DRAFT SITE CHARACTERIZATION WORK PLAN
FOR THE
FORMER BARRETT MANUFACTURING
AND
MICA ROOFING SITE
NYSDEC Site Numbers 224197 & 224196
BROOKLYN, KINGS COUNTY, NEW YORK

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SECTION 1

INTRODUCTION

1.1 PROJECT BACKGROUND

As described in a notification letter dated September 23, 2014, Honeywell International Inc. (Honeywell) has been identified by the New York State Department of Environmental Conservation (NYSDEC) as a predecessor to companies that occupied two potentially hazardous inactive waste disposal sites in Brooklyn, Kings County, New York. One of these facilities is the Former Barrett Manufacturing Site, which was historically occupied by the Barrett Manufacturing Company and located on municipal Block 492, Lots 15 and 20 (NYSDEC Site: 224197). Lots 15 and 20 of the Former Barrett Manufacturing Site are currently owned by the Magrill Bros. Inc. and the Smith St. Corporation, respectively. The other potentially hazardous inactive waste disposal site is the Mica Roofing Site, historically occupied by the Mica Roofing Company and located on municipal Block 494, Lot 1 (NYSDEC Site: 224196). The Mica Roofing Site is currently owned by Red Hook Realty Co. The location of the two sites is depicted in **Figure 1**. Historical research was conducted for the two subject sites and is described further in Section 2.

On March 11, 2016, NYSDEC and Honeywell executed an Order on Consent and Administrative Settlement, Index No. 2-20160111-14 (the "Order") for the Former Barrett Manufacturing and Mica Roofing Site. The Order requires a draft Site Characterization Work Plan be prepared.

This Site Characterization Work Plan (SCWP) is for the Former Barrett Manufacturing Site and the Mica Roofing Site, henceforth referred to as "subject sites". This SCWP was developed based on a review of historical operations at these sites and the results of off-site investigations on adjacent properties performed by others. This SCWP presents a conceptual site model for the subject sites and surrounding properties, as well as the scope of work and methods to be used during the site characterization (SC).

1.2 SITE CHARACTERIZATION OBJECTIVES

The SC described in this work plan reflects the fact that investigation work has already been performed by others on selected portions of surrounding properties and on the subject sites (as described in Section 2.3 below). Therefore, it incorporates many elements that are typically included in a remedial investigation as described in NYSDEC DER-10/Technical Guidance for Site Investigation and Remediation. The specific objectives of this SC are to assess:

- The horizontal and vertical extent of contaminants in soil and groundwater, including non-aqueous phase liquid (NAPL), if present;
- Subsurface characteristics including groundwater flow direction;
- If impacts to soil and groundwater exist and are migrating off-site;
- The potential for soil vapor intrusion; and
- Potential for impact to human health via a Qualitative Human Health Exposure Assessment.

1.3 WORK PLAN ORGANIZATION

This SCWP is organized into the following sections:

Section 1 – Provides the background and objectives of the proposed SC.

Section 2 – Provides information regarding the subject sites description, geology and hydrogeology, as well as previously conducted investigations of the subject sites and surrounding area.

Section 3 – Presents the conceptual site model and technical approach for the SC. Details the SC scope of work and includes descriptions of proposed investigation field activities to assess soil, groundwater, non-aqueous phase liquid (NAPL), and soil vapor.

Section 4 – Describes the proposed Qualitative Human Health Exposure Assessment.

Section 5 – Describes the organizational structure of the project including key staffing roles.

Section 6 – Provides the anticipated project schedule related to this SCWP.

Section 7 – Provides references to documents used to support the development of this SCWP.

SECTION 2

SITE BACKGROUND

2.1 SITE DESCRIPTION

The Former Barrett Manufacturing Site and the Mica Roofing Site are located in Red Hook, an industrial area of Brooklyn, Kings County, New York (**Figure 1** and **Figure 2**). Former occupants of the subject sites, Barrett Manufacturing and Mica Roofing, used the properties to house various portions of their former tar manufacturing structures and processes including pitch sheds, stills, oil house, tar tanks, tar pipe lines, and a tar well. Barrett Manufacturing operations also extended to the property east of the Former Barrett Manufacturing Site (Block 493), which contained nine coal tar storage tanks and two gasoline underground storage tanks (USTs). However, the Block 493 property is not the focus of this SCWP as it is being investigated by others (Langan, 2012).

Section 2.1.1 through 2.1.3 provide descriptions of the subject sites and one adjacent property where investigation work is proposed for this SC.

Additionally, the Gowanus Canal Superfund Site is located to the east of the subject sites. The remediation of the Gowanus Canal is currently being undertaken by the United States Environmental Protection Agency (EPA) in accordance with the Superfund Program (Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended).

2.1.1 Former Barrett and Mica Roofing Historical Operations

Based on a review of Sanborn® maps, it appears that the Mica Roofing Company (a predecessor to Barrett) occupied Block 494, Lot 1 between 1886 and 1904. Between 1904 and 1939, the Barrett Manufacturing Company had operations on Block 492, Lots 1, 15 and 20 and Block 493, Lot 1. Former operations of Mica and Barrett consisted of manufacturing of roofing materials including tar treated roofing paper. Several potential tar-containing above ground and subsurface structures associated with these operations were historically present including; above-ground tar tanks, stills, oil house, pitch storage, trenches and sewer lines as well as a large-capacity tar well located under the main floor of the building on Block 492, Lot 20. These operations have likely contributed to tar-related impacts in soil and groundwater.

2.1.2 Former Barrett Manufacturing Site (Block 492, Lots 15 & 20)

The Former Barrett Manufacturing Site is approximately 0.75 acres and consists of two parcels listed as Block 492, Lot 15 (628 Smith Street) and Block 492, Lot 20 (182 Sigourney Street), as shown on **Figure 1**. Block 492, Lot 15 (628 Smith Street) is bound by Sigourney Street to the north; Block 492, Lot 20 to the east; Halleck Street to the south; and Block 492, Lot 1 to the west. Block 492, Lot 20 (182 Sigourney Street) is bound by Sigourney Street to the north; Smith Street to the east; Halleck Street to the south; and Block 492, Lot 15 to the west. The Former Barrett Manufacturing Site is located approximately 200 to 300 feet west of the Gowanus Canal. Between 1904 and 1938, the Barrett Manufacturing Company occupied this subject site and produced roofing materials utilizing coal tar. Several coal tar containing structures were historically present including a tar well, tar tanks, and a manufacturing pitch

shed. The tar well, located underneath the main floor of the building that currently exists on this subject site, is still present.

628 Smith Street is currently owned by 610 Smith St. Corp and is improved with a three-story building primarily utilized as an art studio. The property located at 182 Sigourney Street is owned by the Magrill Bros. Inc. and is partially developed with a one-story building located on the southern portion of the lot. The northern portion of the lot is used as a staging area for construction materials.

2.1.3 Mica Roofing Site (Block 494, Lot 1)

The Mica Roofing Site is approximately 1.37 acres and is listed as municipal Block 494, Lot 1, as depicted on **Figure 1**. Block 494, Lot 1 is bound by Halleck Street to the north; Smith Street to the east; Block 496, Lot 1 (currently occupied by a port and maritime service outfit) to the south; and Court Street to the west. This property is currently owned by Red Hook Realty, Co. An office building is located at the center of the block, surrounded by an asphalt parking lot.

Prior to 1886, this subject site was occupied by the Mica Roofing Company and was operated as a roofing material manufacturing facility. The Mica Roofing Company produced roofing paper and operated several tar containing structures including two above ground tar tanks (ASTs), a UST, pitch storage area, and manufacturing pitch area.

2.1.4 Red Hook Smith Street Property (Adjacent Block 493, Lot 1)

The Red Hook Smith Street Property is approximately 43,400 square feet in size, is located at 627 Smith Street and is listed as municipal Block 493, Lot 1. The property consists of a vacant 1-story warehouse and paved lot. Block 493, Lot 1 is bound by Block 491, Lot 1 (industrial/commercial property) to the north; Gowanus Canal to the east; Block 495, Lot 1 (vacant 1-story warehouse and paved lot) to the south; and Smith Street to the west. Between 1886 and 1938, the property located at Block 493 Lot, 1 was occupied by the former Barrett Manufacturing and Mica Roofing Companies and was used for the manufacture and storage of coal tar and roofing materials.

2.2 GEOLOGY AND HYDROGEOLOGY

The United States Geological Survey (USGS) "Bedrock and Engineering Maps of New York Counties, and Parts of Bergen and Hudson Counties, New Jersey" indicates that the subject sites and surrounding area are underlain by the Hartland Formation. The Hartland Formation is primarily a metamorphic rock described by the USGS as being composed of gray, fine to medium-grained biotite-muscovite-quartz schist with minor garnet and gray sillimanite-plagioclase-muscovite schist with minor garnet pegmatite. The Hartland Formation bedrock is overlain by unconsolidated anthropogenic and natural materials, as described in more detail below.

Based on previous environmental investigations conducted on adjacent properties, the subject sites are underlain by historic fill extending to approximately eight (8) feet below ground surface (bgs); historic fill being unconsolidated material placed on marshland or similar wet land to raise the grade of the land for development. Beneath the fill layer are alluvial / marsh deposits composed of fine sands and silts with interbedded organic materials extending from eight (8) feet bgs to approximately 32 feet bgs. A clay layer described as having high organic content exists below the sand and extends from 32 ft bgs to approximately 38 ft bgs. This clay layer is potentially discontinuous and may vary in thickness throughout the subject sites. Beneath the

clay layer exists an approximately 20 ft thick native fluvial sand material of fine to medium grain size with some thin clay bands and trace gravel content. Beneath the alluvial sand is another clay layer that is at least 10 ft thick. Bedrock is assumed to be encountered at 150 feet bgs in the vicinity. The generally stratigraphy is summarized from the ground surface down as follows:

1. Fill – historic fill (0 to 8 ft);
2. Fine sands and silts with interbedded organic materials – alluvial / marsh deposits (8 to 32 ft);
3. Clay (32 to 38 ft); and
4. Sand – fluvial deposits (38 ft to 58 ft); and
5. Clay (58 ft to unknown depth; > 10 ft thick).

Based on the regional topography and groundwater contour maps prepared for adjacent properties, the general groundwater flow direction beneath the subject sites is inferred to be in the east/southeasterly direction. A groundwater divide is likely present to the west of the subject sites and is defined by a groundwater high located on the 688-700 Court Street property between the Gowanus Canal and the Henry Street Basin. Groundwater potentially flows radially outward from this location under a low gradient.

Based on a review of soil boring logs from previous investigations on adjacent properties, it is expected that two (2) primary groundwater stratigraphic units exist in this area: 1) Fill and Fine Sand and Silt with interbedded organic materials, and 2) Sand below the clay layer. The clay layer present at approximately 32 feet bgs could potentially serve as a confining unit between the upper and lower groundwater zones.

2.3 PREVIOUS INVESTIGATIONS

This area of Red Hook has been subject to several previous environmental investigations. Below is a synopsis of significant environmental investigations that have occurred on adjacent properties and on the subject sites.

2.3.1 Adjacent Properties

633 Court Street Property

This property is located on Block 492, Lot 1, immediately adjacent to the western boundary of the Former Barrett Manufacturing Site. A Site Characterization (SC) was performed for this property in 2012 that is documented in the *Site Characterization Report for NYSDEC Site No. 224146* dated January 18, 2013 (WSP, 2013). Soil, groundwater and soil vapor were investigated for the former Chemtura Corporation that had historically occupied this parcel. It was determined that soils beneath the 633 Court Street Site were impacted with semi-volatile organic compounds (SVOCs), metals, and poly-chlorinated biphenyls (PCBs). Groundwater was found to be impacted with volatile organic compounds (VOCs), SVOCs, metals, and PCBs. Based on the results of the SC, a RI was proposed to further delineate impacts to soil and groundwater. The results of the RI were not available for review at the time of the writing of this SCWP.

Although this property is not the part of the investigation activities proposed in this SCWP, the findings and results from the previous investigations conducted on the 633 Court Street property by other parties have been considered during the development of the scope of work for this SCWP. Pertinent data previously collected from the 633 Court Street property will continue to be evaluated to provide context for the interpretation of the SC data for the subject sites, and in refining the conceptual site model (CSM).

688-700 Court Street Property

This property is located on Block 621, approximately 50 feet west of the Mica Roofing Site. This particular property was subject to a recent RI detailed in a report titled *Remedial Investigation Report for NYSDEC Site No. 224145*, dated August 26, 2013. Through this RI, it was determined that soils on and off the property were impacted with PCBs, SVOCs, and metals. Groundwater was found to be impacted with VOCs, SVOCs, metals, and PCBs. A feasibility study was proposed to determine a remedial strategy to address the impacts described, and no interim remedial measures were recommended.

