTY
201 Anderson Road
Chesterfield, Madison County, Indiana**

CLIENT

**INDIANA BROWNFIELDS PROGRAM
INDIANAPOLIS, INDIANA**

Project	Task	Size	Date
IN16026	01	A	03/14/2019

APPENDIX B

HAZARD ASSESSMENT/ATTACHMENTS



Job Safety Analysis Drilling/Well Installation

Principal Steps	Potential Hazards	Recommended Controls
Review H&S plan and put on PPE	Neighborhood and weather conditions, traffic	Prepare away from traffic. If weather is unsuitable for work then reschedule. Be aware of your surroundings.
Establish traffic controls	Auto traffic	Block Entrances
Make sure that utilities are marked and disconnected	Explosion, electrocution	If utilities are not marked, call in for immediate marking.
Perform Push Probe Soil Sampling	See Soil Sampling/Push Probe Sampling JSA	See Soil Sampling/Push Probe Sampling JSA: Follow Subsurface Disturbance Protocol
Perform Well Installation	Lifting Injuries, Hand Abrasions; Injuries From Equipment – Turning Augers; Loose clothing, lack of gloves, eye protection; equipment position; Falling trees, brush, slip trip fall, poison ivy.	Determine the perimeter with ground crew. Maintain eye protection, hand protection hard hat and steel toe boot requirements. All personnel must maintain proper clearance during drilling activities. Maintain proper clearance from swing radius. Operator and ground crew must be diligent of each other. Work slowly. Operator must face in the direction that the drill rig is moving. Ground personnel must stay out of the forward and reverse paths of the drill rig while moving. No one can approach the drill rig without acknowledgement from the operator. No one is to approach the drill rig while out of view of the operator.
Housekeeping	Auto traffic and drill rig, and pinch hazard for hands, debris, abrasions from debris, slip, trip and fall, back strain	Handle one container at a time. Wear safety glasses, steel toed boots, and gloves. Maintain traffic control and awareness. Work deliberately. Do not overexert yourself when lifting.
Installation of well tops and manholes.	Auto traffic and pinch hazard for hands and feet.	Maintain traffic control and awareness. Methodically seal off and lock well head. Place, lock and bolt down manhole covers.
Prepare field reports	Auto traffic and neighborhood conditions.	Complete paperwork in vehicle and away from traffic area. Maintain neighborhood awareness.
Staging Drums	Equipment injury, Back Injury, Foot injury, Hand Injury	



Job Safety Analysis
Drilling/Well Installation

Equipment to be Used	Inspection Requirements	Training Requirements
Drill Rig/Push Probe Sampler	Check hydraulics for leaks. Check condition of tracks. Check controls for proper operation. Emergency Shut offs	
Lifting cables or straps	Make sure it has sufficient load rating to carry the object; Inspect for frays prior to use	



Job Safety Analysis Soil Sampling

Principal Steps	Potential Hazards	Recommended Controls
Work Zone Set-Up	Traffic	Traffic control (barricades and/or cones) Face flow of traffic and use appropriate cones, flags, and/or tape per client and/or Handex protocols. Block off designated sampling area.
	Overhead utilities	Look up before setting up equipment, spotter
	Sharp debris in sample	Wear thick gloves
Excavation	Overhead, underground utilities	Look up/hand clear holes
	Noise	Ear plugs or ear muffs
	Debris	Hard hat, safety glasses, steel toes
Sample collection	Chemical contact with skin	Nitrile gloves
Clean Up	Traffic, slip trip fall,	See above. Be aware of surroundings and use good housekeeping methods.
	Weather	Pay attention to predicted and current weather conditions
	Hot weather	Drink plenty of fluids (preferably water and/or sports drinks) wear light colored clothing, take rest breaks when necessary
	Cold weather	Wear plenty of clothing, take breaks when necessary
	Severe weather Thunderstorms	Take shelter, lower any raised equipment,
	Tornado	Move inside building or vehicle, take appropriate shelter in building or ditch
Equipment to be Used	Inspection Requirements	Training Requirements



Job Safety Analysis Groundwater Gauging & Sampling

Principal Steps	Potential Hazards	Recommended Controls
Groundwater Gauging	<p>Auto Traffic</p> <p>Dissolved hydrocarbons on the electronic water level indicator</p> <p>Pinch (hand); debris (cuts/puncture); Biological</p>	<p>Follow Traffic Control SOP; wear Hi-Visibility safety vests; utilize buddy system; remain aware of surroundings.</p> <p>Wear appropriate PPE. Utilize decon solutions to clean water level indicator of all hydrocarbons.</p> <p>Use tools to open the well vault and clear wellhead area of debris liquids or biological hazards. Wear leather gloves while opening vault and clearing debris.</p>
Groundwater Bailing	<p>Exposure; Back Strain; Hand injury</p> <p>Spill/Splash</p> <p>Repetitive Stress</p> <p>Bailer Lodged in Well</p> <p>Slip, trip & fall; back strain</p>	<p>Use even footing on firm ground. Avoid twisting body. Stand close to and over the well. Handle rope slowly, coil rope away from feet.</p> <p>Wear nitrile gloves and eye protection.</p> <p>Ergonomics - adjust hand position to avoid repetitive motion. Take breaks.</p> <p>Do not use excessive force. Free bailer by dropping further into well and then pulling upwards.</p> <p>When transporting and disposing purge water, use proper lifting techniques and avoid twisting the body.</p>
Groundwater Sampling	<p>Breakage and acid</p>	<p>Work slowly and handle only one container at a time.</p> <p>Wear safety glasses and gloves. Inspect sample containers for cracks prior to handling and removing/installing the lid. Do not over tighten the sample container.</p>
Equipment to be Used	Inspection Requirements	Training Requirements
Electronic Water Level Indicator	<p>Inspect water level indicator to verify that there are no frayed wires or loose connections.</p>	<p>Not applicable</p>



Job Safety Analysis *Trenching and Excavating*

Principal Steps	Potential Hazards	Recommended Controls
Preparing to Trench and/or Excavate	Underground Utilities	Mark-out must be called for and performed prior to breaking ground
	Overhead Utilities	Work area must be assessed before moving heavy machinery, if overhead utilities present a hazard, operator will plan the work to avoid the lines
	Machine malfunction	Heavy machinery will be inspected before and after each use to prevent malfunction
Excavating and/or Trenching	Personal injury	<p>Employees are to wear proper PPE at all times, including ANSI approved steel toe boots, hard hat, gloves, safety vest, and safety glasses.</p> <p>Operator must wear seat belt when operating heavy equipment. Operator must be trained and certified</p> <p>No employee may enter a trench greater than foot in depth without notifying the HSO, obtaining a confined space permit, and obeying the confined space permit</p>
	Working with and near heavy machinery	<p>Spotter required to stay in the operator's field of vision at all times when digging or moving soil (spotter wearing reflective safety vest)</p> <p>Universal hand signals are to be agreed upon by operator and spotter prior to work commencing</p> <p>Work area needs to be barricaded or employee needs to be stationed to keep all other employees, pedestrians, and vehicles out of the work area</p>



Job Safety Analysis
Trenching and Excavating

	Trench collapse	<p>Keep all equipment and spoil piles at least 4 feet from the excavation</p> <p>Use planks for walking/working surfaces around the excavation to distribute the weight of equipment and employees</p> <p>No employee may enter a trench greater than foot in depth without notifying the HSO, obtaining a confined space permit, and obeying the confined space permit</p> <p>Before any work is performed in a trench (after proper CSE permit is obtained, see above), the soil must be analyzed by a competent person and the trench must be sloped or shored to OSHA specifications</p> <p>The Competent Person will make the determination if additional protective measures such as shoring or trench box will be required prior to start of work. Employees not working directly next to the trench should keep their work area away from the open hole</p>
Equipment to be Used	Inspection Requirements	Training Requirements
Excavator	Prior to start of each day	Certification
Shoring/Trench box	Regularly throughout the day and after every change in weather	Engineer approval
Hand tools	Inspect all parts of tool prior to each use	

APPENDIX C

MATERIAL SAFETY DATA SHEETS

And/Or

PUBLIC HEALTH STATEMENTS FOR COMPOUNDS OF INTEREST



Centers for Disease Control and Prevention
 CDC 24/7: Saving Lives. Protecting People.™

Search the NIOSH Pocket Guide

Enter search terms separated by spaces.

<h1>1,3,5-Trimethylbenzene</h1>					
Synonyms & Trade Names Mesitylene, Symmetrical trimethylbenzene, sym-Trimethylbenzene					
CAS No. 108-67-8	RTECS No. OX6825000 (/niosh-rtecs/OX682428.html)		DOT ID & Guide 2325 129 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx/guide129/) (http://www.cdc.gov/Other/disclaimer.html)		
Formula C ₆ H ₃ (CH ₃) ₃	Conversion 1 ppm = 4.92 mg/m ³		IDLH N.D. See: IDLH INDEX (/niosh/idlh/intridl4.html)		
Exposure Limits <small>NIOSH</small> REL : TWA 25 ppm (125 mg/m ³) OSHA PEL † (nengapdxg.html) : none			Measurement Methods OSHA PV2091 (http://www.osha.gov/dts/sltc/methods/partial/pv2091/pv2091.html) (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html)		
Physical Description Clear, colorless liquid with a distinctive, aromatic odor.					
MW: 120.2	BP: 329° F	FRZ: -49°F	Sol: 0.002%	VP: 2 mmHg	IP: 8.39 eV
Sp.Gr: 0.86	FL.P: 122° F	UEL: ?	LEL: ?		
Class II Flammable Liquid					
Incompatibilities & Reactivities Oxidizers, nitric acid					
Exposure Routes inhalation, ingestion, skin and/or eye contact					
Symptoms irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)					
Target Organs Eyes, skin, respiratory system, central nervous system, blood					
Personal Protection/Sanitation (See protection codes (protect.html)) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or			First Aid (See procedures (firstaid.html)) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately		

contaminated
Change: No recommendation

Respirator Recommendations

Not available.

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

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [1155 \(/niosh/ipcsneng/neng1155.html\)](#)

Page last reviewed: April 4, 2011

Page last updated: February 13, 2015

Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information Division

Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA 30329-4027,
USA

800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [Contact CDC-INFO](#)





SAFETY DATA SHEET

Creation Date 24-Nov-2010

Revision Date 10-Feb-2015

Revision Number 1

1. Identification

Product Name 1-Methylnaphthalene

Cat No. : AC127160000; AC127160025; AC127160050; AC127161000;
AC127165000

Synonyms Alpha-methylnaphthalene; 1-Methylnaphthalene

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company	Entity / Business Name	Emergency Telephone Number
Fisher Scientific One Reagent Lane Fair Lawn, NJ 07410 Tel: (201) 796-7100	Acros Organics One Reagent Lane Fair Lawn, NJ 07410	For information US call: 001-800-ACROS-01 / Europe call: +32 14 57 52 11 Emergency Number US :001-201-796-7100 / Europe : +32 14 57 52 99 CHEMTREC Tel. No. US :001-800-424-9300 / Europe :001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 4
Acute oral toxicity	Category 4

Label Elements

Signal Word
Warning

Hazard Statements
Combustible liquid
Harmful if swallowed



Precautionary Statements

Prevention

Wash face, hands and any exposed skin thoroughly after handling

Do not eat, drink or smoke when using this product
 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
 Wear protective gloves/protective clothing/eye protection/face protection

Ingestion

IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell

Rinse mouth

Fire

In case of fire: Use CO₂, dry chemical, or foam for extinction

Storage

Store in a well-ventilated place. Keep cool

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Toxic to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
1-Methylnaphthalene	90-12-0	97

4. First-aid measures

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.
Skin Contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention.
Inhalation	Remove from exposure, lie down. Move to fresh air. Obtain medical attention.
Ingestion	Clean mouth with water. Get medical attention.
Most important symptoms/effects	Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray. Carbon dioxide (CO ₂). Dry chemical. alcohol-resistant foam.
Unsuitable Extinguishing Media	No information available
Flash Point	82 °C / 179.6 °F
Method -	No information available
Autoignition Temperature	525 °C / 977 °F
Explosion Limits	
Upper	6.50%
Lower	.70%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Combustible material. Flammable.

Hazardous Combustion Products

Carbon monoxide (CO) Carbon dioxide (CO₂)

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full

protective gear.

NFPA

Health
2

Flammability
1

Instability
0

Physical hazards
N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Do not breathe vapors or spray mist. Avoid contact with clothing.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
1-Methylnaphthalene	TWA: 0.5 ppm Skin		

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
1-Methylnaphthalene			TWA: 0.5 ppm Skin

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Light yellow
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-22 °C / -7.6 °F
Boiling Point/Range	240 - 243 °C / 464 - 469.4 °F

Flash Point	82 °C / 179.6 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	6.50%
Lower	.70%
Vapor Pressure	No information available
Vapor Density	No information available
Relative Density	1.020
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	525 °C / 977 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C11 H10
Molecular Weight	142.2

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO ₂)
Hazardous Polymerization	No information available.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
1-Methylnaphthalene	1840 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	No information available
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
1-Methylnaphthalene	90-12-0	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure	None known
Aspiration hazard	No information available
Symptoms / effects, both acute and delayed	Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Endocrine Disruptor Information	No information available
Other Adverse Effects	The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
1-Methylnaphthalene	Not listed	Pimephales promelas: LC50=9mg/L 48h	Not listed	LC50=1.2-1.4 mg/L 48h

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

Component	log Pow
1-Methylnaphthalene	3.87

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN3082
Hazard Class 9
Packing Group III

TDG

UN-No UN3082
Hazard Class 9
Packing Group III

IATA

UN-No 3082
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.*
Hazard Class 9
Packing Group III

IMDG/IMO

UN-No 3082
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Hazard Class 9
Packing Group III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
1-Methylnaphthalene	X	X	-	201-966-8	-		X	X	X	X	-

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
1-Methylnaphthalene	X	X	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class B3 Combustible liquid
D1B Toxic materials



16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	24-Nov-2010
Revision Date	10-Feb-2015
Print Date	10-Feb-2015
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS



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2-Methylnaphthalene

General Description

Synonyms: beta-Methylnaphthalene

OSHA IMIS Code Number: M156

Chemical Abstracts Service (CAS) Registry Number: 91-57-6

NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) Identification Number: [QJ9635000](#)

Chemical Description and Physical Properties:

crystals
molecular weight: 142.21
vapor pressure: 0.068 mmHg @ 20°C
molecular formula: C₁₁H₁₀
boiling point: 241°C
melting point: 35°C

Health Factors

Potential Symptoms: Eye irritation; cough. In mice, lung damage occurs by all routes of exposure (inhalation, oral, percutaneous, parenteral)

Health Effects: Irritation-Eyes---Mild (HE-16); Potential lung damage (HE-10)

Affected Organs: Eyes, respiratory system

Notes:

1. OSHA does not have a PEL for 2-methylnaphthalene, to which workers at coke plants and refineries, as well as machine operators and aircraft engine mechanics, may be exposed. It is found in some solvents and in tobacco smoke.
2. No cases of occupational toxicity from 2-methylnaphthalene have been reported, but caution is advised due to insufficient information about human health effects.
3. Lung damage in mice is caused by the formation of reactive metabolites (by the P450 enzyme CYP2F2 in lung Clara cells) that bind covalently to lung proteins.
4. In guinea pigs, major urinary metabolites of 2-methylnaphthalene are naphthoic acid and its conjugates with glucuronic acid and glycine, within 24 hours following oral administration of a 500-mg/kg dose. Similarly, in rats injected twice with a lower dose of radiolabeled 2-methylnaphthalene (0.3 mg/kg), approximately one-third of the radioactivity in urine was identified as 2-naphthoicglycine.
5. Inhalational exposure of rats for 4 hours produced antinociception to a thermal stimulus in a concentration-dependent manner.
6. The inhalational RD₅₀ for decreasing the respiratory rate in mice by 50% (a measure of respiratory irritation) was reported to be 67 mg/m³ (12 ppm).

Literature Basis:

- International Chemical Safety Cards (WHO/IPCS/ILO): [2-Methylnaphthalene](#).
- Agency for Toxic Substances and Disease Registry (ATSDR): Toxicological profile for naphthalene, 1-methylnaphthalene and 2-methylnaphthalene. US Government Printing Office 1995-639-298, 200 pp., 1995.
- Korsak, Z., Majcherek, W. and Rydzynski, K.: Toxic effects of acute inhalation exposure to 1-methylnaphthalene and 2-methylnaphthalene in experimental animals. *Int. J. Occup. Med. Environ. Health* 11(4): 335-342, 1998.
- Melancon, M.J., Rickert, D.E. and Lech, J.J.: Metabolism of 2-methylnaphthalene in the rat in vivo. I. Identification of 2-naphthoicglycine. *Drug Metab. Dispos.* 10(2): 128-133, 1982.
- Schultz, M.A., Morin, D., Chang, A.-M., Buckpitt, A.: Metabolic capabilities of CYP2F2 with various pulmonary toxicants and its relative abundance in mouse lung subcompartments. *J. Pharmacol. Exp. Ther.* 296(2): 510-519, 2001.
- Teshima, R., Nagamatsu, K., Ikebuchi, H., Kido, Y. and Terao, T.: In vivo and in vitro metabolism of 2-methylnaphthalene in the guinea pig. *Drug. Metab. Dispos.* 11(2): 152-157, 1983.

Date Last Revised: 05/13/2005

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Chemical Sampling Information (CSI)

Search (use word(s)/phrase)

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Telephone: 800-321-OSHA (6742) | TTY

www.OSHA.gov



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Enter search terms separated by spaces.

<h1>Benzene</h1>					
Synonyms & Trade Names Benzol, Phenyl hydride					
CAS No. 71-43-2	RTECS No. CY1400000 (/niosh-rtecs/CY155CCo.html)	DOT ID & Guide 1114 130 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx/guide130/) ☒			
Formula C ₆ H ₆	Conversion 1 ppm = 3.19 mg/m ³	IDLH Ca [500 ppm] See: 71432 (/niosh/idlh/71432.html)			
Exposure Limits NIOSH REL : Ca TWA 0.1 ppm ST 1 ppm See Appendix A (nengapdx.html) OSHA PEL : [1910.1028] TWA 1 ppm ST 5 ppm See Appendix F (nengapdx.html)		Measurement Methods NIOSH 1500 ☒ (/niosh/docs/2003-154/pdfs/1500.pdf), 1501 ☒ (/niosh/docs/2003-154/pdfs/1501.pdf), 3700 ☒ (/niosh/docs/2003-154/pdfs/3700.pdf), 3800 ☒ (/niosh/docs/2003-154/pdfs/3800.pdf); OSHA 12 (http://www.osha.gov/dts/sltc/methods/organic/orgo12/orgo12.html) ☒ (http://www.cdc.gov/Other/disclaimer.html), 1005 (http://www.osha.gov/dts/sltc/methods/validated/1005/1005.html) ☒ (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) ☒ (http://www.cdc.gov/Other/disclaimer.html)			
Physical Description Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.]					
MW: 78.1	BP: 176° F	FRZ: 42°F	Sol: 0.07%	VP: 75 mmHg	IP: 9.24 eV
Sp.Gr: 0.88	Fl.P: 12° F	UEL: 7.8%	LEL: 1.2%		
Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.					
Incompatibilities & Reactivities Strong oxidizers, many fluorides & perchlorates, nitric acid					
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact					
Symptoms irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]					
Target Organs Eyes, skin, respiratory system, blood, central nervous system, bone marrow					

Cancer Site [leukemia]

Personal Protection/Sanitation (See [protection codes \(protect.html\)](#))
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See [procedures \(firstaid.html\)](#))
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations
 (See [Appendix E \(nengapdx.html\)](#))

NIOSH

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

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

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

Escape:

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

Any appropriate escape-type, self-contained breathing apparatus

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

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0015 \(/niosh/ipcsneng/neng0015.html\)](#) See MEDICAL TESTS: [0022 \(/niosh/docs/2005-110/nmed0022.html\)](#)

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Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information Division

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Chemical Sampling Information / Benz(a)Anthracene

Benz(a)Anthracene

General Description

Synonyms: Cobalt metal dust; Cobalt metal fume

OSHA IMIS Code Number: 0350

Chemical Abstracts Service (CAS) Registry Number: 56-55-3

NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) Identification Number: CV9275000

Exposure Limits

OSHA Permissible Exposure Limit (PEL):

- **General Industry:** See Coal Tar Pitch Volatiles (Benzene Soluble Fraction)

American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV): Appendix A2 (Suspected Carcinogen)

Health Factors

Carcinogenic Classification:

- **National Toxicology Program:** Suspect Human Carcinogen
- **International Agency for Research on Cancer (IARC):** Group 2A, probably carcinogenic to humans (PDF)

Monitoring Methods used by OSHA

Primary Laboratory Sampling/Analytical Method (SLC1):

Sampling Media

Pre-cleaned Glass Fiber Filter (37 mm)

maximum volume: 960 Liters

maximum flow rate: 2.0 L/min

current analytical method: High Performance Liquid Chromatography; HPLC/UV/FLU

method reference: 2 (OSHA In-House File)

method classification: Partially Validated

note: OSHA personnel can obtain pre-cleaned filters, vials, and Teflon-lined caps from SLTC. Immediately after sampling, transfer filter to glass scintillation vial and seal with Teflon-lined cap. Protect from light.