Red Hook Smith Street Property

The Red Hook Smith Street property is located at 627-661 Smith Street and occupies Blocks 493 and 495. The property is approximately 75 feet east of the Former Barrett Manufacturing and Mica Roofing Site and is immediately west of the Gowanus Canal. This property has undergone a RI as part of a NYSDEC Voluntary Cleanup Agreement (VCA) and Brownfield Cleanup Program (BCP) requirements to investigate impacts that originated from former Barrett Manufacturing operations that historically existed on the property. Soil, groundwater, and soil vapor were investigated and reported in the *Supplemental Remedial Investigation Report* dated May 2014. It was determined that grossly contaminated soil (GCS) containing VOCs, SVOCs and metals was present on the property and to the west along Halleck Street. Additionally, VOCs and SVOCs were found in groundwater beneath the property and to the west at upgradient monitoring wells along Halleck Street. In 2015, visual and field screening data from a series of four deep soil borings performed in upland areas next to the Gowanus Canal indicated that GCS was predominantly absent from the areas investigated immediately adjacent to the canal (one boring indicated GCS at selected intervals). The four borings were extended to a depth of 70 ft below ground surface into a clay layer.

2.3.2 Former Barrett Manufacturing and Mica Roofing Sites

The Former Barrett Manufacturing and Mica Roofing Sites have not undergone any significant environmental investigations specifically pertaining to their operational histories. However, based on work performed at adjacent properties, it is anticipated that soil and groundwater beneath these two subject sites may be impacted with GCS, VOCs and SVOCs. Soil borings and groundwater monitoring wells were installed along Halleck Street between the Former Barrett Manufacturing and Mica Roofing Sites as part of the RI conducted for the Red Hook Smith Street Site (Langan, 2012). GCS was mapped west of Smith Street on the eastern and southern portions of 628 Smith Street. Soil samples collected from these locations exhibited concentrations of VOCs and SVOCs above the NYSDEC Restricted and Unrestricted Use Soil Cleanup Objectives (SCOs). Additionally, groundwater samples collected from these locations were above the NYSDEC Technical and Operational Guidance Series (TOGS) Ambient Water Quality Standards (AWQS) for VOCs and SVOCs.

2.3.3 Summary of Current Investigations

Below is a summary of the current investigation status of the subject sites and surrounding properties.

Site/Property Name	Block	Lot	Address	Investigation Status

Site/Property Name	Block	Lot	Address	Investigation Status
Former Barrett Manufacturing Site	492	15	182 Sigourney St.	Remedial Investigation pending
		20	628 Smith St.	
Mica Roofing Site	494	1	643 Court St.	Remedial Investigation pending
Red Hook Smith St. Site	493	1	627 Smith St.	Remedial Investigation ongoing as part of Brownfield Cleanup Program
	495	1	659 Smith St.	
633 Court St. – Chemtura Site	492	1	633 Court St.	Site Characterization complete and Remedial Investigation pending
688 – 700 Court St. Chemtura Site	621	1, 34, 134, 136, 139	688 – 700 Court St.	Site Characterization complete, Remedial Investigation complete, Remedial Action pending

SECTION 3

SITE CHARACTERIZATION SCOPE OF WORK

The following sections present the CSM, technical approach, and scope of work for the SC to be performed at the subject sites. The CSM presents the potential sources of contamination on the subject sites, possible migration pathways, and receptors (**Figure 2** and **Figure 3**). The technical approach provides an overview of the strategy and rationale for the investigations proposed in the SC, within the context of the CSM. The technical approach for the SC is consistent with the future development of a reasonable and appropriate remedial action at the subject sites.

The scope of the field investigation activities includes the installation of soil borings, soil vapor points, and monitoring wells. Additionally, hydraulic conductivity tests in the form of slug tests and a tidal study are included in this scope to better characterize groundwater characteristics in and adjacent to the subject sites. Samples of soil, soil gas, groundwater, and NAPL (if present) will be collected for laboratory analysis. Proposed sampling locations are shown on **Figure 4**. **Table 1** provides the rationale for soil boring, soil vapor, NAPL seep, and monitoring well locations and includes proposed samples and analyses for each location. **Table 2** summarizes the anticipated analytical methods and quality control samples required. Sampling locations are subject to change based on accessibility, utility clearance, and conditions encountered during field activities. Significant modifications to the work plan due to conditions encountered during the field activities will be made in consultation with, and under the approval of, NYSDEC.

The investigation field activities described below include the installation of soil borings and monitoring wells on third party properties which are operated by various owners. In addition, the investigation field activities will include observational investigation and surveying the location of the "tar well" structure that is currently located beneath the main floor of the building at 628 Smith Street as further discussed in Section 3.8. As such, coordination with the adjacent property owners will need to be conducted to gain property access to complete the proposed tasks for the SC.

Sampling procedures are described in detail in **Appendix A**, the Field Sampling Plan (FSP). Quality Assurance/Quality Control (QA/QC) procedures are described in **Appendix B**, the Quality Assurance Project Plan (QAPP). A Project Safety, Health, and Environmental Plan (PSHEP) is provided as **Appendix C**.

3.1 CONCEPTUAL SITE MODEL AND TECHNICAL APPROACH

3.1.1 Conceptual Site Model

The CSM for the subject sites and surrounding area is based on information from previous nearby investigations and is presented graphically in **Figure 2** and **Figure 3**. The two subject sites are located in an upland industrial area of Brooklyn near the Gowanus Canal. Former tar manufacturing processes occurred on Block 492, Lot 15 (628 Smith Street) and Block 492, Lot 20 (182 Sigourney Street) – Barrett Manufacturing. These operations are potential sources of tar, petroleum hydrocarbons and other chemicals in soil and groundwater, and there is evidence that these materials could have potentially migrated down into the subsurface materials (e.g., sand with interbedded silt and clay lenses). GCS (including NAPL) has been identified in unsaturated

and saturated soils above the confining clay layer in the an area of former tar tanks and lines on Block 493 Lot 1 and Block 495 Lot 1 (Langan 2012). The GCS extends west across Smith Street toward Block 492 Lot 20, but the extent of the GCS west of Smith Street is not yet defined. A small amount of NAPL has been identified in two monitoring wells on Block 493 Lot 1, indicating that some areas of GCS/NAPL have at least micro-scale mobility (i.e., the NAPL footprint is not expanding, but it has the ability to move into a monitoring well). The GSC/NAPL in the subsurface soils is expected to be many decades old and has likely reached residual saturation [i.e., NAPL is immobilized (trapped) by capillary forces as discontinuous ganglia under ambient groundwater flow conditions (Cohen and Mercer 1993), or similarly, capillary retention forces are greater than the gravitational forces that tend to mobilize the NAPL (Brost and DeVaull 2000)], and is unlikely to have mobility in the unconsolidated subsurface soils to expand its footprint.

Groundwater flow in the unconsolidated groundwater zones on the subject sites is inferred to be in the east/southeasterly direction, based on groundwater contour maps prepared for surrounding properties. The groundwater flow in the area is driven from a topographic high on west of the subject sites on 688-700 Court Street. Portions of the groundwater near the Gowanus Canal may be tidally-influenced, however, based on the previous investigations conducted in the area, the overall groundwater flow is towards the east/southeast. The historical groundwater elevation data suggest that groundwater from the subject sites does not flow west across Court Street toward Red Hook Smith Park. Dissolved-phase constituents (e.g., benzene and naphthalene) are present in the groundwater within the unconsolidated materials, with some of the higher concentrations occurring in the lower portion of the sand with interbedded silt and clay layers. The data indicate that there is a potential for an upgradient off-site source for some of the dissolved-phase volatile organic constituents (e.g., at MW-15 on Block 492 Lot 20, benzene in the sand unit below the clay confining layer).

The majority of the subject sites are covered with buildings, asphalt or concrete cover, therefore, the current potential for direct exposure to contaminated soil at the subject sites is limited. In addition, the groundwater beneath the subject sites and surrounding properties is not used as a drinking water source as documented in New York City's Water Supply System map.

3.1.2 Technical Approach

The technical approach for the SC is to better define the geology and hydro-stratigraphy on the subject sites to provide a framework for characterizing the distribution of chemicals in soil and groundwater. Specifically, the field activities are designed to characterize the nature and extent of tar-related impacts associated with the former Barrett and Mica tar manufacturing facilities in soil, groundwater, and soil vapor.

One focus of the SC is to better define the extent of GCS in soil as initially defined on Block 493 Lot 1 and 495 Lot 1 by Langan (2012) using intermediate and deep soil borings. As a calibration step, one deep boring on Block 492 Lot 20 is proposed adjacent to a boring with known GCS. This deep boring will be used to confirm the stratigraphy at this location and calibrate the identification of GCS with known GCS soil identified by Langan (2012).

Another main component of the SC is the well clusters (three wells) that are geographically positioned across the subject sites to provide a soil boring/well array that will aerially characterize the geology/hydrostratigraphy and will allow the horizontal and vertical distribution of chemicals (and contaminant mass) to be described. The deepest well in each cluster is

proposed to be screened in the sand layer below the clay confining layer (as previously elevated benzene concentrations were reported in this layer). Water level and hydraulic conductivity data gathered from these cluster locations will also be used to understand the groundwater flow directions and transmissive layers in the context of the suspected clay confining layer, as currently defined by previous investigations. Review of historical data from surrounding properties indicates that the hydraulic conductivity of the groundwater zones beneath the subject sites has not been adequately characterized. The extent of tidal influence from the Gowanus Canal on groundwater elevations in the hydrostratigraphic layers will also be evaluated in this well array. The array of proposed well clusters will provide data to guide the selection of an appropriate remedy for the subject sites.

Other strategically placed shallow and intermediate borings and wells are targeted to characterize the soil and groundwater near specific representative potential former sources of contamination (e.g., tar well, underground utilities, above and underground storage tanks). At representative soil boring locations, soil samples for chemical characterization are proposed to be collected at two depths: 1) the observed worst-case based on highest PID readings or visual impacts and 2) below the impacts or bottom of the boring. However, in selected instances, a third surface soil sample (0 to 2 feet) is proposed in order collect representative data to evaluate the potential human exposure to surface soils.

The potential for vapor intrusion is being investigated using near-slab soil gas samples, which is an appropriate technical approach at this stage in the SC.

This technical approach outlined below, will provide data that will define the geologic/hydrostratigraphic units on the subject sites and characterize the distribution of chemicals in soil and groundwater, including the potential for GCS. Collectively, the results will provide a basis for developing a reasonable, relevant, and effective remedy for the subject sites.

3.2 SUBSURFACE UTILITY CLEARANCE PROCEDURE

An inspection will be conducted to refine the locations of the proposed SC points and the proposed scope of work will be reviewed with representatives of the current property owners. As-built diagrams will be reviewed to help plan for access, feasibility, occupant health and safety, worker health and safety, and crowd control. Subsurface utility locations will be reviewed. Proposed locations and methods may be altered in the field based on physical conditions, access, utilities, and public safety. Significant alterations, if necessary, will be made in consultation with the NYSDEC.

Prior to beginning the field investigation work, the Dig Safe New York One-Call Center will be contacted for a Code 753 utility mark-out. No drilling will be conducted until the following minimum requirements have been met:

- The Parsons Project Manager and/or field team leader have inspected the drilling location and surrounding area for the Code 753 mark-out and the location is clear of marked utilities;
- Parsons will retain a private utility locating contractor to conduct a geophysical survey of the proposed sampling locations to locate potential underground utilities or obstructions;

- Utility plates for the subject sites and surrounding area have been provided to Parsons by the New York City Department of Environmental Protection (NYCDEP), Con Edison, Fire Department of New York and/or any other appropriate entities with potential utilities in the vicinity, and reviewed;
- Parsons has met with and reviewed the drilling locations with facility representatives and Honeywell project representative, and verified that drilling locations have been appropriately marked; and
- Each drilling location has been cleared using hand-auger or soft dig techniques to a minimum depth of five (5) feet.

Additional utility clearance measures may be required based on the subsurface utility clearance procedure findings and/or Honeywell/facility specific requirements.

3.3 AIR MONITORING

The proposed investigation and sampling activities described herein may generate fugitive dust or organic vapors. Worker breathing zone air monitoring will be conducted as described in Section 3.3.1. A Community Air Monitoring Program (CAMP) will also be implemented as described in Section 3.3.2.

3.3.1 Worker Air Monitoring

Air monitoring of the worker breathing zone will be conducted continuously during intrusive activities to assure proper health and safety protection for the team and occupants of the facilities. Readings will be taken prior to start of intrusive work at the Site to establish background conditions. Initially, air monitoring will be conducted at the subject site of the investigation (potential source area). If air monitoring identifies the presence of VOCs in the worker breathing zone, guidelines in the PSHEP (**Appendix C**) will be followed regarding action levels, permissible exposure, engineering controls, and personal protective equipment. The following equipment will be used to conduct air monitoring:

- A photoionization detector (PID) (RaeSystems MiniRae 2000 or equivalent) will be used to monitor for organic vapors and benzene;
- A MiniRAM Portable Aerosol Monitor will be used to monitor particulate dust and aerosolized vapors; and
- Cyanide color detector tubes will be used to monitor for hydrogen cyanide, if necessary; alternatively, a MultiRAE 5-Gas Meter equipped with a hydrogen cyanide sensor will be used.