Bulk Method:**Notes**

Limit the amount of bulk submitted to one gram or one mL

Conditions:

Column: C18 mobile phase: 85:15 Acetonitrile: Water detector wavelength: 254nm fluorescence
detection limit: excitation: 254nm emissions: 370nm

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www.OSHA.gov



Search the NIOSH Pocket Guide

Enter search terms separated by spaces.

Ethyl benzene					
Synonyms & Trade Names Ethylbenzol, Phenylethane					
CAS No. 100-41-4	RTECS No. DA0700000 (/niosh-rtecs/DAAAE6o.html)		DOT ID & Guide 1175 130 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx/guide130/) (http://www.cdc.gov/Other/disclaimer.html)		
Formula CH ₃ CH ₂ C ₆ H ₅	Conversion 1 ppm = 4.34 mg/m ³		IDLH 800 ppm [10%LEL] See: 100414 (/niosh/idlh/100414.html)		
Exposure Limits NIOSH REL : TWA 100 ppm (435 mg/m ³) ST 125 ppm (545 mg/m ³) OSHA PEL † (nengapdxg.html): TWA 100 ppm (435 mg/m ³)			Measurement Methods NIOSH 1501 (/niosh/docs/2003-154/pdfs/1501.pdf); OSHA 7 (http://www.osha.gov/dts/sltc/methods/organic/org007/org007.html) (http://www.cdc.gov/Other/disclaimer.html), 1002 (http://www.osha.gov/dts/sltc/methods/mdt/mdt1002/1002.html) (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html)		
Physical Description Colorless liquid with an aromatic odor.					
MW: 106.2	BP: 277° F	FRZ: -139°F	Sol: 0.01%	VP: 7 mmHg	IP: 8.76 eV
Sp.Gr: 0.87	FLP: 55° F	UEL: 6.7%	LEL: 0.8%		
Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.					
Incompatibilities & Reactivities Strong oxidizers					
Exposure Routes inhalation, ingestion, skin and/or eye contact					
Symptoms irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma					
Target Organs Eyes, skin, respiratory system, central nervous system					
Personal Protection/Sanitation (See protection codes (protect.html)) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation			First Aid (See procedures (firstaid.html)) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately		
Respirator Recommendations NIOSH/OSHA					

Up to 800 ppm:

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*

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

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

(APF = 10) Any supplied-air respirator*

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

Emergency or planned entry into unknown concentrations or IDLH conditions:

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

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

Escape:

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

Any appropriate escape-type, self-contained breathing apparatus

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

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0268 \(/niosh/ipcsneng/nengo268.html\)](#)

See MEDICAL TESTS: [0098 \(/niosh/docs/2005-110/nmed0098.html\)](#)

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Search the NIOSH Pocket Guide

Enter search terms separated by spaces.

Lead					
Synonyms & Trade Names Lead metal, Plumbum					
CAS No. 7439-92-1	RTECS No. OF7525000 (/niosh-rtecs/OF72D288.html)		DOT ID & Guide		
Formula Pb	Conversion		IDLH 100 mg/m ³ (as Pb) See: 7439921 (/niosh/idlh/7439921.html)		
Exposure Limits <small>NIOSH</small> REL *: TWA (8-hour) 0.050 mg/m ³ See Appendix C (nengapdx.html) [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.] OSHA PEL *: [1910.1025] TWA 0.050 mg/m ³ See Appendix C (nengapdx.html) [*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.]			Measurement Methods NIOSH 7082 (/niosh/docs/2003-154/pdfs/7082.pdf) , 7105 (/niosh/docs/2003-154/pdfs/7105.pdf) , 7300 (/niosh/docs/2003-154/pdfs/7300.pdf) , 7301 (/niosh/docs/2003-154/pdfs/7301.pdf) , 7303 (/niosh/docs/2003-154/pdfs/7303.pdf) , 7700 (/niosh/docs/2003-154/pdfs/7700.pdf) , 7701 (/niosh/docs/2003-154/pdfs/7701.pdf) , 7702 (/niosh/docs/2003-154/pdfs/7702.pdf) , 9100 (/niosh/docs/2003-154/pdfs/9100.pdf) , 9102 (/niosh/docs/2003-154/pdfs/9102.pdf) , 9105 (/niosh/docs/2003-154/pdfs/9105.pdf) ; OSHA ID121 http://www.osha.gov/dts/sltc/methods/inorganic/id121/id121.html http://www.cdc.gov/Other/disclaimer.html , ID125G http://www.osha.gov/dts/sltc/methods/inorganic/id125g/id125g.html http://www.cdc.gov/Other/disclaimer.html , ID206 http://www.osha.gov/dts/sltc/methods/inorganic/id206/id206.html http://www.cdc.gov/Other/disclaimer.html See: NMAM (/niosh/docs/2003-154/) or OSHA Methods http://www.osha.gov/dts/sltc/methods/index.html http://www.cdc.gov/Other/disclaimer.html		
Physical Description A heavy, ductile, soft, gray solid.					
MW: 207.2	BP: 3164° F	MLT: 621°F	Sol: Insoluble	VP: 0 mmHg (approx)	IP: NA
Sp.Gr: 11.34	Fl.P: NA	UEL: NA	LEL: NA		
Noncombustible Solid in bulk form.					
Incompatibilities & Reactivities Strong oxidizers, hydrogen peroxide, acids					
Exposure Routes inhalation, ingestion, skin and/or eye contact					

Symptoms lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension

Target Organs Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue

Personal Protection/Sanitation (See [protection codes \(protect.html\)](#))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: Daily

Remove: When wet or contaminated

Change: Daily

First Aid (See [procedures \(firstaid.html\)](#))

Eye: Irrigate immediately

Skin: Soap flush promptly

Breathing: Respiratory support

Swallow: Medical attention immediately

Respirator Recommendations

(See [Appendix E \(nengapdx.html\)](#))

NIOSH/OSHA

Up to 0.5 mg/m³:

(APF = 10) Any air-purifying respirator with an N100, R100, or P100 filter (including N100, R100, and P100 filtering facepieces) except quarter-mask respirators.

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

(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m³:

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

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

Up to 2.5 mg/m³:

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

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

(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter

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

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

Up to 50 mg/m³:

(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Up to 100 mg/m³:

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:

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

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

Escape:

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

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

Any appropriate escape-type, self-contained breathing apparatus

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

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](/niosh/npg/pgintrod.html) See ICSC CARD: [0052 \(/niosh/ipcsneng/neng0052.html\)](/niosh/ipcsneng/neng0052.html) See MEDICAL TESTS: [0127 \(/niosh/docs/2005-110/nmedo127.html\)](/niosh/docs/2005-110/nmedo127.html)

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METHYL TERT-BUTYL ETHER

ICSC: 1164

tert-Butyl methyl ether MTBE Methyl-1,1-dimethylethyl ether 2-Methoxy-2-methyl propane $(CH_3)_3COCH_3 / C_5H_{12}O$ Molecular mass: 88.2 ICSC # 1164		CAS # 1634-04-4 RTECS # <u>KN5250000</u> UN # 2398 EC # 603-181-00-X November 04, 2000 Validated	
TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking. NO contact with oxidants.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
• INHALATION	Drowsiness. Dizziness. Headache. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
• SKIN	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.

<p>•EYES</p>	<p>Redness.</p>	<p>Safety goggles or face shield.</p>	<p>First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.</p>
<p>•INGESTION</p>	<p>Abdominal pain. Nausea. Vomiting. (Further see Inhalation).</p>	<p>Do not eat, drink, or smoke during work.</p>	<p>Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Refer for medical attention.</p>
<p>SPILLAGE DISPOSAL</p>	<p>STORAGE</p>		<p>PACKAGING & LABELLING</p>
<p>Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: filter respirator for organic gases and vapours.</p>	<p>Fireproof. Separated from strong oxidants, strong acids.</p>		<p>F symbol Xi symbol R: 11-38 S: 2-9-16-24 UN Hazard Class: 3 UN Packing Group: II</p>
<p>ICSC: 1164</p>	<p>Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>		

ICSC: 1164


METHYL TERT-BUTYL ETHER

<p>I M P O R T A N T D A T A</p>	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p>PHYSICAL DANGERS: The vapour is heavier than air and may travel along the ground; distant ignition possible.</p> <p>CHEMICAL DANGERS: Reacts violently with strong oxidants causing fire hazard. The substance decomposes on contact with acids.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 50 ppm as TWA; A3; (ACGIH 2004). MAK: 50 ppm, 180 mg/m³; Peak limitation category: I(1.5); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004).</p> <p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation and by ingestion.</p> <p>INHALATION RISK: A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20° C.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the skin. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure far above the OEL could cause lowering of consciousness.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</p>
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**PHYSICAL
PROPERTIES**

Boiling point: 55°C
 Melting point: -109°C
 Relative density (water = 1): 0.7
 Solubility in water, g/100 ml at 20°
 C: 4.2
 Vapour pressure, kPa at 20°C: 27
 Relative vapour density (air = 1):
 3.0

Relative density of the vapour/air-
 mixture at 20°C (air = 1): 1.5
 Flash point:
 -28°C c.c.
 Auto-ignition temperature: 375°C
 Explosive limits, vol% in air:
 1.6-15.1
 Octanol/water partition coefficient
 as log Pow: 1.06

ENVIRONMENTAL DATA	It is strongly advised not to let the chemical enter into the environment because it persists in the environment.	
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NOTES

Much less likely to form peroxides than other ethers. Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.
 Transport Emergency Card: TEC (R)-30GF1-I+II

ADDITIONAL INFORMATION

ICSC: 1164 **METHYL TERT-BUTYL ETHER**
 (C) IPCS, CEC, 1994

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Page last reviewed: July 22, 2015

Page last updated: July 1, 2014

Content source: Centers for Disease Control and Prevention (<http://www.cdc.gov/>)



Chemical Sampling Information / Naphthalene

Naphthalene

General Description

Synonyms: Naphthalin; Naphthaline; Naphthene

OSHA IMIS Code Number: 1810

Chemical Abstracts Service (CAS) Registry Number: 91-20-3

NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) Identification Number: QJ0525000

Department of Transportation Regulation Number (49 CFR 172.101) and Emergency Response Guidebook: 1334 133 (crude or refined); 2304 133 (molten)

NIOSH Pocket Guide to Chemical Hazards, Naphthalene: Physical description, chemical properties, potentially hazardous incompatibilities, and more

U.S. Environmental Protection Agency (EPA) Hazard Summary, Naphthalene: Uses, sources and potential exposure, acute and chronic health hazard information, and more

Exposure Limits and Health Effects

Exposure Limit	Limit Values	HE Codes	Health Factors and Target Organs
OSHA Permissible Exposure Limit (PEL) - General Industry See 29 CFR 1910.1000 Table Z-1	10 ppm (50 mg/m ³) TWA	HE3	Cataracts, jaundice, bloody urine, kidney and liver damage
		HE7	Headache, tiredness, confusion Target organs: Brain, central nervous system
		HE12	Hemolytic anemia
		HE14	Marked eye and skin irritation
OSHA PEL - Construction Industry See 29 CFR 1926.55 Appendix A	10 ppm (50 mg/m ³) TWA	HE3	Cataracts, jaundice, bloody urine, kidney and liver damage
		HE7	

Exposure Limit	Limit Values	HE Codes	Health Factors and Target Organs
			Headache, tiredness, confusion Target organs: Brain, central nervous system
		HE12	Hemolytic anemia
		HE14	Marked eye and skin irritation
OSHA PEL - Shipyard Employment See 29 CFR 1915.1000 Table Z-Shipyards	10 ppm (50 mg/m ³) TWA	HE3	Cataracts, jaundice, bloody urine, kidney and liver damage
		HE7	Headache, tiredness, confusion Target organs: Brain, central nervous system
		HE12	Hemolytic anemia
		HE14	Marked eye and skin irritation Target organs: Eyes, skin
National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL)	10 ppm (50 mg/m ³) TWA 15 ppm (75 mg/m ³) STEL	HE3	Jaundice, blood in urine, renal shutdown, optical neuritis, corneal damage
		HE7	Headache, confusion, excitement Target organs: Brain, central nervous system
		HE14	Eye irritation
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) (2001)*	10 ppm (52 mg/m ³) TWA 15 ppm (79 mg/m ³) STEL Skin; A4	HE3	Ocular toxicity (cataracts, optical neuritis, lens opacities, retinal degeneration), jaundice, renal failure
		HE7	Headache Target organs:

Exposure Limit	Limit Values	HE Codes	Health Factors and Target Organs
			Brain, central nervous system
		HE12	Hemolytic anemia
		HE14	Marked eye and respiratory tract irritation
CAL/OSHA PELs	10 ppm (50 mg/m ³) TWA 15 ppm (75 mg/m ³) STEL	HE3	Ocular toxicity (cataracts, optical neuritis, lens opacities, retinal degeneration), jaundice, renal failure
		HE7	Headache Target organs: Brain, central nervous system
		HE12	Hemolytic anemia
		HE14	Marked eye and respiratory tract irritation

*In the ACGIH 2012 Notice of Intended Changes, ACGIH proposed the following limit values and notations: 5 ppm TWA; No STEL; Skin; A3; basis: upper respiratory tract irritation

National Toxicology Program (NTP) carcinogenic classification: Reasonably anticipated to be a human carcinogen (PDF)

International Agency for Research on Cancer (IARC) carcinogenic classification: Group 2B (PDF) (possibly carcinogenic to humans)

EPA carcinogenic classification: Carcinogenic potential cannot be determined

EPA Inhalation Reference Concentration (RfC): 3x10⁻³ mg/m³

Agency for Toxic Substances and Disease Registry (ATSDR) Inhalation Minimal Risk Level (MRL): 0.0007 ppm (chronic)

NIOSH Immediately Dangerous to Life or Health (IDLH) concentration: 250 ppm

Notes on Other Potential Health Effects and Hazards

1. EPA's oral reference dose (daily oral exposure likely to be without an appreciable risk of deleterious effects during a lifetime) for naphthalene is 0.02 mg/kg/day (EPA 2000).
2. At least one study has shown that exposure to naphthalene in the air at a workplace can lead to DNA strand breaks, which are often seen as a precursor to tumor formation (Marczynski et al. 2005).
3. There have been numerous reports of hemolytic anemia and cataracts following occupational exposure to naphthalene (ATSDR 1995).
4. Naphthalene in expired air has been studied as a biomarker of dermal and inhalational exposure to jet fuel, but the elimination in breath is fairly rapid, with a half-time of 19 to 25 minutes (Egeghy et al. 2003).
5. Occupational monitoring of naphthalene exposure usually involves the measurement of the urinary metabolites 1-naphthol and 2-naphthol (Preuss et al. 2003).

6. The EPA reference concentration is based on an inhalation study in mice in which hyperplasia and metaplasia in respiratory and olfactory epithelium, were observed in nearly all the animals at 30 ppm, which was the lowest dose tested (EPA 1998).
7. The NTP classification of naphthalene as reasonably anticipated to be carcinogenic to humans, and the IARC classification as Group 2B, possibly carcinogenic to humans, was based on an inhalation bioassay in rats and mice (IARC 2002).

Date Last Revised: 12/11/2012

Literature Basis

- ACGIH: Documentation of the Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) - Naphthalene. 2001.
- ATSDR: Toxicological Profile for Naphthalene, 1-Methylnaphthalene and 2-Methylnaphthalene. 2005.
- Egeghy, P.P., Hauf-Cabalo, L., Gibson, R. and Rappaport, S.M.: Benzene and naphthalene in air and breath as indicators of exposure to jet fuel. *Occup. Environ. Med.* 60(12): 969-976, 2003.
- EPA IRIS Naphthalene (1998)
- IARC Monographs on Evaluation of Carcinogenic Risks to Humans, Volume 82, Naphthalene, 2002
- Marczynski, B. et al.: Genotoxic risk assessment in white blood cells of occupationally exposed workers before and after alteration of the polycyclic aromatic hydrocarbon (PAH) profile in the production material: comparison with PAH air and urinary metabolite levels. *Int Arch Occup Environ Health* 78(2): 97-108, 2005.
- NIOSH: *Occupational Health Guideline for Naphthalene*. September 1978.
- NIOSH/IPCS: International Chemical Safety Cards - Naphthalene. April 21, 2005.
- National Toxicology Program (NTP). Toxicology and carcinogenesis studies of naphthalene in B6C3F1 mice (inhalation studies). Technical Report Series No. 410. NIH Publication No. 92-3141. (1992).
- NTP Report on Carcinogens Naphthalene (PDF).
- Preuss, R., Angerer, J. and Drexler, H.: Naphthalene - an environmental and occupational toxicant. *Int. Arch. Occup. Environ. Health* 76(8): 556-576, 2003.

Monitoring Methods used by OSHA

Laboratory Sampling/Analytical Method:

Sampling Media

Chromosorb 106 Tube (100/50 mg sections, 60/80 mesh)

analytical solvent: Carbon Disulfide

maximum volume: 10 Liters

maximum flow rate: 0.2 L/min (TWA)

maximum volume: 3 Liters

maximum flow rate: 0.2 L/min (STEL)

current analytical method: Gas Chromatography; GC/FID

method reference: OSHA Analytical Method (OSHA 35)

method classification: Fully Validated

note: Submit as a separate sample.

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U.S. Department of Labor | Occupational Safety & Health Administration | 200 Constitution Ave., NW, Washington, DC 20210
Telephone: 800-321-OSHA (6742) | TTY
www.OSHA.gov

N-PROPYLBENZENE

PBZ

CAUTIONARY RESPONSE INFORMATION

Common Synonyms Benzene, propyl Isocumene 1-Phenylpropane UN 2364 (DOT)	Liquid Light yellow
<p>Keep people away. Avoid contact with liquid and vapor. EVACUATE AREA. Wear full face self-contained breathing apparatus and protective clothing. Shut off ignition sources. Call fire department. Stay upwind and use water spray to "knock down" vapor. Notify local health and pollution control agencies. Protect water intakes.</p>	
Fire	Combustible. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Water may be ineffective on fire. Wear full face self-contained breathing apparatus, and full protective clothing including rubber boots and gloves. Extinguish with dry chemical, alcohol foam, or CO ₂ . Cool exposed containers with water.
Exposure	CALL FOR MEDICAL AID. VAPOR May be irritating to eyes, nose and throat. If inhaled, will cause dizziness or difficult breathing. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. LIQUID May be irritating to skin and eyes. May be harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water.
Water Pollution	Effect of low concentration on aquatic life is unknown. Fouling to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.

1. CORRECTIVE RESPONSE ACTIONS

Stop discharge
Contain
Collection Systems: Skim
Clean shore line
Salvage waterfowl

2. CHEMICAL DESIGNATIONS

2.1 **CG Compatibility Group:** 32; Aromatic hydrocarbons
 2.2 **Formula:** C₉H₁₀
 2.3 **IMO/UN Designation:** 3.3/2364
 2.4 **DOT ID No.:** 2364
 2.5 **CAS Registry No.:** 103-65-1
 2.6 **NAERG Guide No.:** 127
 2.7 **Standard Industrial Trade Classification:** 51129

3. HEALTH HAZARDS

3.1 **Personal Protective Equipment:** Self-contained breathing apparatus, rubber boots and heavy rubber gloves.
 3.2 **Symptoms Following Exposure:** May be harmful by inhalation, ingestion, or skin absorption. May cause eye and skin irritation.
 3.3 **Treatment of Exposure:** INHALATION: Call for medical aid. Remove the victim to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. SKIN: Wash with soap and copious amounts of water. EYES: Flush with copious amounts of water for at least 15 minutes.
 3.4 **TLV-TWA:** Not listed.
 3.5 **TLV-STEL:** Not listed.
 3.6 **TLV-Ceiling:** Not listed.
 3.7 **Toxicity by Ingestion:** Grade 1; LD₅₀ = 6.04 g/kg rat
 3.8 **Toxicity by Inhalation:** Currently not available.
 3.9 **Chronic Toxicity:** Currently not available
 3.10 **Vapor (Gas) Irritant Characteristics:** Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary.
 3.11 **Liquid or Solid Characteristics:** Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of skin.
 3.12 **Odor Threshold:** Currently not available
 3.13 **IDLH Value:** Not listed.
 3.14 **OSHA PEL-TWA:** Not listed.
 3.15 **OSHA PEL-STEL:** Not listed.
 3.16 **OSHA PEL-Ceiling:** Not listed.
 3.17 **EPA AEGL:** Not listed