Air monitoring results will be recorded in the field book during investigation activities and made available for NYSDEC and New York State Department of Health (NYSDOH) review.

3.3.2 Community Air Monitoring

Community air monitoring will be conducted using the NYSDOH's Generic Community Air Monitoring Plan (NYSDOH, 2000) as a guidance document (**Appendix D**). Real-time air monitoring for volatile compounds and particulates at the perimeter of the work zone will be performed as described below.

VOC Monitoring

Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of groundwater samples. Periodic monitoring may include obtaining measurements upon arrival at a location, while opening a monitoring well cap, when bailing/purging a well, and upon leaving the location. In some instances, depending on the proximity of exposed individuals, continuous monitoring may be conducted during these activities.

Continuous monitoring for VOCs will be conducted during ground intrusive activities (i.e., hand-clearing, NAPL seep sampling, soil boring installation and monitoring well installation). Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the work zone. Monitoring will be conducted with a PID equipped with a 10.6 eV lamp capable of calculating 15-minute running average concentrations. The following actions will be taken based on organic vapor levels measured:

- If total organic vapor levels exceed 5 parts per million (ppm) above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the work zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet, is below 5 ppm above background for the 15-minute average.
- If the total organic vapor level is above 25 ppm at the perimeter of the work zone, activities will be shut down.

15-minute readings will be recorded and available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, will also be recorded.

Particulate Monitoring

During ground intrusive activities, particulate concentrations will be monitored continuously at the downwind perimeter of the work zone with a portable real-time particulate monitor capable of measuring particulate matter less than 10 micrometers in size and capable of integrating over a period of 15 minutes (or less). The equipment will include an audible alarm to indicate exceedence of the action level. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. The following actions will be taken based on particulate concentrations measured:

- If the downwind particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) above background for the 15-minute period or if dust is observed leaving the work area, then dust suppression techniques such as applying water to the work area will be employed. Work will continue with dust suppression provided that the downwind particulate level does not exceed 150 $\mu g/m^3$ above background, and no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, the downwind particulate level is greater than 150 $\mu g/m^3$ above background, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind particulate level to within 150 $\mu g/m^3$ of the background (upwind) level and in preventing visible dust migration.

Readings will be recorded and be available for NYSDEC and NYSDOH personnel to review.

3.4 SOIL INVESTIGATION

A total of 20 soil borings are proposed to investigate subsurface conditions and the presence and extent of tar-related residue at the subject sites. Half of the drilling locations are soil borings only and the other half are borings that are proposed as part of the installation of monitoring wells. Nine (9) soil borings (PSB03 through PSB11) will be advanced as soil borings only, and 11 additional soil borings (PMW03D, PMW06D, PMW08I, PMW09, PMW12D, PMW15D, PMW18D, PMW19, PMW20, PMW23D, and PMW26D) will be performed during installation of intermediate and deep monitoring wells; monitoring well advancement and installation details are described in Section 3.5. **Figure 4** depicts the proposed boring locations and **Table 1** summarizes the sampling rationale. Boring locations are subject to change based on accessibility, utility clearance, and conditions encountered during the site inspection and field activities.

Each soil boring location will be cleared for utilities as described above in Section 3.2. Drilling will be performed using sonic, Geoprobe®, or hollow stem auger (HSA) methods. Accessibility of soil boring locations, as well as the subsurface conditions encountered, will govern the drilling techniques used. Soil borings proposed within the footprint of the building at 182 Sigourney Street will be advanced using direct push techniques (i.e., Geoprobe®), if possible. It is anticipated that a sonic rig or HSA rig will be used for exterior boring installations, however if warranted by site conditions, a direct push rig may be used instead of sonic or HSA rig.

Based on review of previous adjacent property investigations, it is anticipated that a confining layer will be encountered at an average depth of 30 feet bgs. As such, it is anticipated that borings will be advanced to approximately 30 feet bgs with the exception of PSB01 and PSB03 which will be advanced to 60 feet bgs (**Table 1**). If visually impacted materials are observed at the bottom of the boring, the boring will be continued until un-impacted soils are observed, bedrock is encountered, or the limit of the drilling equipment is reached. At PSB03, the boring will be advanced to the next deepest confining unit at or below 60 feet bgs. In the event that impacted materials are encountered at the interface of a confining layer, this layer will be cased off prior to deeper drilling, to prevent vertical migration of contamination during drilling.

Soil samples will be collected continuously to the bottom of the borings using 5- or 10- foot long sonic core barrels, 5-foot long macrocore samplers, or 2-foot long split spoons, depending on the type of drill rig used. Soil samples retrieved from each boring will be visually classified for soil type, grain size, texture, moisture content, and visible evidence of staining or impacts. Each sample will also be screened for the presence of VOCs with a PID. In addition, a sample from each 2-foot interval will be collected in a sealed plastic bag and the sample headspace will be screened for the presence of VOCs with a PID.

Two soil samples will be selected from each boring location and submitted to a laboratory for chemical analysis, except where surface soil samples will be collected as noted below (see **Table 1**). The two samples will be collected as follows:

- One sample will be collected from the zone within the soil boring that exhibits highest PID readings or visual impacts. If no visual impacts or elevated PID readings are observed, a sample will be collected from directly above the water table.
- One sample will be collected below the impacted zone or near the base of the boring to define the vertical extent of impacts at that location.

At six (6) boring locations surface soil samples will also be collected. Surface Soil samples will be collected at three (3) locations on the Former Barrett Manufacturing Site (PSB04, PSB05, and PMW08I) and three (3) locations on the Mica Roofing Site (PMW15D, PMW18D, and PMW26D). Surficial soil samples are intended to determine whether shallow soils are contaminated and could potentially impact sensitive receptors. Additional soil samples may be collected based on field observations.

Soil samples will be submitted for laboratory analysis for Target Compound List (TCL) VOCs by EPA Method 8260, TCL SVOCs by EPA Method 8270 (including phenol), Target Analyte List (TAL) metals by EPA Method 6010 (or updated), and cyanide by EPA Method 9012B (or updated). Selected soil samples will be submitted for PCBs by EPA method 8082 (**Table 1**). Geotechnical soil samples will be collected from specific soil borings during the investigation field activities, as described in **Table 1**. The soil samples that are most representative of the full subsurface stratigraphy and material will be selected for geotechnical laboratory testing. The geotechnical laboratory testing may consist of moisture content (ASTM D2216) and grain size (ASTM D422), if warranted based on visual observations. This geotechnical data will be used in the evaluation of the remedial approach and subsequent design of the selected remedial alternative for the subject sites.

One (1) boring (SB03) is proposed to establish the stratigraphy and confirm and calibrate the identification of GCS/LNAPL in areas previously investigated during the RI west of the Red Hook property (Block 492 Lot 20) by Langan (2012) (**Table 1**). Boring SB03 is a deep boring proposed adjacent to existing boring MW-15 (Block 492 Lot 20). No soil samples for traditional chemical analyses (as described above) is proposed from this boring as it is within an area previously characterized during the RI at the Red Hook property (Langan 2012).

If free phase NAPL is encountered, representative samples may be submitted for forensic fingerprinting analysis to a lab that specializes in analyzing and determining the origin of NAPL samples. Fingerprint analysis is expected to utilize GC/FID fingerprint and total petroleum hydrocarbons (TPH) by EPA Method 8100M. NAPL samples may also be submitted for poly-cyclic aromatic hydrocarbons (PAHs), alkylated PAHs, and selected petroleum biomarkers by GC/MS by EPA Method 8270M.

Borings that are not converted into monitoring wells will be grouted to the surface following completion. Borings in asphalt or concrete will be repaired and patched with similar materials. Drilling equipment will be decontaminated between each boring in accordance with procedures specified in the FSP included as **Appendix A**. Drill cuttings and decontamination water will be containerized in accordance with procedures also specified in the FSP and will be staged on a decontamination pad to serve as secondary containment. A description of the decontamination pad is provided in Section 3.1 of the FSP in **Appendix A**.

3.5 GROUNDWATER INVESTIGATION

3.5.1 Monitoring Well Installation

A total of twenty six (26) monitoring wells (PMW01 through PMW26D) will be installed at the proposed locations shown on **Figure 4**. **Table 1** summarizes the rationale for the location, depth, and samples collected from monitoring wells. Monitoring well borings will be advanced to depths ranging from 30 feet to 60 feet bgs to characterize shallow, intermediate, and deep stratigraphy and groundwater chemistry. Shallow (S), intermediate (I) and deep (D) screened monitoring wells are proposed for the SC, including one (1) well pair (S and I wells) and seven (7) well clusters (S, I and D wells). The deepest well in a pair or cluster will be performed first. Upon completion of a monitoring well boring to the desired depth, the boring will be converted to become the deeper well in the cluster. Although shallow and intermediate monitoring wells will be installed immediately adjacent to the deep monitoring well, where stratigraphy was characterized, additional soil logging will be performed in the S and I well borings. The shallow screened monitoring well will straddle the groundwater table and provide shallow groundwater chemistry of the upper groundwater zone. Intermediate monitoring wells will be screened immediately above the clay confining unit and will provide groundwater chemistry of the lower portion of the shallow groundwater zone. Deep monitoring wells will be screened below the clay confining unit and will provide groundwater chemistry from the lower sand groundwater zone. During the installation of deep wells, if a confining clay layer is not present, the boring will be advanced to a maximum depth of 60 feet. If visually impacted materials are observed at the bottom of the boring, the boring will be continued until un-impacted soils are observed, bedrock is encountered, or the limit of the drilling equipment is reached. In the event that impacted materials are encountered at the interface of a confining layer, this layer will be cased-off prior to deeper drilling, to prevent vertical migration of contamination. Based on review of previous adjacent site investigations, depth to groundwater is anticipated to be less than 10 feet bgs.

The monitoring wells will be used to: characterize groundwater chemistry conditions, assess groundwater flow direction, evaluate the presence of NAPL, conduct slug tests (detailed in Section 3.10), conduct a tidal study (detailed in Section 3.11), and evaluate the potential impact of tar residuals and other constituents on groundwater quality.

Monitoring well borings will be advanced using a sonic rig or HSA rig as described in Section 3.4. Where specified, two (2) or three (3) soil samples will be selected from each monitoring well boring location and submitted to the laboratory for chemical analysis as described in Section 3.4 and **Table 1**.

The monitoring wells will be constructed with 2-inch ID, threaded, flush-joint, polyvinyl chloride (PVC) casing and approximately 10 feet of 0.02-inch slot screens. A 2-foot sump will be placed below the screens at locations where NAPL is observed during installation of the monitoring well boring. The annulus around the screens will be backfilled with silica sand having appropriate size for the subsurface conditions (e.g., Morie No. 2). For shallow monitoring wells, the screens will be placed across the water table to allow for the monitoring of light non-aqueous phase liquid (LNAPL), if present.

The monitoring wells will be constructed, developed, and purged for sampling in accordance with the FSP, QAPP, and PSHEP.

3.5.2 Monitoring Well Development and Sampling

After a minimum of 24 hours after installation, monitoring wells will be developed until the well is reasonably free of sediment (less than 50 nephelometric turbidity units [NTU] if possible) or until the pH, temperature and conductivity stabilize. A maximum of one to two hours of development time per well is anticipated. The level of effort, however, is dependent upon the nature of the soils at each location.

Groundwater sampling will commence a minimum of two weeks after well development. Groundwater samples will be collected from the twenty six (26) monitoring wells (PMW01 through PMW26D). Prior to sampling, the headspace within each well will be measured with a PID. An oil/water level interface probe and/or a water level indicator will be used to measure the depths to the water table and thickness of any free-phase product in the wells. Groundwater sampling will be conducted in accordance with the January 19, 2010 *USEPA Region 1 Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells*. Groundwater samples will then be collected using dedicated sampling equipment (e.g., pump tubing). During low flow groundwater sampling, if it is determined that monitoring wells have recharge rates that are not high enough for low flow sampling, volume averaged sampling will be performed instead on those wells. During volume averaged sampling, a minimum of three (3) well volumes will be purged from the monitoring well and samples will be collected via a clean bottom-fill bailer.

Prior to filling the sample bottles, the turbidity, pH, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP) and conductivity of the sample will be measured and recorded. The groundwater samples will be analyzed at the laboratory for TCL VOCs by EPA Method 8260, TCL SVOCs by EPA Method 8270, and TAL metals by EPA Method 6010 (or updated). Selected water samples will be submitted for PCBs by EPA method 8082 (**Table 1**). Sampling procedures are described in detail in the FSP (**Appendix A**). QA/QC procedures are described in the QAPP (**Appendix B**). In addition, if NAPL (LNAPL or dense non-aqueous phased liquid [DNAPL]) is encountered in a monitoring well, a representative sample may be submitted for laboratory analysis in order to determine the characteristics of the material.

The monitoring well gauging and sampling activities will be performed in accordance with the protocols and procedures set forth in the FSP, QAPP and PSHEP.

3.6 VAPOR INTRUSION INVESTIGATION

Soil vapor samples will be collected from eight (8) locations (PNSG01 through PNSG08) on the subject sites as shown on **Figure 4** to assess the potential for VOC migration through the unsaturated zone and into the occupied portions of structures. Where soil borings and monitoring wells are co-located with soil vapor sampling points, soil vapor sampling will be conducted prior to borehole advancement. Soil vapor samples will be near-slab samples and installed as close to the exterior building foundations as is practical based on field conditions in order to adequately assess the potential for vapor migration into buildings. **Table 1** summarizes the sampling rationale. Soil vapor samples will be collected in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion (NYSDOH, 2006).

One soil vapor sample will be collected from each location at a depth that is approximately equal to the depth of the building foundation (estimated at four (4) feet bgs). Actual depths will be determined in the field based on available information (e.g., building construction drawings,

measurements taking inside the building, discussions with property owners, etc.) and in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion (NYSDOH, 2006). Prior to installing the soil vapor sample probe, underground utility clearance protocols will be followed and pre-clearance soil vapor points will be backfilled with bentonite clay and soil. Following installation of the soil vapor sampling probe to the appropriate depth, the integrity of the surface seal will be checked by using helium as a tracer gas. The immediate atmosphere around the point where the probe is inserted into the ground will be enriched with helium. The sample will be purged with a helium meter to check for the presence of helium. This will be done on the first two (2) soil vapor samples. Once the adequacy of the sampling technique has been verified, the helium testing will be discontinued. The soil vapor samples will be collected in 6-liter certified clean Summa canisters fitted with flow controllers calibrated to collect a soil vapor sample at a rate of 0.2 liters per minute. Soil vapor samples will be submitted to the laboratory for analysis of VOCs using a modified EPA Method TO-15.

3.7 NAPL SEEP SAMPLING

Historically, NAPL has been observed on the ground surface on and adjacent to the subject sites. It has been reported that this NAPL originates from the subsurface and seeps onto the ground or up through asphalt cover material. Based on a review of historical reports where NAPL seeps were sampled, it has been determined that this material has not been fully characterized. During the SC, a survey of the subject sites and surrounding area will be conducted to determine the number and locations of potential NAPL seeps. If present, NAPL-impacted soils will be collected from the four (4) previously identified areas were seeps were observed, depicted on **Figure 4** and referenced in **Table 1** PNSEEP1 through PNSEEP4 will be collected via decontaminated or dedicated disposable sampling equipment from depths between one (1) and two (2) feet bgs and will be submitted for SVOC and PCB laboratory analysis. If possible given current accessibility and field determinations, seep sample locations may be co-located with proposed soil borings in order to reduce the total number of intrusive locations.

3.8 SITE SURVEY

Surveying activities will be conducted during the investigation field activities in order to obtain data on the current subject sites and adjacent features. Planimetric features that will be surveyed include building footprints, municipal block/lot extents, sidewalk features, and ground surface elevations. The locations and elevations of the soil borings, monitoring wells, and soil vapor points will be surveyed by a Professional Surveyor licensed in the State of New York. Vertical control of elevations will be established to the nearest 0.01-foot. Horizontal coordinates and vertical elevations of locations will be referenced to the New York State Plane Eastern Zone of the North American Datum of 1983 and the North American Vertical Datum of 1988, respectively. The updated survey data will be incorporated into a base map used for report and future drawings.

The licensed surveyor will also be subcontracted by Parsons and used to document the location of the “tar well” structure that is currently located beneath the main floor of the building at 628 Smith Street. The survey will be based on the approximate location and dimensions of the tar well from historical maps and information obtained from the site manager at 628 Smith Street. The surveyed location of this structure will be used to evaluate the merits of additional investigations within the building and in developing potential future remedial strategies associated with the structure contents.

3.9 SYNOPTIC GROUNDWATER LEVEL MEASUREMENTS

Groundwater level measurements will be obtained from each of the twenty six (26) new monitoring wells, and wells on surrounding properties, as permitted, to facilitate development of groundwater contour maps and depiction of groundwater flow directions. Groundwater level measurements in wells on surrounding properties will be obtained only as permitted by the property owners. One round of synoptic water level measurements from all wells will be collected and used to prepare groundwater contour maps for multiple groundwater zones (shallow, intermediate and deep), and for determining vertical gradients between the groundwater zones. The water level measurements in the wells will be made with an electronic oil/water interface probe to the nearest 0.01 foot in each well. Details on the procedures for performing water level measurements are provided in the FSP.

3.10 SLUG TESTING

Slug testing will be conducted on a representative number of wells within main hydrostratigraphic units at the subject sites. Slug tests (falling and rising head) will be performed on twenty one (21) wells in seven well clusters that are geographically-spaced across the two subject sites. Slug tests will be performed on the shallow, intermediate and deep wells in the seven clusters. The slug test results will be interpreted and hydraulic conductivities calculated based on the method of Bouwer (1998), and Bouwer and Rice (1976), or a similarly appropriate method. Slug testing procedures are described in detail in the FSP.

3.11 TIDAL STUDY

Based on the subject sites' proximity to the historic Gowanus creek and its current proximity to the Gowanus Canal bank, a tidal study will be conducted to evaluate the effects that tidal fluctuations in the canal have on groundwater elevations and flow directions beneath the subject sites. These data will also be used to determine whether the tidal fluctuations affect the migration of groundwater and contaminants. The tidal study will be conducted by placing pressure transducers with automatic data loggers in eighteen (18) monitoring wells to record groundwater levels over a 24-hour period. The transducers will be place at five (5) geographically spaced well clusters (15 wells: PMW01/02I/03D, PMW10/11I/12D, PMW16/17I/18D, PMW21/22I/23D, and PMW24/25I/26D) and three (3) wells screened across the water table (PMW09, PMW19, and PMW20). Tidal study procedures are described in detail in the FSP.

3.12 LABORATORY ANALYSIS AND VALIDATION

Laboratory analyses of soil and groundwater samples will be conducted by a NYSDOH Environmental Laboratory Analysis Program (ELAP-) approved laboratory certified for analyses using the most recent Analytical Services Protocol (ASP). Laboratory analyses will be conducted in accordance with USEPA SW-846 methods and standard deliverable format. Geotechnical analyses will be conducted in accordance with ASTM methods.

Table 2 summarizes the anticipated analytical methods and quality control samples required. QA/QC procedures required by the SW-846 methods will be followed, including initial and continuing instrument calibrations, standard compound spikes, surrogate compound spikes, and analysis of other samples (blanks, laboratory control samples, matrix spikes/matrix spike duplicates, etc.). The laboratory will provide sample bottles, which have been pre-cleaned and preserved in accordance with the SW-846 methods. Aqueous VOC samples will be preserved using hydrochloric acid. NYSDEC ASP holding times will be adhered to. Note that the SW-846

methods have are incorporated into the NYSDEC ASP. Where there are differences in the SW-846 and NYSDEC ASP requirements, the NYSDEC ASP shall take precedence.

Data validation will be performed in accordance with USEPA Region II standard operating procedures (SOPs) for organic and inorganic data review. These validation guidelines are regional modifications to the National Functional Guidelines for organic and inorganic data review (USEPA 1999 and 2004). Validation will include the following:

- Verification of 100% of all quality control (QC) sample results (both qualitative and quantitative);
- Verification of the identification of 100% of sample results (both positive hits and non-detects);
- Re-calculation of 10% of all investigative sample results; and
- Preparation of a Data Usability Summary Report (DUSR).

Data reduction, validation, and reporting procedures are provided in the QAPP (**Appendix B**).

Chemical analysis of soil, soil gas, and groundwater samples will require the collection of a duplicate sample for every 20 samples submitted for analysis. Additional sample volume collection will not be required for the lab to perform the QC analyses. Data validation will be performed in accordance with USEPA Region II standard operating procedures (SOPs) for organic and inorganic data review. These validation guidelines are regional modifications to the National Functional Guidelines for organic and inorganic data review (USEPA 1999 and 2004). Data reduction, validation, and reporting procedures are provided in the QAPP (**Appendix B**).

3.13 WASTE MANAGEMENT

Investigation-derived wastes (IDW) generated during the SC will be containerized. Soils will be placed in 55-gallon Department of Transportation (DOT-) approved drums that are labeled appropriately. Plastic sheeting and personal protective equipment will be consolidated in DOT-approved drum(s). Fluids will be placed in DOT-approved fluid drums with closed tops. The drums will be staged in a secure area as determined by Parsons and facility representatives prior to proper characterization and disposal.

SECTION 4

QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

Pursuant to with DER-10, a Qualitative Human Health Exposure Assessment (QHHEA) will be prepared and included in the Site Characterization Report (SCR). The QHHEA will identify areas of concern and chemicals of concern, evaluate actual or potential exposure pathways, characterize the potentially exposed receptors (residents, workers, recreational users, etc.), and identify how any unacceptable exposures might be eliminated/mitigated.

SECTION 5

PROJECT ORGANIZATION

This SC will be completed for Honeywell by Parsons. Key members of the project team are identified below:

Key Position	Contact Name
Honeywell Project Manager	Mr. Steve Coladonato Telephone: (302) 791-6738 E-mail: Steven.Coladonato@Honeywell.com
Parsons Project Manager	Mr. Daniel Martoccia Telephone: (732) 537-3557 Fax: (732) 537-3502 E-mail: Daniel.Martoccia@Parsons.com
Parsons Technical Director	Mr. Paul Feshbach-Meriney, PG, LSP, LSRP Telephone: (617) 449-1561 Fax: (617) 946-9777 E-mail: Paul.Feshbach-Meriney@Parsons.com
Parsons Health and Safety Officer	Mr. Gregory Beck Telephone: (732) 537-3502 Fax: (732) 868-3110 E-mail: Gregory.Beck@Parsons.com
Parsons Field Representative:	TBD Telephone: Fax: E-mail:

SECTION 6

PROJECT SCHEDULE

The schedule presented below is based on an assumption that access agreements for the subject sites and surrounding properties where investigation is proposed will be completed at the time of the approved SCWP. It is important to note that the schedule shown below presents the duration of time to complete the described tasks for SC activities and some tasks may be dependent upon the successful completion of an earlier task. The durations listed below are from when this SCWP is approved by the NYSDEC.

Task	Duration
Implementation of SC Activities (subject to access agreements)*	16 weeks
Data Validation	4 weeks
Preparation of SC Report	12 weeks

* Implementation is expected to start within 8 to 12 weeks of approval of this SCWP.