4. FIRE HAZARDS

4.1 **Flash Point:** 118°F C.C.
 4.2 **Flammable Limits in Air:** LEL 0.8%; UEL 6%
 4.3 **Fire Extinguishing Agents:** Water spray, carbon dioxide, dry chemical, alcohol foam.
 4.4 **Fire Extinguishing Agents Not to Be Used:** Currently not available
 4.5 **Special Hazards of Combustion Products:** Vapor may travel considerable distance to a source of ignition and flashback.
 4.6 **Behavior in Fire:** Currently not available
 4.7 **Auto Ignition Temperature:** Currently not available
 4.8 **Electrical Hazards:** Currently not available
 4.9 **Burning Rate:** Currently not available
 4.10 **Adiabatic Flame Temperature:** Currently not available
 4.11 **Stoichiometric Air to Fuel Ratio:** 57.1 (calc.)
 4.12 **Flame Temperature:** Currently not available
 4.13 **Combustion Molar Ratio (Reactant to Product):** 15.0 (calc.)
 4.14 **Minimum Oxygen Concentration for Combustion (MOCC):** Not listed

5. CHEMICAL REACTIVITY

5.1 **Reactivity with Water:** No reaction
 5.2 **Reactivity with Common Materials:** No reaction
 5.3 **Stability During Transport:** Stable
 5.4 **Neutralizing Agents for Acids and Caustics:** Not pertinent
 5.5 **Polymerization:** Will not occur
 5.6 **Inhibitor of Polymerization:** Not pertinent

6. WATER POLLUTION

6.1 **Aquatic Toxicity:** Currently not available
 6.2 **Waterfowl Toxicity:** Currently not available
 6.3 **Biological Oxygen Demand (BOD):** Currently not available
 6.4 **Food Chain Concentration Potential:** Currently not available
 6.5 **GESAMP Hazard Profile:** Not listed

7. SHIPPING INFORMATION

7.1 **Grades of Purity:** 98%
 7.2 **Storage Temperature:** Ambient
 7.3 **Inert Atmosphere:** Currently not available
 7.4 **Venting:** Currently not available
 7.5 **IMO Pollution Category:** A
 7.6 **Ship Type:** 3
 7.7 **Barge Hull Type:** Currently not available

8. HAZARD CLASSIFICATIONS

8.1 **49 CFR Category:** Flammable Liquid
 8.2 **49 CFR Class:** 3
 8.3 **49 CFR Package Group:** III
 8.4 **Marine Pollutant:** No
 8.5 **NFPA Hazard Classification:**

Category	Classification
Health Hazard (Blue)	2
Flammability (Red)	3
Instability (Yellow)	0

 8.6 **EPA Reportable Quantity:** Not listed.
 8.7 **EPA Pollution Category:** Not listed.
 8.8 **RCRA Waste Number:** Not listed
 8.9 **EPA FWPCA List:** Not listed

9. PHYSICAL & CHEMICAL PROPERTIES

9.1 **Physical State at 15° C and 1 atm:** Liquid
 9.2 **Molecular Weight:** 120.20
 9.3 **Boiling Point at 1 atm:** 318.2°F = 159°C = 432.2°K
 9.4 **Freezing Point:** -146.2°F = -99°C = 174.2°K
 9.5 **Critical Temperature:** Currently not available
 9.6 **Critical Pressure:** Currently not available
 9.7 **Specific Gravity:** 0.862
 9.8 **Liquid Surface Tension:** Currently not available
 9.9 **Liquid Water Interfacial Tension:** Currently not available
 9.10 **Vapor (Gas) Specific Gravity:** 4.14
 9.11 **Ratio of Specific Heats of Vapor (Gas):** Currently not available
 9.12 **Latent Heat of Vaporization:** Currently not available
 9.13 **Heat of Combustion:** Currently not available
 9.14 **Heat of Decomposition:** Currently not available
 9.15 **Heat of Solution:** Currently not available
 9.16 **Heat of Polymerization:** Currently not available
 9.17 **Heat of Fusion:** Currently not available
 9.18 **Limiting Value:** Currently not available
 9.19 **Reid Vapor Pressure:** 0.1455 psia

NOTES

N-PROPYLBENZENE

PBZ

9.20 SATURATED LIQUID DENSITY		9.21 LIQUID HEAT CAPACITY		9.22 LIQUID THERMAL CONDUCTIVITY		9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit inch per hour-square foot-F	Temperature (degrees F)	Centipoise
	C U R R E N T L Y N O T A V A I L A B L E		C U R R E N T L Y N O T A V A I L A B L E		C U R R E N T L Y N O T A V A I L A B L E		C U R R E N T L Y N O T A V A I L A B L E

9.24 SOLUBILITY IN WATER		9.25 SATURATED VAPOR PRESSURE		9.26 SATURATED VAPOR DENSITY		9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
68	0.006	43	0.019		C	0	0.260
		68	0.039		U	25	0.275
		88	0.097		R	50	0.289
		100	0.141		R	75	0.303
		110	0.193		E	100	0.317
		134	0.387		N	125	0.331
		161	0.774		T	150	0.344
		178	1.160		L	175	0.357
		201	1.934		Y	200	0.370
		236	3.867			225	0.383
		276	7.735		N	250	0.395
		319	14.696		O	275	0.407
					T	300	0.419
						325	0.431
					A	350	0.443
					V	375	0.454
					A	400	0.465
					I	425	0.476
					L	450	0.487
					A	475	0.497
					B	500	0.507
					L	525	0.517
					E	550	0.527
						575	0.537
						600	0.546



Agency for Toxic Substances & Disease Registry

Public Health Statement for Polycyclic Aromatic Hydrocarbons (PAHs)

(Hidrocarburos Aromáticos Policíclicos (HAPs))

August 1995

 **PDF Version, 66 KB**

This Public Health Statement is the summary chapter from the Toxicological Profile for polycyclic aromatic hydrocarbons (PAHs). It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQs, is also available. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present. For more information, call the ATSDR Information Center at 1-888-422-8737.

This statement was prepared to give you information about polycyclic aromatic hydrocarbons (PAHs) and to emphasize the human health effects that may result from exposure to them. The Environmental Protection Agency (EPA) has identified 1,408 hazardous waste sites as the most serious in the nation. These sites make up the National Priorities List (NPL) and are the sites targeted for long-term federal clean-up activities. PAHs have been found in at least 600 of the sites on the NPL. However, the number of NPL sites evaluated for PAHs is not known. As EPA evaluates more sites, the number of sites at which PAHs are found may increase. This information is important because exposure to PAHs may cause harmful health effects and because these sites are potential or actual sources of human exposure to PAHs.

When a substance is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. This release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking substances containing the substance or by skin contact with it.

If you are exposed to substances such as PAHs, many factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, lifestyle, and state of health.

1.1 What are PAHs?

PAHs are a group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances, such as tobacco and charbroiled meat. There are more than 100 different PAHs. PAHs generally occur as complex mixtures (for example, as part of combustion products such as soot), not as single compounds. PAHs usually occur naturally, but they can be manufactured as individual compounds for research purposes; however, not as

the mixtures found in combustion products. As pure chemicals, PAHs generally exist as colorless, white, or pale yellow-green solids. They can have a faint, pleasant odor. A few PAHs are used in medicines and to make dyes, plastics, and pesticides. Others are contained in asphalt used in road construction. They can also be found in substances such as crude oil, coal, coal tar pitch, creosote, and roofing tar. They are found throughout the environment in the air, water, and soil. They can occur in the air, either attached to dust particles or as solids in soil or sediment.

Although the health effects of individual PAHs are not exactly alike, the following 17 PAHs are considered as a group in this profile:

acenaphthene
acenaphthylene
anthracene
benz[a]anthracene
benzo[a]pyrene
benzo[e]pyrene
benzo[b]fluoranthene
benzo[g,h,i]perylene
benzo[j]fluoranthene
benzo[k]fluoranthene
chrysene
dibenz[a,h]anthracene
fluoranthene
fluorene
indeno[1,2,3-c,d]pyrene
phenanthrene
pyrene

These 17 PAHs were chosen to be included in this profile because (1) more information is available on these than on the others; (2) they are suspected to be more harmful than some of the others, and they exhibit harmful effects that are representative of the PAHs; (3) there is a greater chance that you will be exposed to these PAHs than to the others; and (4) of all the PAHs analyzed, these were the PAHs identified at the highest concentrations at NPL hazardous waste sites.

1.2 What happens to PAHs when they enter the environment?

PAHs enter the environment mostly as releases to air from volcanoes, forest fires, residential wood burning, and exhaust from automobiles and trucks. They can also enter surface water through discharges from industrial plants and waste water treatment plants, and they can be released to soils at hazardous waste sites if they escape from storage containers. The movement of PAHs in the environment depends on properties such as how easily they dissolve in water, and how easily they evaporate into the air. PAHs in general do not easily dissolve in water. They are present in air as vapors or stuck to the surfaces of small solid particles. They can travel long distances before they return to earth in rainfall or particle settling. Some PAHs evaporate into the atmosphere from surface waters, but most stick to solid particles and settle to the bottoms of rivers or lakes. In soils, PAHs are most likely to stick tightly to particles. Some PAHs evaporate from surface soils to air. Certain PAHs in soils also contaminate underground water. The PAH content of plants and animals living on the land or in water can

be many times higher than the content of PAHs in soil or water. PAHs can break down to longer-lasting products by reacting with sunlight and other chemicals in the air, generally over a period of days to weeks. Breakdown in soil and water generally takes weeks to months and is caused primarily by the actions of microorganisms.

1.3 How might I be exposed to PAHs?

PAHs are present throughout the environment, and you may be exposed to these substances at home, outside, or at the workplace. Typically, you will not be exposed to an individual PAH, but to a mixture of PAHs.

In the environment, you are most likely to be exposed to PAH vapors or PAHs that are attached to dust and other particles in the air. Sources include cigarette smoke, vehicle exhausts, asphalt roads, coal, coal tar, wildfires, agricultural burning, residential wood burning, municipal and industrial waste incineration, and hazardous waste sites. Background levels of some representative PAHs in the air are reported to be 0.02-1.2 nanograms per cubic meter (ng/m³; a nanogram is one-millionth of a milligram) in rural areas and 0.15-19.3 ng/m³ in urban areas. You may be exposed to PAHs in soil near areas where coal, wood, gasoline, or other products have been burned. You may be exposed to PAHs in the soil at or near hazardous waste sites, such as former manufactured-gas factory sites and wood-preserving facilities. PAHs have been found in some drinking water supplies in the United States. Background levels of PAHs in drinking water range from 4 to 24 nanograms per liter (ng/L; a liter is slightly more than a quart).