SECTION 7

REFERENCES

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TABLES

Table 1
Proposed Sampling Locations, Analyses, and Rationale
Former Barrett Manufacturing and Mica Roofing
Brooklyn, Kings County, New York

Location ID	Location (Block/Lot)	Depth (feet)	Location Description	Sampling Strategy	Laboratory Analytical																Rationale
					Soil / NAPL										Groundwater					Air	
					VOCs	SVOCs[2]	Metals & Cn	PCBs	Grain Size	TPH	NAPL Finger-print[2]	NAPL Specific Gravity	NAPL Viscosity	NAPL Phys. Prop. Package (PTS)	VOCs	SVOCs[2]	Metals & Cn	TPH (sheen net)	PCBs	VOCs	
PNSEEP1	494/1	1-2	Parking area near Halleck Street/Court Street	Collect a grab sample of the tar material just below the ground surface near seep RHB2 in the former Manufacturing Pitch area	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	Characterize further the nature of the tar in the seep at 494/1
PNSEEP2	N-A	1-2	In right-of way on Halleck Street	Collect a grab sample of the tar material just below the ground surface near seep HSR2 in Halleck Street north of former Manufacturing Pitch area.	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	Characterize further the nature of the tar in the seep in Halleck Street
PNSEEP3	619/1	1-2	Grassy area next to Red Hook Recreation Center path	Collect a grab sample of the tar material just below the ground surface near seep CSR1A in the southeastern corner of Red Hook Recreation Center	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	Characterize further the nature of the tar in the seep in southeast corner of Red Hook Smith Park
PNSEEP4	N-A	1-2	Grassy area next to Red Hook Recreation Center along Court Street	Collect a grab sample of the tar material just below the ground surface near seep CSR1B in the Halleck Street right of way south of the Red Hook Recreation Center.	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	Characterize further the nature of the tar in the seep in the Halleck Street right of way south of Red Hook Smith Park.
PSB03[4]	492/20	60	In right-of-way on Halleck Street	Collect soil samples continuously in boring for visual identification of soil and GCS- to the next confining unit below 60 feet bgs. Collect 2 soil samples: most contaminated below 40 ft., and for vertical delineation at depth or bottom of boring.	2	2	2	0	4	10	2	2	2	1	0	0	0	0	0	0	Obtain full stratigraphy and GCS calibration next to MW15 (S, Ia, Ib, and D). This boring also addresses data gaps identified in the NYSDEC December 24, 2014 comment letter to CF Smith, LLC on the Supplemental Remedial Investigation Report at 627-677 Smith Street, regarding the depth of MW15.
PSB04	492/15	30	In parking area between buildings	Collect 3 soil samples: surface 0-2', most contaminated, and for vertical delineation at depth or bottom of boring.	3	3	3	3	0	1	0	0	0	0	0	0	0	0	0	0	Characterize soil chemistry immediately downgradient of the Stills and Oil House at 421/1.
PSB05	492/15	30	Along the western edge of the building at 182 Sigourney Street	Collect 3 soil samples: surface 0-2', most contaminated, and for vertical delineation at depth or bottom of boring.	3	3	3	3	0	1	0	0	0	0	0	0	0	0	0	0	Characterize soil chemistry below the Saturation Room at 492/15,and downgradient of the Pitch Shed on 421/1. And supplement the distribution of GCS previously defined by Langan.
PSB06	N of 492/15	30	In right-of-way on Sigourney Street	Collect 2 soil samples: most contaminated, and for vertical delineation at depth or bottom of boring.	2	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	Characterize soil chemistry along the underground sewer line in Sigourney Street alley and west of Saturating Room north of 492/15.
PSB07	492/20	30	In right-of-way on Smith Street	Collect 2 soil samples: most contaminated, and for vertical delineation at depth or bottom of boring.	2	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	Characterize shallow stratigraphy and soil chemistry downgradient and northeast of the tar well under main floor at 492/20.

Table 1
Proposed Sampling Locations, Analyses, and Rationale
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Brooklyn, Kings County, New York

Location ID	Location (Block/Lot)	Depth (feet)	Location Description	Sampling Strategy	Laboratory Analytical																Rationale
					Soil / NAPL										Groundwater					Air	
					VOCs	SVOCs[2]	Metals & Cn	PCBs	Grain Size	TPH	NAPL Finger-print[2]	NAPL Specific Gravity	NAPL Viscosity	NAPL Phys. Prop. Package (PTS)	VOCs	SVOCs[2]	Metals & Cn	TPH (sheen net)	PCBs	VOCs	
PSB08	494/1	30	In parking area next to Halleck Street	Collect 2 soil samples: most contaminated, and for vertical delineation at depth or bottom of boring.	2	2	2	2	0	1	0	0	0	0	0	0	0	0	0	0	Characterize soil chemistry beneath the former Stills, and the extent of PCBs (from 688 Court Street) at 492/20.
PSB09	494/1	30	In parking area next to Halleck Street	Collect 2 soil samples: most contaminated, and for vertical delineation at depth or bottom of boring.	2	2	2	2	0	2	0	0	0	0	0	0	0	0	0	0	Characterize soil chemistry beneath the eastern portion of the former Manufacturing Pitch area, and the extent of PCBs (from 688 Court Street) at 494/1.
PSB10	494/1	30	In parking area next to Halleck Street	Collect 2 soil samples: most contaminated, and for vertical delineation at depth or bottom of boring.	2	2	2	2	0	1	0	0	0	0	0	0	0	0	0	0	Characterize soil chemistry beneath an area upgradient of the Pitch Storage area to define the extent of GCS at 492/20, based on previously identified GCS near Halleck Street at MW14 by Langan.
PSB11	494/1	30	In parking area next to Smith Street	Collect 2 soil samples: most contaminated, and for vertical delineation at depth or bottom of boring.	2	2	2	2	0	1	0	0	0	0	0	0	0	0	0	0	Characterize soil chemistry beneath an area on the downgradient side of 494/1 and upgradient of 495/1 to define the extent of GCS at R-SR-14 and R-EB09 on 495/1, as defined by Langan.
PMW01[4]	492/20	25	In right-of-way on Smith Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow stratigraphy and shallow groundwater chemistry downgradient of the southern portion of the tar well under main floor at 492/20.
PMW02I[4]	492/20	35	In right-of-way on Smith Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate stratigraphy and intermediate groundwater chemistry above the confining unit downgradient of the southern portion of the tar well under main floor at 492/20.
PMW03D[4]	492/20	55	In right-of-way on Smith Street	Soil - collect 2 samples: most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	2	2	2	0	0	2	1	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate/deep stratigraphy and soil chemistry, and deep groundwater chemistry below the confining unit downgradient of the southern portion of the tar well under main floor at 492/20.
PMW04[4]	492/20	30	In right-of-way on Smith Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow stratigraphy and shallow groundwater chemistry downgradient of the northern portion of the tar well under main floor at 492/20.
PMW05I[4]	492/20	40	In right-of-way on Smith Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate stratigraphy and intermediate groundwater chemistry above the confining unit downgradient of the northern portion of the tar well under main floor at 492/20.
PMW06D[4]	492/20	60	In right-of-way on Smith Street	Soil - collect 2 samples: most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	2	2	2	0	4	2	1	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate/deep stratigraphy and soil chemistry, and deep groundwater chemistry below the confining unit downgradient of the northern portion of the tar well under main floor at 492/20.
PMW07	N of 492/20	30	In roadway on Sigourney Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow stratigraphy and soil chemistry and shallow groundwater chemistry north of the tar well under main floor at 492/20.
PMW08I	N of 492/20	40	In roadway on Sigourney Street	Soil - collect 3 samples: surface 0-2', most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	3	3	3	0	0	1	0	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate stratigraphy and intermediate groundwater chemistry above the confining unit north of tar well under main floor at 492/20.
PMW09	492/15	30	In parking area between buildings	Soil - collect 2 samples: most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	2	2	2	2	0	1	0	0	0	0	1	1	1	1	0	0	Characterize shallow stratigraphy and soil chemistry, and shallow groundwater chemistry near underground sewer, an above ground storage tank near Saturating Room at 492/15.

Table 1
Proposed Sampling Locations, Analyses, and Rationale
Former Barrett Manufacturing and Mica Roofing
Brooklyn, Kings County, New York

Location ID	Location (Block/Lot)	Depth (feet)	Location Description	Sampling Strategy	Laboratory Analytical																Rationale
					Soil / NAPL										Groundwater					Air	
					VOCs	SVOCs[2]	Metals & Cn	PCBs	Grain Size	TPH	NAPL Finger-print[2]	NAPL Specific Gravity	NAPL Viscosity	NAPL Phys. Prop. Package (PTS)	VOCs	SVOCs[2]	Metals & Cn	TPH (sheen net)	PCBs	VOCs	
PMW10[4]	492/1	30	In sidewalk along Court Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow stratigraphy and shallow groundwater chemistry upgradient of 421/1. [Use existing well MW102 as shallow well if the existing well is deemed sound and appropriate.]
PMW11I[4]	492/1	40	In sidewalk along Court Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate stratigraphy and intermediate groundwater chemistry above the confining unit upgradient of 421/1.
PMW12D[4]	492/1	60	In sidewalk along Court Street	Soil - collect 2 samples: most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	2	2	2	0	4	1	0	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate/deep stratigraphy and soil chemistry, and deep groundwater chemistry below the confining unit upgradient of 421/1.
PMW13[4]	494/1	30	In parking area along Halleck Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	Characterize shallow stratigraphy and shallow groundwater chemistry in Manufacturing Pitch area of 494/1.
PMW14I[4]	494/1	40	In parking area along Halleck Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	Characterize shallow/intermediate stratigraphy and intermediate groundwater chemistry above the confining unit in Manufacturing Pitch area of 494/1.
PMW15D[4]	494/1	60	In parking area along Halleck Street	Soil - collect 3 samples: surface 0-2', most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	3	3	3	3	4	1	0	0	0	0	1	1	1	1	1	0	Characterize shallow/intermediate/deep stratigraphy and soil chemistry, and deep groundwater chemistry below the confining unit in Manufacturing Pitch area of 494/1.
PMW16[4]	494/1	30	In parking area near Court Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	Characterize shallow stratigraphy and shallow groundwater chemistry in Roofing Paper Facility area of 494/1. [Use existing well MW-03 as shallow well if the existing well is deemed sound and appropriate.]
PMW17I[4]	494/1	40	In parking area near Court Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	Characterize shallow/intermediate stratigraphy and intermediate groundwater chemistry above the confining unit in Roofing Paper Facility area of 494/1.
PMW18D[4]	494/1	60	In parking area near Court Street	Soil - collect 3 samples: surface 0-2', most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	3	3	3	3	4	1	0	0	0	0	1	1	1	1	1	0	Characterize shallow/intermediate/deep stratigraphy and soil chemistry, and deep groundwater chemistry below the confining unit in Roofing Facility area of 494/1.
PMW19[3]	494/1	30	In parking area near Halleck Street	Soil - collect 2 samples: most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	2	2	2	0	0	1	0	0	0	0	1	1	1	1	1	0	Characterize shallow stratigraphy and soil chemistry, and shallow groundwater chemistry near underground storage tank in the northern portion of 494/1.
PMW20[3]	494/1	30	In parking area south of building at 643 Court Street	Soil - collect 2 samples: most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	2	2	2	2	0	1	0	0	0	0	1	1	1	1	1	0	Characterize shallow stratigraphy and soil chemistry, and shallow groundwater chemistry near two former above ground storage tanks in the southern portion of 494/1, and in along the downgradient lot boundary.
PMW21[4]	494/1	30	In vegetated area next to Smith Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow stratigraphy and shallow groundwater chemistry in southeast corner of 494/1.
PMW22I[4]	494/1	40	In vegetated area next to Smith Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate stratigraphy and intermediate groundwater chemistry above the confining unit in southeast corner of 494/1.

Table 1
Proposed Sampling Locations, Analyses, and Rationale
Former Barrett Manufacturing and Mica Roofing
Brooklyn, Kings County, New York

Location ID	Location (Block/Lot)	Depth (feet)	Location Description	Sampling Strategy	Laboratory Analytical																Rationale
					Soil / NAPL										Groundwater					Air	
					VOCs	SVOCs[2]	Metals & Cn	PCBs	Grain Size	TPH	NAPL Finger-print[2]	NAPL Specific Gravity	NAPL Viscosity	NAPL Phys. Prop. Package (PTS)	VOCs	SVOCs[2]	Metals & Cn	TPH (sheen net)	PCBs	VOCs	
PMW23D[4]	494/1	60	In vegetated area next to Smith Street	Soil - collect 2 samples: most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	2	2	2	0	4	1	0	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate/deep stratigraphy and soil chemistry, and deep groundwater chemistry below the confining unit in southeast corner of 494/1.
PMW24[4]	494/1	30	In parking area at the corner of Smith Street and Halleck Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow stratigraphy and shallow groundwater chemistry in northeast corner downgradient portion of 494/1.
PMW25I[4]	494/1	40	In parking area at the corner of Smith Street and Halleck Street	Soil - None. Groundwater - collect 1 sample	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate stratigraphy and intermediate groundwater chemistry above the confining unit in in northeast corner downgradient portion of 494/1.
PMW26D[4]	494/1	60	In parking area at the corner of Smith Street and Halleck Street	Soil - collect 3 samples: surface 0-2', most contaminated, and for vertical delineation at depth or bottom of boring. Groundwater - collect 1 sample.	3	3	3	0	0	3	0	0	0	0	1	1	1	1	0	0	Characterize shallow/intermediate/deep stratigraphy and soil chemistry, and deep groundwater chemistry below the confining unit in northeast corner downgradient portion of 494/1.
PNSG01	492/20	1	In right-of-way on Sigourney Street	Collect 1 near slab soil gas sample adjacent to the foundation floor outside the building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Characterize soil gas near the floor slab of the building at 492/20.
PNSG02	492/20	1	In right-of way on Smith Street	Collect 1 near slab soil gas sample adjacent to the foundation floor outside the building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Characterize soil gas near the floor slab of the building at 492/20.
PNSG03	492/20	1	In right-of-way on Halleck Street	Collect 1 near slab soil gas sample adjacent to the foundation floor outside the building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Characterize soil gas near the floor slab of the building at 492/20.
PNSG04	492/20	1	In parking area behind building at 182 Sigourney Street	Collect 1 near slab soil gas sample adjacent to the foundation floor outside the building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Characterize soil gas near the floor slab of the building at 492/20.
PNSG05	494/1	1	In parking area west of building at 643 Court Street	Collect 1 near slab soil gas sample adjacent to the foundation floor outside the building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Characterize soil gas near the floor slab of the building at 494/1.
PNSG06	494/1	1	In parking area north of building at 643 Court Street	Collect 1 near slab soil gas sample adjacent to the foundation floor outside the building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Characterize soil gas near the floor slab of the building at 494/1.
PNSG07	494/1	1	In parking area east of building at 643 Court Street	Collect 1 near slab soil gas sample adjacent to the foundation floor outside the building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Characterize soil gas near the floor slab of the building at 494/1.
PNSG08	494/1	1	In parking area south of building at 643 Court Street	Collect 1 near slab soil gas sample adjacent to the foundation floor outside the building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Characterize soil gas near the floor slab of the building at 494/1.

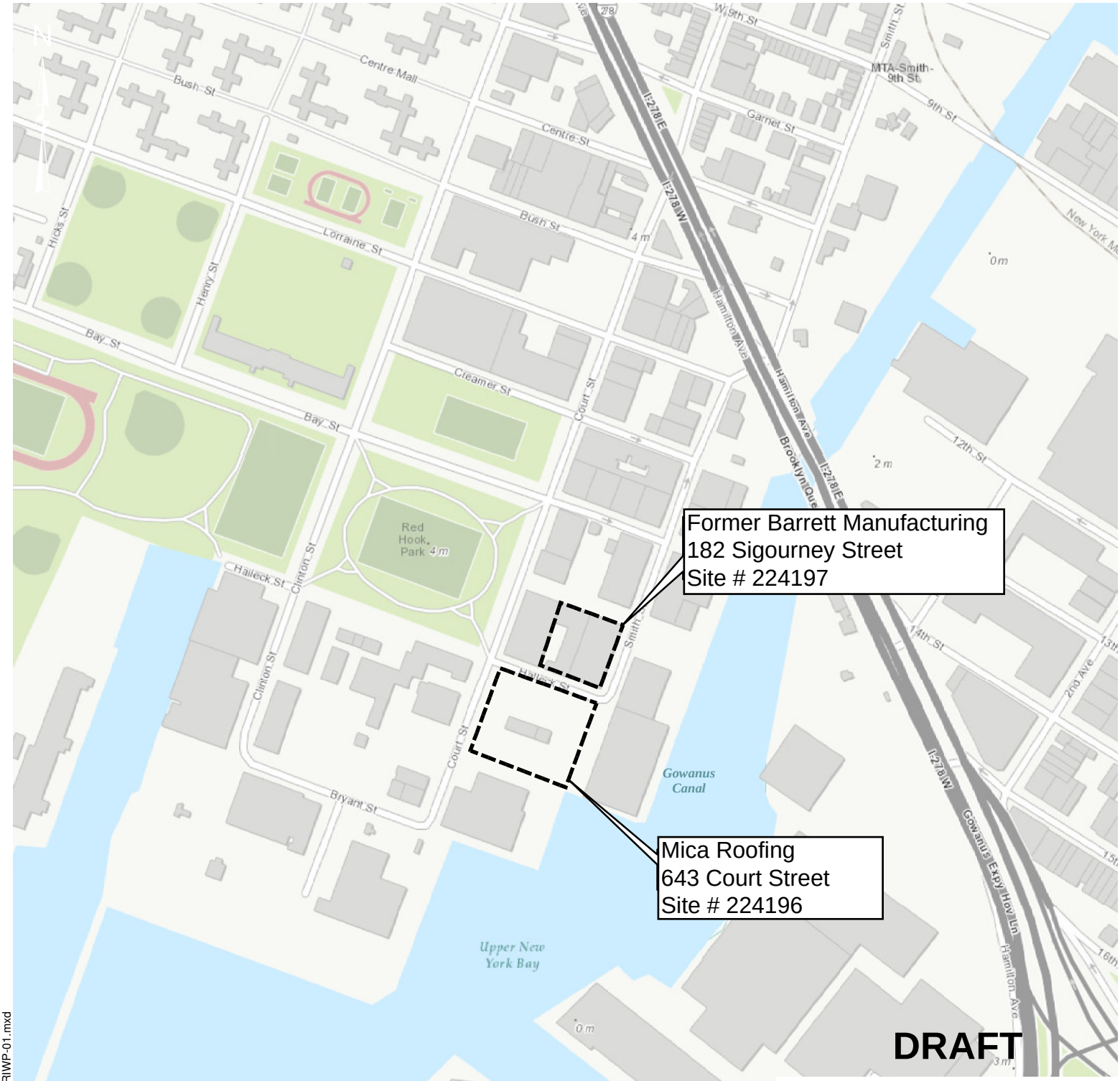
Notes:

1) GCS = Grossly Contaminated Soil as defined by NYSDEC.
2) SVOC and NAPL Fingerprinting shall report ABN compounds including phenols.
3) An intermediate well may be installed depending on chemical results at depth from other nearby wells. Intermediate well is currently not planed.
4) This location also addresses a data gap identified in NYSDECs December 24, 2014 comment letter to CF Smith, LLC on the Supplemental Remedial Investigation Report at 627-677 Smith Street.

Table 2
Summary of Proposed Samples and Analyses
Former Barrett Manufacturing and Mica Roofing
Brooklyn, Kings County, New York

Matrix	Parameter	Analytical Method	Field Samples				QC		Total
			Normal Sample	Field Duplicate	MS/MSD	Subtotal	Trip Blanks	Rinse Blanks	
Soil									
	TCL VOCs	EPA 8260	46	5	3/3	57	0	5	62
	TCL SVOCs	EPA 8270	50	5	3/3	61	0	5	66
	TAL Metals	EPA 6010 (or updated)	50	5	3/3	61	0	5	66
	Cyanide	EPA 9012B (or updated)	50	5	3/3	61	0	5	66
	PCBs	EPA 8082	30	2	2/2	36	0	2	38
	TPH	EPA 8015 Modified	54	3	3/3	63	0	5	68
	Moisture Content & Grain Size	ASTM D2216/ASTM D422	28	0	0	28	0	0	28
Groundwater									
	TCL VOCs	EPA 8260	26	2	2/2	32	10	8	50
	TCL SVOCs	EPA 8270	26	2	2/2	32	0	8	40
	TAL Metals / Cyanide	EPA 6010 (or updated) / EPA 335.2	26	2	2/2	32	0	8	40
	PCBs	EPA 8082	8	1	1/1	11	0	8	19
	TPH	EPA 8015C (sheen net)	26	2	2/2	32	0	8	50
NAPL									
	Fingerprint	EPA 8100M	8	0	0	8	0	0	8
	Specific Gravity		6	0	0	6	0	0	6
	Viscosity		6	0	0	6	0	0	6
Air	VOCs	EPA TO-15 with added compounds	8	1	1/1	11	0	0	11
Forensics									
	Fingerprinting Forensics	Various Forensic Methods	11	2	4	17	0	2	19

Notes:
1. Matrix spike/matrix spike duplicate for organic analyses..
2. NAPL Physical Properties & Other analyses performed on soil cores at PTS Labs using various methods.
3. If an updated EPA method is available, that updated method will be used for sample analysis.



SOURCE:

Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

REV	DATE	DESCRIPTION	DRWN	CHKD	APPR

PARSONS

CLIENT/PROJECT TITLE:

Honeywell

FORMER BARRETT MANUFACTURING AND MICA ROOFING SITE
BROOKLYN, NEW YORK

FIGURE TITLE:

FIGURE 1
USGS SITE LOCATION MAP

SCALE:	DRWN:	CHKD:	APPD:
1 " = 400 '	RR	PFM	DM

DWG:	DATE:	REV:
FIG-RIWP-01	FEB. 2015	-

P:\PIT\Projects\Honeywell\Smith Street - Brooklyn NY\CAD\GIS\RIWP\FIG-RIWP-01.mxd

N

RED HOOK
SMITH PARK

BAY ST.

SMITH ST.

SIGOURNEY ST.

HALLECK ST.

COURT ST.

GOWANUS
CANAL

A

A'

BLOCK 492
LOT 1

633 COURT ST

PITCH
SHED

STILLS

OIL
HOUSE

STILLS

BLOCK 492
LOT 15

SATURATING ROOM

192 SIGOURNEY ST

TAR WELL UNDER
MAIN FLOOR 2ND
TIER BEAMS

BLOCK 492
LOT 20

628 SMITH ST

627-641 SMITH ST

BLOCK 493
LOT 1

MANUFACTURING PITCH

STILLS

643 COURT ST

BLOCK 494
LOT 1

PITCH
STORAGE

ROOFING PAPER FAC

685 SMITH ST

BLOCK 495
LOT 1

BLOCK 491
LOTS 1, 26, 134, 136, 138

636 COURT ST

C-MW-107

C-SB-2

C-SB-1

R-MW-16

R-MW-15

R-MW-7

MW-10

R-SB-10

R-SB-16

R-SB-9

R-SB-17

R-MW-9

R-MW-8

150

60 30 0 60
Feet

LEGEND:

- TAR SEEP/BOIL (NEW FIELDS)
- PIPE OUTFALL LOCATION (CH2M HILL)
- SOIL BORING
- MONITORING WELL
- NAPL PRESENT IN THE WELL OR FOUND IN THE WELL IN THE PAST
- INDICATES GROSSLY CONTAMINATED SOIL FOUND IN BORING
- INFERRED GROUNDWATER FLOW DIRECTION
- CHEMTURA PROPERTY
- RED HOOK PROPERTY
- FORMER BARRETT MANUFACTURING SITE (BLOCK 492, LOTS 15 AND 20) AND MICA ROOFING SITE (BLOCK 494, LOT 1)
- MAJOR BATHYMETRY ELEV. CONTOUR
- MINOR BAYHTMETRY ELEV. CONTOUR
- EXTENT OF GROSSLY CONTAMINATED SOILS (LANGAN)

SOFT SEDIMENT / NATIVE SEDIMENT — SEDIMENT CORE (HDR/CH2M HILL)

- NA - NO RECOVERY
- NO OBSERVED NAPL IMPACTS
- NAPL SHEEN, COATING, STAINING, OR BLEBS

FORMER TAR MANUFACTURING STRUCTURES:

- WALL OR STILL OR TANK (T)
- ABOVE GROUND STORAGE TANK
- UNDERGROUND UTILITY (SEWER OR DRAIN)
- UNDERGROUND TRENCH

NOTES:

1. BASEMAP FROM AUTOCAD DRAWING (FIGURE 3 - FIELD OBSERVATIONS.DWG) PROVIDED BY LANGAN. HORIZONTAL DATUM IS NAD83 NEW YORK STATE PLANE LONG ISLAND ZONE.
2. BATHYMETRIC CONTOURS IN GOWANUS CANAL ARE DIGITIZED FROM FIGURE 2A: GOWANUS CANAL SITE BATHYMETRY, 0.5 FOOT CONTOUR INTERVAL, BATHYMETRIC SURVEY REPORT BY CR ENVIRONMENTAL IN APPENDIX OF THE REMEDIAL INVESTIGATION, BY HDR AND CH2M HILL, JANUARY 2011; RE-CONTOURED USING AUTOCAD CIVIL 3D. VERTICAL DATUM IS NAVD88, US SURVEY FEET.
3. FORMER BARRETT MANUFACTURING CO. STRUCTURES BETWEEN SMITH AND COURT STREETS DIGITIZED FROM PDF OVERLAY OF BARRETT MFG. CO., PLAN OF BROOKLYN PLANT, DRAWING NO. 2200, FEBRUARY 11, 1913.
4. FORMER BARRETT MANUFACTURING CO. STRUCTURES BETWEEN SMITH AND GOWANUS CANAL DIGITIZED FROM PDF OVERLAY OF SANBORN MAP, COPYRIGHT 1915.
5. FORMER MICA ROOFING CO. STRUCTURES DIGITIZED FROM PDF OVERLAY OF SANBORN MAP, COPYRIGHT 1886.
6. AT CHEMTURA CORPORATION (MAIN PROPERTY, BLOCK 493 LOT 1) STRUCTURES AND MONITORING WELL LOCATIONS WERE DIGITIZED FROM A PDF OVERLAY OF FIGURE 2, SITE LAYOUT, CHEMTURA CORPORATION, 698-700 COURT STREET, BROOKLYN, NEW YORK (DRAWING NO. 00026247-006) BY WSP USA CORP.
7. AT CHEMTURA (SATELLITE PROPERTY, BLOCK 492 LOT 1), MONITORING WELL AND SOIL BORING LOCATIONS WERE DIGITIZED FROM A PDF OVERLAY OF FIGURE 2, SITE LAYOUT, CHEMTURA CORPORATION, 6333 COURT STREET, BROOKLYN, NEW YORK (DRAWING NO. 00026248-003).
8. GROSSLY CONTAMINATED SOILS LINE DIGITIZED FROM SITE PLAN WITH FIELD OVSERVATIONS, 627-661 SMITH STREET, SUPPLEMENTAL RI (2014) LANGAN ENGINEERING & ENVIRONMENTAL SERVICES. THE LINE SHOWS THE APPROXIMATE LATERAL EXTENT OF GROSSLY CONTAMINATED SOILS (NAPL) BASED ON OBSERVATIONS DURING REMEDIAL INVESTIGATION ACTIVITIES.
9. PIPE OUTFALLS ON GOWANUS CANAL ARE FROM FIGURE 3-8G, CSO AND OTHER PIPE OUTFALL LOCATIONS, GOWANUS CANAL REMEDIAL INVESTIGATION, BY HDR AND CH2M HILL, JANUARY, 2011. PIPE OUTFALLS ARE CHARACTREIZED AS "NO CORRELATION, REQUIRES ADDTIONAL INVESTIGATION" IN THE LEGEND OF THE FIGURE.