In the home, PAHs are present in tobacco smoke, smoke from wood fires, creosote-treated wood products, cereals, grains, flour, bread, vegetables, fruits, meat, processed or pickled foods, and contaminated cow's milk or human breast milk. Food grown in contaminated soil or air may also contain PAHs. Cooking meat or other food at high temperatures, which happens during grilling or charring, increases the amount of PAHs in the food. The level of PAHs in the typical U.S. diet is less than 2 parts of total PAHs per billion parts of food (ppb), or less than 2 micrograms per kilogram of food (1/4g/kg; a microgram is one-thousandth of a milligram).

The primary sources of exposure to PAHs for most of the U.S. population are inhalation of the compounds in tobacco smoke, wood smoke, and ambient air, and consumption of PAHs in foods. For some people, the primary exposure to PAHs occurs in the workplace. PAHs have been found in coal tar production plants, coking plants, bitumen and asphalt production plants, coal-gasification sites, smoke houses, aluminum production plants, coal tarring facilities, and municipal trash incinerators. Workers may be exposed to PAHs by inhaling engine exhaust and by using products that contain PAHs in a variety of industries such as mining, oil refining, metalworking, chemical production, transportation, and the electrical industry. PAHs have also been found in other facilities where petroleum, petroleum products, or coal are used or where wood, cellulose, corn, or oil are burned. People living near waste sites containing PAHs may be exposed through contact with contaminated air, water, and soil.

1.4 How can PAHs enter and leave my body?

PAHs can enter your body through your lungs when you breathe air that contains them (usually stuck to particles or dust). Cigarette smoke, wood smoke, coal smoke, and smoke from

many industrial sites may contain PAHs. People living near hazardous waste sites can also be exposed by breathing air containing PAHs. However, it is not known how rapidly or completely your lungs absorb PAHs. Drinking water and swallowing food, soil, or dust particles that contain PAHs are other routes for these chemicals to enter your body, but absorption is generally slow when PAHs are swallowed. Under normal conditions of environmental exposure, PAHs could enter your body if your skin comes into contact with soil that contains high levels of PAHs (this could occur near a hazardous waste site) or with used crankcase oil or other products (such as creosote) that contain PAHs. The rate at which PAHs enter your body by eating, drinking, or through the skin can be influenced by the presence of other compounds that you may be exposed to at the same time with PAHs. PAHs can enter all the tissues of your body that contain fat. They tend to be stored mostly in your kidneys, liver, and fat. Smaller amounts are stored in your spleen, adrenal glands, and ovaries. PAHs are changed by all tissues in the body into many different substances. Some of these substances are more harmful and some are less harmful than the original PAHs. Results from animal studies show that PAHs do not tend to be stored in your body for a long time. Most PAHs that enter the body leave within a few days, primarily in the feces and urine.

1.5 How can PAHs affect my health?

PAHs can be harmful to your health under some circumstances. Several of the PAHs, including benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene, have caused tumors in laboratory animals when they breathed these substances in the air, when they ate them, or when they had long periods of skin contact with them. Studies of people show that individuals exposed by breathing or skin contact for long periods to mixtures that contain PAHs and other compounds can also develop cancer.

Mice fed high levels of benzo[a]pyrene during pregnancy had difficulty reproducing and so did their offspring. The offspring of pregnant mice fed benzo[a]pyrene also showed other harmful effects, such as birth defects and decreased body weight. Similar effects could occur in people, but we have no information to show that these effects do occur.

Studies in animals have also shown that PAHs can cause harmful effects on skin, body fluids, and the body's system for fighting disease after both short and long-term exposure. These effects have not been reported in people.

The Department of Health and Human Services (DHHS) has determined that benz[a]anthracene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene are known animal carcinogens. The International Agency for Research on Cancer (IARC) has determined the following: benz[a]anthracene and benzo[a]pyrene are probably carcinogenic to humans; benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, and indeno[1,2,3-c,d]pyrene are possibly carcinogenic to humans; and anthracene, benzo[g,h,i]perylene, benzo[e]pyrene, chrysene, fluoranthene, fluorene, phenanthrene, and pyrene are not classifiable as to their carcinogenicity to humans. EPA has determined that benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene are probable human carcinogens and that acenaphthylene, anthracene, benzo[g,h,i]perylene, fluoranthene, fluorene, phenanthrene, and pyrene are not classifiable as to human carcinogenicity. Acenaphthene has not been classified for carcinogenic effects by the DHHS, IARC, or EPA.

1.6 Is there a medical test to determine whether I have been exposed to PAHs?

In your body, PAHs are changed into chemicals that can attach to substances within the body. The presence of PAHs attached to these substances can then be measured in body tissues or blood after exposure to PAHs. PAHs or their metabolites can also be measured in urine, blood, or body tissues. Although these tests can show that you have been exposed to PAHs, these tests cannot be used to predict whether any health effects will occur or to determine the extent or source of your exposure to the PAHs. It is not known how effective or informative the tests are after exposure is discontinued. These tests to identify PAHs or their products are not routinely available at a doctor's office because special equipment is required to detect these chemicals.

1.7 What recommendations has the federal government made to protect human health?

The federal government has set regulations to protect people from the possible health effects of eating, drinking, or breathing PAHs. EPA has suggested that taking into your body each day the following amounts of individual PAHs is not likely to cause any harmful health effects: 0.3 milligrams (mg) of anthracene, 0.06 mg of acenaphthene, 0.04 mg of fluoranthene, 0.04 mg of fluorene, and 0.03 mg of pyrene per kilogram (kg) of your body weight (one kilogram is equal to 2.2 pounds). Actual exposure for most of the United States population occurs from active or passive inhalation of the compounds in tobacco smoke, wood smoke, and contaminated air, and from eating the compounds in foods. Skin contact with contaminated water, soot, tar, and soil may also occur. Estimates for total exposure in the United States population have been listed as 3 mg/day.

From what is currently known about benzo[a]pyrene, the federal government has developed regulatory standards and guidelines to protect people from the potential health effects of PAHs in drinking water. EPA has provided estimates of levels of total cancer-causing PAHs in lakes and streams associated with a risk of human cancer development. If the following amounts of individual PAHs are released to the environment within a 24-hour period, EPA must be notified: 1 pound of benzo[b]fluoranthene, benzo[a]pyrene, or dibenz[a,h]anthracene; 10 pounds of benz[a]anthracene; 100 pounds of acenaphthene, chrysene, fluoranthene, or indeno [1,2,3-c,d]pyrene; or 5,000 pounds of acenaphthylene, anthracene, benzo[k]fluoranthene, benzo[g,h,i]perylene, fluorene, phenanthrene, or pyrene.

PAHs are generally not produced commercially in the United States except as research chemicals. However, PAHs are found in coal, coal tar, and in the creosote oils, oil mists, and pitches formed from the distillation of coal tars. The National Institute for Occupational Safety and Health (NIOSH) concluded that occupational exposure to coal products can increase the risk of lung and skin cancer in workers. NIOSH established a recommended occupational exposure limit, timeweighted average (REL-TWA) for coal tar products of 0.1 milligram of PAHs per cubic meter of air (0.1 mg/m³) for a 10-hour workday, within a 40-hour workweek. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends an occupational exposure limit for coal tar products of 0.2 mg/m³ for an 8-hour workday, within a 40-hour workweek. The Occupational Safety and Health Administration (OSHA) has established a legally enforceable limit of 0.2 mg/m³ averaged over an 8-hour exposure period.

Mineral oil mists have been given an IARC classification of 1 (sufficient evidence of carcinogenicity). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist is 5 mg/m³ averaged over an 8-hour exposure period. NIOSH has concurred with this limit, and has established a recommended occupational exposure limit (REL-TWA) for mineral oil mists of 5 mg/m³ for a 10-hour work day, 40-hour work week, with a 10 mg/m³ Short Term Exposure Limit (STEL).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons (PAHs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

If you have questions or concerns, please contact your community or state health or environmental quality department or:

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences
1600 Clifton Road NE, Mailstop F-57
Atlanta, GA 30329-4027
Phone: 1-800-CDC-INFO · 888-232-6348 (TTY)
Email: Contact CDC-INFO

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses resulting from exposure to hazardous substances.

Information line and technical assistance:

Phone: 888-422-8737

To order toxicological profiles, contact:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Phone: 800-553-6847 or 703-605-6000

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Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA
30329-4027, USA
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - Contact CDC-INFO





Material Safety Data Sheet
sec-Butylbenzene, 99+%

MSDS# 73785

Section 1 - Chemical Product and Company Identification

MSDS Name: sec-Butylbenzene, 99+%
Catalog Numbers: AC107860000, AC107860050, AC107860500, AC107861000, AC107862500, AC107865000
AC107865000
Synonyms: 2-Phenylbutane; Benzene, (1-methylpropyl)-; (1-Methylpropyl)benzene; Benzene, sec-butyl-

Company Identification: Acros Organics BVBA
Janssen Pharmaceuticaaan 3a
2440 Geel, Belgium
Acros Organics
Company Identification: (USA) One Reagent Lane
Fair Lawn, NJ 07410
For information in the US, call: 800-ACROS-01
For information in Europe, call: +32 14 57 52 11
Emergency Number, Europe: +32 14 57 52 99
Emergency Number US: 201-796-7100
CHEMTREC Phone Number, US: 800-424-9300
CHEMTREC Phone Number, Europe: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#: 135-98-8
Chemical Name: sec-Butylbenzene
%: 99+
EINECS#: 205-227-0

Hazard Symbols: XI



Risk Phrases: 10 36/37/38

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Warning! Flammable liquid and vapor. May cause central nervous system depression. Causes eye, skin, and respiratory tract irritation. Target Organs: Central nervous system.

Potential Health Effects

Eye: Causes eye irritation.

Skin: Causes skin irritation.

Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Ingestion of large amounts may cause CNS depression.

Inhalation: Causes respiratory tract irritation.

Chronic: Prolonged or repeated skin contact may cause dermatitis.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Flammable liquid and vapor.

Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Use agent most appropriate to extinguish fire. Do NOT use straight streams of water.