DRAFT

REV	DATE	DESCRIPTION	DRWN	CHKD	APPR

PARSONS

CLIENT/PROJECT TITLE:

Honeywell

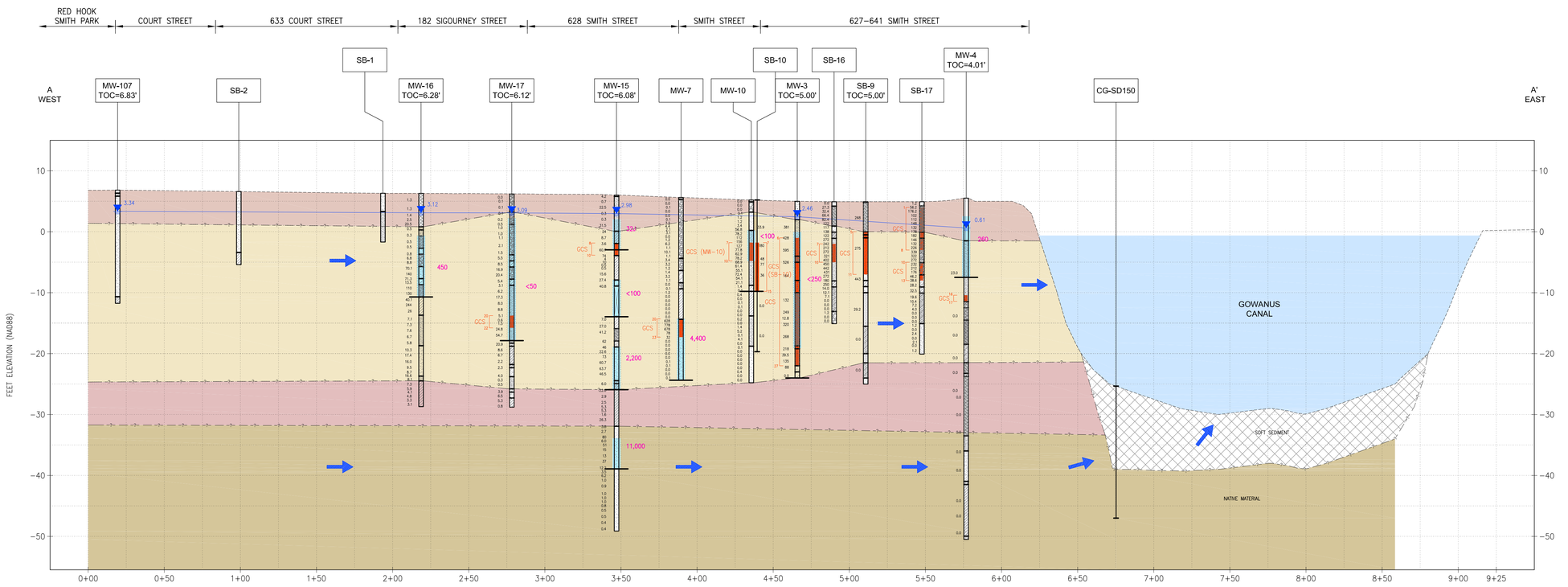
FORMER BARRETT MANUFACTURING
AND MICA ROOFING SITE
BROOKLYN, NEW YORK

FIGURE TITLE:

FIGURE 2
CONCEPTUAL SITE MODEL PLAN VIEW

SCALE:	1 " = 60 '	DRWN:	RR	CHKD:	PFM	APPD:	DM
DWG:	FIG-RIWP-02A			DATE:	APR. 2016	REV:	-

P:\PIT\Projects\Honeywell\Smith Street - Brooklyn NY\CAD\GIS\RIWP\FIG-RIWP-02A.mxd



CROSS-SECTION A-A'
VERTICAL SCALE: 1" = 10'
HORIZONTAL SCALE: 1" = 40'

40H 20H 0 40H 80H
10V 5V 0 10V 20V
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1" = 10'

NOTES:

1. SOIL BORING, VOC CONCENTRATIONS, AND GROUNDWATER ELEVATION INFORMATION TAKEN FROM THE SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT (LANGAN 2012).
2. MONITORING WELL CONSTRUCTION INFORMATION TAKEN FROM FINAL REMEDIAL INVESTIGATION REPORT (LANGAN 2010).
3. GROUND SURFACE ELEVATION DASHED WHERE INFERRED.

LEGEND:

SOIL BORING
PID VALUE
NAPL THICKNESS (DEPTH FT. BGS)
BOREHOLE LITHOLOGY
BENZENE CONC. IN GW (2012)
WATER ELEVATION (FT. BPBD) JANUARY 27, 2012 GAUGING EVENT
MONITORING WELL
PVC SCREEN
MW FINAL DEPTH

LITHOLOGY GRAPHICS
- SAND
- CONCRETE
- ASPHALT
- SILT
- WOOD CHIPS
- CLAY
- SHELLS
- NO RECOVERY
- GRAVEL OR SUB-BASE
- BRICK FRAGMENTS [FILL]
- GROSSLY CONTAMINATED SOIL
- INFERRED GROUNDWATER FLOW DIRECTION

GENERAL STRATIGRAPHY
- FILL (HISTORIC FILL)
- FINE SAND AND SILTS WITH INTERBEDDED ORGANIC DEPOSITS (ALLUVIAL/MARSH DEPOSITS)
- CLAY
- SAND (GLACIOFLUVIAL DEPOSITS)

NO.	DESCRIPTION	DATE	DRAWN	CHK'D	APPV'D

DRAWN BY	RR	DATE	12/03/14
CHECKED BY	PFM	DATE	12/03/14
APPROVED BY	DM	DATE	12/03/14
PROJECT MGR.	DM	DATE	12/03/14

SEAL

PARSONS
COMMERCIAL TECHNOLOGY GROUP

OFFICE
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JOB 446693
WBS 01100

PROJECT TITLE
Honeywell
FORMER BARRET MANUFACTURING AND MICA ROOFING SITE
BROOKLYN
NEW YORK

DRAWING TITLE
FIGURE 3
CONCEPTUAL SITE MODEL
CROSS-SECTION

SCALE 1:40H; 1:10V

DRAWING NO. FIG-RIWP-03
REV. A

FILE NAME: P:\PIT\PROJECTS\HONEYWELL\SMITH STREET - BROOKLYN NY\CAD\GIS\RIWP\FIG-RIWP-03.DWG
PLOT DATE: 3/12/2015 10:26 AM PLOTTED BY: RABUFFETTI, RICHARD

N

SMITH ST.

SIGOURNEY ST.

HALLECK ST.

COURT ST.

GOWANUS CANAL

BLOCK 492 LOT 1

BLOCK 492 LOT 15

BLOCK 492 LOT 20

BLOCK 493 LOT 1

BLOCK 494 LOT 1

BLOCK 495 LOT 1

PITCH SHED

HOUSE

STILLS

OIL

MANUFACTURING PITCH

PITCH STORAGE

ROOFING PAPER FAC.

630 COURT ST

643 COURT ST

649 SIGOURNEY ST

182 SIGOURNEY ST

SATURATING ROOM

TAR WELL UNDER MAIN FLOOR ZERO BELS

627-641 SMITH ST

628 SMITH ST

659 SMITH ST

C-MW-103
C-A-05
C-MW-108
C-MW-02
CSR1A
HSR
C-MW-107
EW-18
CSR1B
EW-30
C-MW-10
EW-29
EW-42
C-MW-04
C-MW-102
PMW10
PMW12D
PMW11I
C-SC-SB-13
C-SC-SB-10
C-SB-2
C-MW-101
C-SB-1
C-SB-8
C-SB-7
C-SB-5
C-SB-6
C-MW-106
C-MW-11
SB-7
C-SB-4
R-MW-16
RH1
HSR2
RH2A
PMW13
PMW14I
PMW15D
NG-MW-41S
NG-MW-41I
RH2B
RH2C
PSB09
PSB08
STILLS
PMW19
M-MW-14
PSB10
PNSG06
PNSG05
C-MW-03
PMW16
PMW18D
PMW17I
PNSG08
PNSG07
PSB11
PMW20
PMW21
PMW23D
PMW22I
R-MW-104
PSB06
C-SB-6
C-SB-5
C-MW-106
C-MW-11
C-SB-7
PMW10
PMW12D
PMW11I
R-MW-105
PSB05
PMW09
PMSG04
PSB04
C-SB-8
C-SB-7
C-SB-4
C-MW-101
C-SB-1
R-MW-16
R-MW-17
PNSG03
R-MW-18
PSB03
R-MW-7
PMW07
PMW08I
PNSG01
PSB07
SB-19
PMW04
PMW05I
PMW06D
PNSG02
PMW01
PMW02
PMW03D
R-MW-8
R-EB-03
R-SB-6
R-EB-04
R-MW-2
R-EB-05
MW-10
PSB10
R-MW-3
R-SB-7
R-SB-8
GB02
R-SB-10
R-SB-9
R-SB-17
E-MW-13S
E-MW-13I
R-MW-4
R-MW-9
R-SB-11
R-SB-12
R-SB-18
R-SB-13
R-EB-07
R-EB-06
GB01
R-MW-5
R-EB-08
R-SB-14
R-EB-09
R-SB-15
R-MW-11
R-MW-6
R-SB-20
R-EB-10
E-MW-14S
R-MW-1
E-MW-14I
R-EB-01
R-SB-1
R-EB-02
R-SB-2
R-SB-3
GC-CF-W-074
GB03
R-EB-12
R-SB-4
R-SB-5
GB04/CW01
R-EB-04
GC-CF-W-062
GC-CF-W-061
GC-CF-W-065
GC-CF-W-063
GC-CF-W-064
GC-CF-W-073
GC-CF-W-066
13
138
73E
74E
75C
150
151
76C
77A

NOTES:

1. BASEMAP FROM AUTOCAD DRAWING (FIGURE 3 - FIELD OBSERVATIONS.DWG) PROVIDED BY LANGAN. HORIZONTAL DATUM IS NAD83 NEW YORK STATE PLANE LONG ISLAND ZONE.
2. BATHYMETRIC CONTOURS IN GOWANUS CANAL ARE DIGITIZED FROM FIGURE 2A: GOWANUS CANAL SITE BATHYMETRY, 0.5 FOOT CONTOUR INTERVAL, BATHYMETRIC SURVEY REPORT BY CR ENVIRONMENTAL IN APPENDIX OF THE REMEDIAL INVESTIGATION, BY HDR AND CH2M HILL, JANUARY 2011; RE-CONTURED USING AUTOCAD CIVIL 3D. VERTICAL DATUM IS NAVD88, US SURVEY FEET.
3. FORMER BARRETT MANUFACTURING CO. STRUCTURES BETWEEN SMITH AND COURT STREETS DIGITIZED FROM PDF OVERLAY OF BARRETT MFG. CO., PLAN OF BROOKLYN PLANT, DRAWING NO. 2200, FEBRUARY 11, 1913.
4. FORMER BARRETT MANUFACTURING CO. STRUCTURES BETWEEN SMITH AND GOWANUS CANAL DIGITIZED FROM PDF OVERLAY OF SANBORN MAP, COPYRIGHT 1915.
5. FORMER MICA ROOFING CO. STRUCTURES DIGITIZED FROM PDF OVERLAY OF SANBORN MAP, COPYRIGHT 1886.
6. AT CHEMTURA CORPORATION (MAIN PROPERTY, BLOCK 493 LOT 1) STRUCTURES AND MONITORING WELL LOCATIONS WERE DIGITIZED FROM A PDF OVERLAY OF FIGURE 2, SITE LAYOUT, CHEMTURA CORPORATION, 698-700 COURT STREET, BROOKLYN, NEW YORK (DRAWING NO. 00026247-006) BY WSP USA CORP.
7. AT CHEMTURA (SATELLITE PROPERTY, BLOCK 492 LOT 1), MONITORING WELL AND SOIL BORING LOCATIONS WERE DIGITIZED FROM A PDF OVERLAY OF FIGURE 2, SITE LAYOUT, CHEMTURA CORPORATION, 6333 COURT STREET, BROOKLYN, NEW YORK (DRAWING NO. 00026248-003).
8. GROSSLY CONTAMINATED SOILS LINE DIGITIZED FROM SITE PLAN WITH FIELD OVSERVATIONS, 627-661 SMITH STREET, SUPPLEMENTAL RI (2014) LANGAN ENGINEERING & ENVIRONMENTAL SERVICES. THE LINE SHOWS THE APPROXIMATE LATERAL EXTENT OF GROSSLY CONTAMINATED SOILS (NAPL) BASED ON OBSERVATIONS DURING REMEDIAL INVESTIGATION ACTIVITIES.
9. PIPE OUTFALLS ON GOWANUS CANAL ARE FROM FIGURE 3-8G, CSO AND OTHER PIPE OUTFALL LOCATIONS, GOWANUS CANAL REMEDIAL INVESTIGATION, BY HDR AND CH2M HILL, JANUARY, 2011. PIPE OUTFALLS ARE CHARACTREIZED AS "NO CORRELATION, REQUIRES ADDTIONAL INVESTIGATION" IN THE LEGEND OF THE FIGURE.