Autoignition Temperature: 415 deg C (779.00 deg F)

Flash Point: 45 deg C (113.00 deg F)

Explosion Limits: Lower: 0.80 vol %

Explosion Limits: Upper: 6.90 vol %

NFPA Rating: health: 2; flammability: 2; instability: 0;

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
sec-Butylbenzene	none listed	none listed	none listed

OSHA Vacated PELs: sec-Butylbenzene: None listed

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

Exposure Limits

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Color: clear colorless

Odor: None reported.

pH: Not available

Vapor Pressure: 4 mm Hg @ 37.7 deg C

Vapor Density: 4.62

Evaporation Rate: Not available

Viscosity: Not available

Boiling Point: 173 - 174 deg C @ 760 mm Hg

Freezing/Melting Point: -75 deg C (-103.00°F)

Decomposition Temperature: Not available

Solubility in water: 0.015 g/L water

Specific Gravity/Density: 0.8630 g/cm³

Molecular Formula: C₁₀H₁₄

Molecular Weight: 134.22

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Ignition sources, excess heat.

Incompatibilities with Other Materials: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: CAS# 135-98-8: CY9100000

RTECS:

CAS# 135-98-8: Draize test, rabbit, eye: 500 mg/24H Mild;

Draize test, rabbit, skin: 100 mg/24H Moderate;

LD50/LC50: Oral, mouse: LD50 = 8700 mg/kg;

Oral, rat: LD50 = 2240 uL/kg;

Oral, rat: LD50 = 6300 mg/kg;

Skin, rabbit: LD50 = >16 mL/kg;

Carcinogenicity: sec-Butylbenzene - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Not available

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT

Shipping Name: BUTYL BENZENES

Hazard Class: 3

UN Number: UN2709

Packing Group: III

Canada TDG

Shipping Name: Not available
Hazard Class:
UN Number:
Packing Group:

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XI

Risk Phrases:

R 10 Flammable.

R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:

S 9 Keep container in a well-ventilated place.

S 16 Keep away from sources of ignition - No smoking.

S 33 Take precautionary measures against static discharges.

WGK (Water Danger/Protection)

CAS# 135-98-8: 1

Canada

CAS# 135-98-8 is listed on Canada's DSL List

Canadian WHMIS Classifications: B3, D2B

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 135-98-8 is not listed on Canada's Ingredient Disclosure List.

US Federal

TSCA

CAS# 135-98-8 is listed on the TSCA
Inventory.

Section 16 - Other Information

MSDS Creation Date: 9/02/1997

Revision #9 Date 7/20/2009

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 the company 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 the company has been advised of the possibility of such damages.



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Trimethylbenzene (mixed isomers)

General Description

Synonyms: Trimethyl benzene; 1,2,3-Trimethylbenzene; 1,2,4-Trimethylbenzene; 1,3,5-Trimethylbenzene; Hemimellitene; Pseudocumene; Mesitylene; Methylxylene

OSHA IMIS Code Number: 2505
(IMIS Name History: Trimethylbenzene ONLY prior to 11/20/06)

Chemical Abstracts Service (CAS) Registry Number: 25551-13-7

Related Chemical Abstracts Service (CAS) Registry Number: 95-63-6 (1,2,4-Trimethylbenzene); 108-67-8 (1,3,5-Trimethylbenzene); 526-73-8 (1,2,3-Trimethylbenzene)

NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) Identification Number: [DC3220000](#), [DC3300000](#) (1,2,3-Trimethylbenzene), [DC3325000](#) (1,2,4-Trimethylbenzene), and [OX6825000](#) (1,3,5-Trimethylbenzene)

Department of Transportation Regulation Number (49 CFR 172.101) and 2012 Emergency Response Guidebook [4 MB PDF, 392 pages]: 2325 129 (1,3,5-Trimethylbenzene)

NIOSH Pocket Guide to Chemical Hazards - [1,2,3-Trimethylbenzene](#), [1,2,4-Trimethylbenzene](#), and [1,3,5-Trimethylbenzene](#): Physical description, chemical properties, potentially hazardous incompatibilities, and more

Exposure Limits and Health Effects

Exposure Limit	Limit Values	HE Codes	Health Factors and Target Organs
OSHA Permissible Exposure Limit (PEL) - General Industry	Not established		
OSHA PEL - Construction Industry See 29 CFR 1926.55 Appendix A	25 ppm (120 mg/m ³) TWA	HE7	Central nervous system changes, including nervousness, tension, anxiety
		HE9	Asthmatic bronchitis
		HE12	Blood changes
OSHA PEL - Shipyard Employment See 29 CFR 1915.1000 Table Z-Shipyards	25 ppm (120 mg/m ³) TWA	HE7	Central nervous system changes, including nervousness, tension, anxiety
		HE9	Asthmatic bronchitis
		HE12	Blood changes
National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL)	25 ppm (125 mg/m ³)	HE7	Central nervous system depression
		HE11	Respiratory failure
		HE15	Skin irritation
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) (2001)	25 ppm (123 mg/m ³) TWA	HE7	Central nervous system depression
		HE9	Asthmatic bronchitis
		HE12	Blood dyscrasias
		HE15	Eye, nose, and respiratory irritation
CAL/OSHA PEL	25 ppm (125 mg/m ³) TWA	HE7	Central nervous system depression
		HE9	Asthmatic bronchitis
		HE12	Blood dyscrasias
		HE15	Eye, nose, and respiratory irritation

National Toxicology Program (NTP) carcinogenic classification: Not listed

International Agency for Research on Cancer (IARC): Not listed

U.S. Environmental Protection Agency (EPA) carcinogenic classification: Not listed

EPA Inhalation Reference Concentration (RFC): Not established

Agency for Toxic Substances and Disease Registry (ATSDR) Inhalation Minimal Risk Level (MRL): Not established

Notes on Other Potential Health Effects and Hazards

- Explosive vapor/air mixtures may be formed above 44°C (NIOSH/IPCS 2002).
- Due to interindividual variation in urinary excretion of single isomers of dimethylhippuric acid (DMHA), it has been suggested that using the sum of DMHA isomer excretion may more closely reflect exposure to trimethylbenzene than monitoring any single isomer in the urine (Järnberg et al. 1997).
- Significant body burden accumulation is expected following repeated occupational exposures to trimethylbenzene (Jones et al. 2006).

Chemical Sampling Information (CSI)

Search (use word(s)/phrase)

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Quick Links

- [Field Label Abbreviations & Descriptions](#)
- [OSHA Occupational Chemical Database](#)

Date last revised: 09/06/2012

Literature Basis

- ACGIH: Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) - Trimethyl Benzene Isomers. 2001.
- Järnberg, J., Ståhlbom, B., Johanson, G. and Löf, A.: Urinary excretion of dimethylhippuric acids in humans after exposure to trimethylbenzenes. *Int. Arch. Occup. Environ. Health* 69(6): 491-497, 1997.
- Jones, K., Meldrum, M., Baird, E., Cottrell, S., Kaur, P., Plant, N., Dyne, D., Cocker, J.: Biological monitoring for trimethylbenzene exposure - a human volunteer study and a practical example in the workplace. *The Annals of Occupational Hygiene*. 50 (6): 593-598, 2006.
- NIOSH: *Recommendations for Occupational Safety and Health - Compendium of Policy Documents and Statements*. January 1992.
- NIOSH/IPC: International Chemical Safety Cards - [Trimethyl Benzene \(Mixed Isomers\)](#). June 3, 2002.

Monitoring Methods used by OSHA

Laboratory Sampling/Analytical Method:

- **sampling media:** Charcoal Tube (100/50 mg sections, 20/40 mesh)
- **analytical solvent:** Carbon Disulfide
- **maximum volume:** 10 Liters
- **maximum flow rate:** 0.1 L/min
- **current analytical method:** Gas Chromatography; GC/FID
- **method reference:** OSHA Analytical Method ([OSHA PV2091](#))
- **method classification:** Partially Validated

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Search the NIOSH Pocket Guide

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Toluene					
Synonyms & Trade Names Methyl benzene, Methyl benzol, Phenyl methane, Toluol					
CAS No. 108-88-3	RTECS No. XS5250000 (/niosh-rtecs/XS501BDO.html)		DOT ID & Guide 1294 130 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx/guide130/) (http://www.cdc.gov/Other/disclaimer.html)		
Formula C ₆ H ₅ CH ₃	Conversion 1 ppm = 3.77 mg/m ³		IDLH 500 ppm See: 108883 (/niosh/idlh/108883.html)		
Exposure Limits NIOSH REL : TWA 100 ppm (375 mg/m ³) ST 150 ppm (560 mg/m ³) OSHA PEL † (nengapdxg.html): TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)			Measurement Methods NIOSH 1500 (/niosh/docs/2003-154/pdfs/1500.pdf), 1501 (/niosh/docs/2003-154/pdfs/1501.pdf), 3800 (/niosh/docs/2003-154/pdfs/3800.pdf), 4000 (/niosh/docs/2003-154/pdfs/4000.pdf); OSHA 111 (http://www.osha.gov/dts/sltc/methods/organic/org111/org111.html) (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html)		
Physical Description Colorless liquid with a sweet, pungent, benzene-like odor.					
MW: 92.1	BP: 232°F	FRZ: -139°F	Sol(74°F): 0.07%	VP: 21 mmHg	IP: 8.82 eV
Sp.Gr: 0.87	FLP: 40°F	UEL: 7.1%	LEL: 1.1%		
Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.					
Incompatibilities & Reactivities Strong oxidizers					
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact					
Symptoms irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage					
Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys					
Personal Protection/Sanitation (See protection codes (protect.html)) Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated			First Aid (See procedures (firstaid.html)) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately		

Remove: When wet (flammable)

Change: No recommendation

Respirator Recommendations

NIOSH

Up to 500 ppm:

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

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

(APF = 10) Any supplied-air respirator*

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

Emergency or planned entry into unknown concentrations or IDLH conditions:

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

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

Escape:

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

Any appropriate escape-type, self-contained breathing apparatus

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

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0078](#)

[\(/niosh/ipcsneng/neng0078.html\)](#) See MEDICAL TESTS: [0232 \(/niosh/docs/2005-110/nmedo232.html\)](#)

Page last reviewed: April 4, 2011

Page last updated: February 13, 2015

Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information Division

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Xylene

General Description

Synonyms: o-, m-, and p-Isomers; Xylol; Dimethylbenzene; Methyl toluene

OSHA IMIS Code Number: 2590

Chemical Abstracts Service (CAS) Registry Number: 1330-20-7

Other Chemical Abstracts Service (CAS) Registry Numbers: 108-38-3 (m-Xylene); 95-47-6 (o-Xylene); 106-42-3 (p-Xylene)

NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) Identification Number: [ZE2275000](#) (m-Xylene); [ZE2450000](#) (o-Xylene); [ZE2625000](#) (p-Xylene)

Department of Transportation Regulation Number (49 CFR 172.101) and [2012 Emergency Response Guidebook](#) [4 MB PDF, 392 pages]: 1307 130

NIOSH Pocket Guide to Chemical Hazards - [m-Xylene](#), [o-Xylene](#), and [p-Xylene](#): Physical description, chemical properties, potentially hazardous incompatibilities, and more

EPA Hazard Summary - [Xylenes](#): Uses, sources and potential exposure, acute and chronic health hazard information, and more

Exposure Limits

Exposure Limit	Limit Values	HE Codes	Health Factors and Target Organs
OSHA Permissible Exposure Limit (PEL) - General Industry See 29 CFR 1910.1000 Table Z-1	100 ppm (435 mg/m ³) TWA	HE4	Liver enlargement
		HE8	Narcosis
		HE12	Mild anemia
		HE15	Eye, nose, and throat irritation
OSHA PEL - Construction Industry See 29 CFR 1926.55 Appendix A	100 ppm (435 mg/m ³) TWA	HE3	Liver enlargement
		HE8	Narcosis
		HE12	Mild anemia
		HE15	Eye, nose, and throat irritation
OSHA PEL - Shipyard Employment See 29 CFR 1915.1000 Table Z-Shipyards	100 ppm (435 mg/m ³) TWA	HE3	Liver enlargement
		HE8	Narcosis
		HE12	Mild anemia
		HE15	Eye, nose, and throat irritation
National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL)	100 ppm (435 mg/m ³) TWA 150 ppm (655 mg/m ³) STEL	HE4	Reversible kidney and liver damage
		HE7	Dizziness, drowsiness Target organs: brain, CNS
		HE11	Difficulty breathing
		HE15	Eye, nose, and throat irritation; skin rash
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) (2001)	100 ppm (434 mg/m ³) TWA 150 ppm (651 mg/m ³) STEL A4; BEI	HE8	Narcosis
		HE15	Eye and upper respiratory tract irritation
CAL/OSHA PELs	100 ppm (435 mg/m ³) TWA 300 ppm Ceiling 150 ppm (655 mg/m ³) STEL	HE8	Narcosis
		HE15	Eye and upper respiratory tract irritation

National Toxicology Program (NTP) carcinogenic classification: Not listed

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International Agency for Research on Cancer (IARC) carcinogenic classification: [Group 3](#) [74 KB PDF, 20 pages] (not classifiable as to its carcinogenicity in humans)

U.S. Environmental Protection Agency (EPA) carcinogenic classification: [Data is inadequate for an assessment of human carcinogenic potential](#)

EPA Inhalation Reference Concentration (RFC): [0.1 mg/m³](#)

Agency for Toxic Substances and Disease Registry (ATSDR) Inhalation Minimal Risk Level (MRL): [2 ppm \(acute\); 0.6 ppm \(intermediate\); 0.05 ppm \(chronic\)](#)

NIOSH Immediately Dangerous To Life or Health Concentration (IDLH): [900 ppm](#)

Notes on Other Potential Health Effects and Hazards

1. The most commonly cited symptoms associated with xylene exposures are headache, fatigue, irritability, and gastrointestinal disturbances (ACGIH 2001).
2. May be involved in ototoxicity associated with exposure to solvents containing xylene (Sulkowski et al. 2002).
3. Urinary metabolites (presumed to be formed by CYP2E1), which are isomers of methylhippuric acid, are used for the biomonitoring of xylene exposure (Gonzales-Reche et al. 2003).
4. The EPA reference concentration is based on a subchronic study Impaired motor coordination (decreased rotarod performance) study in male rats (Korsak et al., 1994).
5. [ATSDR bases its minimal risk level on potential of xylenes to cause developmental liver, neurological and renal effects.](#)

Date Last Revised: 11/16/2012

Literature Basis:

- ACGIH: Documentation of the Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) - Xylene (all isomers). 2001.
- ATSDR Toxicological Profile for Xylene, 2007
- [EPA IRIS Xylenes 2003](#)
- Gonzalez-Reche, L.M., Schettgen, T. and Angerer, J.: New approaches to the metabolism of xylenes: verification of the formation of phenylmercapturic acid metabolites of xylenes. *Arch. Toxicol.* 77(2): 80-85, 2003.
- Korsak, Z; Wisniewska-Knypl, J; Swiercz, R. (1994) Toxic effects of subchronic combined exposure to n-butyl alcohol and m-xylene in rats. *Int J Occup Med Environ Health* 7:155-166.
- NIOSH: *Occupational Health Guideline for Xylene*. 1978.
- NIOSH/IPCS: International Chemical Safety Cards - [m-Xylene](#). 2002.
- NIOSH/IPCS: International Chemical Safety Cards - [o-Xylene](#). 2002.
- NIOSH/IPCS: International Chemical Safety Cards - [p-Xylene](#). 2002.
- Hood RD, Ottley MS Developmental effects associated with exposure to xylene: a review.
- Drug Chem Toxicol. 1985;8(4):281-97.
- Sulkowski, W.J. et al.: Effects of occupational exposure to a mixture of solvents on the inner ear - a field study. *Int. J. Occup. Med. Environ. Health* 15(3): 247-256, 2002.

Monitoring Methods used by OSHA

Laboratory Sampling/Analytical Method:

- **sampling media:** Charcoal Tube (100/50 mg sections, 20/40 mesh)
analytical solvent: Carbon Disulfide
alternative solvent: (99:1) Carbon Disulfide:Dimethylformamide
maximum volume: 12 Liters
maximum flow rate: 0.05 L/min (TWA)
minimum volume: 0.25 Liters
maximum flow rate: 0.05 L/min (STEL)
current analytical method: Gas Chromatography; GC/FID
method reference: OSHA Analytical Method ([OSHA 1002](#))
method classification: Fully Validated
- **sampling media:** Diffusive Sampler (SKC 575-002 Passive Sampler)
analytical solvent: Carbon Disulfide
sampling time: 5 to 240 Minutes (TWA)
current analytical method: Gas Chromatography; GC/FID
method reference: OSHA Analytical Method ([OSHA 1002](#))
method classification: Fully Validated

On-Site Sampling Techniques/Methods:

- **device:** Detector Tube
manufacturer: Gastec
model/type: 123
sampling information: 0.5 to 2 strokes
upper measurement limit: 625 ppm
detection limit: 1 ppm
overall uncertainty: 16% for 10 to 50 ppm, 8% for 50 to 250 ppm
method reference: on-site air secondary ([SEI Certified](#))
- **device:** Detector Tube
manufacturer: Matheson-Kitagawa
model/type: 8014-143SA
sampling information: 2 strokes
upper measurement limit: 1000 ppm
detection limit: approximately 2 ppm
overall uncertainty: unknown
method reference: on-site air secondary ([SEI Certified](#))

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APPENDIX D
SITE SPECIFIC MONITORING RESULTS

APPENDIX E

SAFETY PLAN AMENDMENTS

SAFETY PLAN AMENDMENTS

Site Name:	Chesterfield Homes Property, Chesterfield, IN	Date of Plan Amendment:	
Scope of Work Change/Amendment/Update/Modification Made to the Plan:			
Reason For Change:			
Hazard Evaluation:			
Level of Protection:			
Air Monitoring:			
Person Requesting Change:			
Person Approving Change:			
Title:			
Printed Name:			
Signature & Date:			
Date Approved:			

SAFETY PLAN AMENDMENTS

Site Name:	Vacant Property, Chesterfield, IN	Date of Plan Amendment:	
Scope of Work Change/Amendment/Update/Modification Made to the Plan:			
Reason For Change:			
Hazard Evaluation:			
Level of Protection:			
Air Monitoring:			
Person Requesting Change:			
Person Approving Change:			
Title:			
Printed Name:			
Signature & Date:			
Date Approved:			

SAFETY PLAN AMENDMENTS

Site Name:	Vacant Property, Chesterfield, IN	Date of Plan Amendment:	
Scope of Work Change/Amendment/Update/Modification Made to the Plan:			
Reason For Change:			
Hazard Evaluation:			
Level of Protection:			
Air Monitoring:			
Person Requesting Change:			
Person Approving Change:			
Title:			
Printed Name:			
Signature & Date:			
Date Approved:			

APPENDIX F

HEALTH AND SAFETY PLAN SIGN-OFF LOG

APPENDIX G

HOSPITAL AND/OR LOCAL MEDICAL PROVIDER MAPS

YOUR TRIP TO:



2015 Jackson St, Anderson, IN, 46016-4337

13 MIN | 6.1 MI

Est. fuel cost: \$0.54

Trip time based on traffic conditions as of 12:21 PM on March 15, 2017. Current Traffic: Moderate



1. Start out going northeast on Anderson Rd toward Vine St.

Then 0.10 miles 0.10 total miles



2. Anderson Rd becomes Veterans Blvd.

Then 0.08 miles 0.17 total miles



3. Turn left onto W Main St/IN-32. Continue to follow IN-32.

Then 2.69 miles 3.06 total miles



4. Turn left onto S Scatterfield Rd/IN-32/IN-109/IN-9.

S Scatterfield Rd is just past E 3rd St.

If you are on University Blvd and reach College Pkwy you've gone about 0.1 miles too far.

Then 0.98 miles 4.04 total miles



5. Turn right onto E 18th St.

E 18th St is 0.2 miles past White River Trl.

Then 0.70 miles 4.74 total miles



6. E 18th St becomes Ohio Ave/IN-32.

Then 0.47 miles 5.21 total miles



7. Turn slight left onto E 14th St/IN-32.

E 14th St is just past Noble St.

If you reach Short St you've gone a little too far.

Then 0.35 miles 5.56 total miles



8. Turn left onto Meridian St.

Meridian St is just past Main St.

If you are on W 14th St and reach Jackson St you've gone a little too far.

Then 0.47 miles 6.03 total miles



9. Turn right.

Just past W 20th St.

If you reach E 22nd St you've gone a little too far.

Then 0.07 miles 6.10 total miles



10. Turn right onto Jackson St.

Then 0.05 miles 6.15 total miles



11. 2015 Jackson St, Anderson, IN 46016-4337, 2015 JACKSON ST is on the left.

If you reach W 20th St you've gone a little too far.

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