LEGEND:

- PROPOSED SHALLOW MONITORING WELL
- PROPOSED INTERMEDIATE MONITORING WELL
- PROPOSED DEEP MONITORING WELL
- PROPOSED INTERMEDIATE SOIL BORING
- PROPOSED DEEP SOIL BORING
- PROPOSED NEAR-SLAB SOIL GAS SAMPLE
- TAR SEEP/BOIL (NEW FIELDS)
- PIPE OUTFALL LOCATION (CH2M HILL)
- SOIL BORING
- MONITORING WELL
- NAPL PRESENT IN THE WELL OR FOUND IN THE WELL IN THE PAST
- INDICATES GROSSLY CONTAMINATED SOIL FOUND IN BORING
- INFERRED GROUNDWATER FLOW DIRECTION
- CHEMTURA PROPERTY
- RED HOOK PROPERTY
- FORMER BARRETT MANUFACTURING SITE (BLOCK 492, LOTS 15 AND 20) AND MICA ROOFING SITE (BLOCK 494, LOT 1)
- MAJOR BATHYMETRY ELEV. CONTOUR
- MINOR BAYHTMETRY ELEV. CONTOUR
- EXTENT OF GROSSLY CONTAMINATED SOILS (LANGAN)

SOFT SEDIMENT / NATIVE SEDIMENT

- SEDIMENT CORE (HDR/CH2M HILL)
- NA - NO RECOVERY
- NO OBSERVED NAPL IMPACTS
- NAPL SHEEN, COATING, STAINING, OR BLEBS

FORMER TAR MANUFACTURING STRUCTURES:

- WALL OR STILL OR TANK (T)
- ABOVE GROUND STORAGE TANK
- UNDERGROUND UTILITY (SEWER OR DRAIN)
- UNDERGROUND TRENCH

40 20 0 40 Feet

DRAFT

REV	DATE	DESCRIPTION	DRWN	CHKD	APPR

PARSONS

CLIENT/PROJECT TITLE:

Honeywell

FORMER BARRETT MANUFACTURING SITE AND MICA ROOFING SITE BROOKLYN, NEW YORK

FIGURE TITLE:

FIGURE 4
PROPOSED
SAMPLE LOCATIONS

SCALE:	DRWN:	CHKD:	APPD:
1 " = 40 '	RR	PFM	DM

DWG:	DATE:	REV:
FIG-RIWP-04	APR. 2016	-

P:\PIT\Projects\Honeywell\Smith Street - Brooklyn NY\CAD\GIS\RIWP\FIG-RIWP-04.mxd

APPENDIX A

Field Sampling Plan

APPENDIX A

FIELD SAMPLING PLAN FOR THE FORMER BARRETT MANUFACTURING AND MICA ROOFING SITE

NYSDEC Site Numbers 224197 & 224196

BROOKLYN, KINGS COUNTY, NEW YORK

Prepared For:

Honeywell

6100 Philadelphia Pike
Claymont, Delaware 19703

Prepared By:

PARSONS

200 Cottontail Lane
Somerset, New Jersey 08873

APRIL 2016

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SECTION 1

INTRODUCTION

This Field Sampling Plan (FSP) describes the methods and procedures to be used for conducting the Site Characterization (SC) at the two potentially hazardous inactive waste disposal sites in Brooklyn, Kings County, New York: the Former Barrett Manufacturing Site and the Mica Roofing Site, collectively referred to as the subject sites.

1.1 OVERVIEW OF FIELD ACTIVITIES

The following field activities will be performed as part of the characterization work:

- **Geophysical Survey** – Soil boring, monitoring well, soil vapor and NAPL seep sampling locations will be scanned by geophysical methods prior to hand clearing, drilling, and sampling activities.
- **Soil Borings and Monitoring Well Borings** – Eleven soil borings and twenty-six monitoring well borings will be advanced to investigate subsurface conditions and the presence and extent of tar-related residue at the Site. Two soil samples will be analyzed from each boring and submitted to the laboratory for VOCs, SVOCs, metals, and cyanide. Selected soil samples will be submitted for analysis of PCBs. Selected soil samples will also be submitted to a laboratory for geotechnical analyses, such as: moisture content and grain size.
- **Monitoring Well Installation** – Twenty-six monitoring wells will be installed.
- **Groundwater Sampling** – Once the monitoring wells are properly developed, one set of samples will be collected from each monitoring well and submitted to the laboratory to be analyzed for VOCs, SVOCs, metals, and cyanide. Selected groundwater sample locations will also be submitted for analysis of PCBs.
- **Vapor Intrusion** – Soil gas samples will be collected from eight locations to assess the potential for VOC migration through the unsaturated zone and into the occupied portions of structures.
- **NAPL Sampling** – If non-aqueous phase liquid (NAPL) is observed in any of the soil borings, a representative sample of the product may be sampled and submitted for forensic hydrocarbon fingerprint analysis, specific gravity and viscosity analysis by a certified laboratory.
- **Seep Sampling** – A survey will be conducted of the Site and surrounding area to determine the number and locations of potential NAPL seeps. If present, NAPL impacted soils will be collected from the four previously identified NAPL seep locations as well as any other identified seep locations. Samples will be collected using decontaminated and/or disposable sampling equipment from depths between one and two feet below ground surface (bgs) and will be submitted for SVOC and PCB laboratory analysis.
- **Slug Testing** – Slug testing will be performed on up to 21 of the newly installed monitoring wells to determine the hydraulic conductivity at the subject sites.

- **Tidal Study** – A tidal study will be conducted to evaluate the potential effects that tidal fluctuations have on groundwater elevations and flow directions beneath the Site, and whether these affect the migration of site groundwater and contaminants. Following installation of the new monitoring wells, pressure transducers with automatic data logging will be installed in 18 monitoring wells to record groundwater levels over a 24-hour period.
- **Surveying** – Planimetric features (including building footprints, municipal block/lot extents, sidewalk features, and ground surface elevations) and the locations of all sampling points will be surveyed by a professional surveyor. The location and elevation of the well casings will be determined to support assessment of groundwater flow direction.

Additional details regarding sample numbers, location IDs, analytical parameters, and rationale for sample collection is discussed in the Site Characterization Work Plan (SCWP).

SECTION 2

GENERAL FIELD GUIDELINES

2.1 SITE HAZARDS

Potential on-site surface hazards, such as sharp objects, overhead power lines, energized areas, and building hazards will be identified prior to initiation of fieldwork. Generally, such hazards will be identified during a site visit prior to the first day of fieldwork.

2.2 UNDERGROUND UTILITIES

Locations of intrusive points including soil borings, monitoring wells, soil gas points, and NAPL seep samples will be reviewed with stakeholders prior to installation. Additionally, these locations will be cleared for subsurface utilities prior to installation as described in the SCWP.

2.3 FIELD LOG BOOKS

All field activities will be carefully documented in field log books. Entries will be of sufficient detail that a complete daily record of significant events, observations, and measurements is obtained. The field log book will provide a legal record of the activities conducted at the site. Accordingly:

- Field books will be bound with consecutively numbered pages.
- Field books will be controlled by the Field Team Leader while field work is in progress.
- Entries will be written with waterproof ink.
- Entries will be signed and dated at the conclusion of each day of fieldwork.
- Erroneous entries made while fieldwork is in progress will be corrected by the person that made the entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing the correction.
- Corrections made after departing the field will be made by the person who made the original entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing and dating the time of the correction.

At a minimum, daily field book entries will include the following information:

- Location of field activity;
- Date and time of entry;
- Names and titles of field team members;
- Names and titles of any site visitors and site contacts;
- Weather information, for example: temperature (low – high), cloud coverage, wind speed and direction;
- Purpose of field activity;

- A description of the field work conducted;
- Sample media (soil, sediment, groundwater, etc.);
- Sample collection method;
- Number and volume of sample(s) taken;
- Description of sampling point(s);
- Volume of groundwater removed before sampling;
- Preservatives used;
- Analytical parameters;
- Date and time of collection;
- Sample identification number(s);
- Sample distribution (e.g., laboratory);
- Field observations (including health & safety observations and/or incidents);
- Any field measurements made, such as pH, temperature, conductivity, water level, etc.;
- References for all maps and photographs of the sampling site(s);
- Information pertaining to sample documentation such as:
  - Bottle lot numbers;
  - Dates and method of sample shipments; and
  - Chain-of-Custody Record and Federal Express Air Bill numbers.

2.4 COMMUNITY AIR MONITORING PROGRAM

Community air monitoring will be conducted using the NYSDOH's Generic Community Air Monitoring Plan (NYSDOH, 2000) as a guidance document. Real-time air monitoring for volatile compounds and particulates at the perimeter of the hot zone will be performed as described in the SCWP.

2.5 SURVEYING

At the conclusion of the drilling and sampling activities, a licensed New York state land surveyor will mobilize to the Site and survey the horizontal and vertical location of each new soil boring, monitoring well, NAPL seep location, soil-vapor sample location, and any other sample location. Two elevation measurements will be taken at each monitoring well location to identify the top of the PVC casing and the grade elevation. The survey elevations will be measured to an accuracy of 0.01 feet above the National Geodetic Vertical Datum of 1988 (NGVD 1988).

SECTION 3

FIELD EQUIPMENT DECONTAMINATION AND MANAGEMENT OF INVESTIGATION DERIVED WASTES

3.1 DECONTAMINATION AREA

A temporary decontamination (de-con) area lined with polyethylene sheeting will be constructed for steam-cleaning the drilling equipment. The de-con pad will be constructed of two layers of approximately 6-mil polyethylene fitted over wood timbers. The pad will be sloped if possible, creating a sump. Sheets of plywood or pallets will be placed inside the de-con pad. Tools and equipment to be cleaned will be placed on the pallets or plywood, to prevent puncture. Also, the de-con pad will be constructed on a paved area, which minimizes the potential for puncture by tree roots or other obstacles.

The location of the decontamination area will be coordinated with Honeywell and other facility representatives. Water collected from the decontamination activities will be collected in 55-gallon drums and managed as described in Section 3.3.

3.2 EQUIPMENT DECONTAMINATION

The following procedures will be used to decontaminate equipment used during the Site Characterization activities.

- All drilling equipment including the drilling rig, augers, bits, rods, tools, split-spoon samplers and tremie pipe will be cleaned with a high-pressure steam cleaning unit before beginning work.
- The bucket of the excavator or backhoe will be cleaned with a high-pressure steam cleaning unit before beginning work, between test pit locations, and prior to leaving the site.
- Tools, drill rods, and augers will be placed on sawhorses or polyethylene plastic sheets following steam cleaning. Direct contact with the ground will be avoided.
- All augers, rods, and tools will be decontaminated between each drilling location according to the above procedures.
- The back of the drill rig and all tools, augers, and rods will be decontaminated at the completion of the work and prior to leaving the Site.

3.2.1 Sampling Equipment Decontamination

Suggested Materials:

- Potable water
- Phosphate-free detergent – ***Simple Green/Alconox***
- Distilled water
- Aluminum foil
- Plastic/polyethylene sheeting
- Plastic buckets and brushes

- Personal protective equipment in accordance with the Project Safety Plan/PSHEP

Procedures:

- Prior to sampling, all non-dedicated sampling equipment (bowls, spoons, interface probes, etc.) will be either steam cleaned or washed with potable water and a phosphate-free detergent (***Simple Green/Alconox***). Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, etc.
- The sampling equipment will then be rinsed with potable water followed by a deionized water rinse.
- Between rinses, equipment will be placed on polyethylene sheets or aluminum foil if necessary. At no time will washed equipment be placed directly on the ground.
- Equipment will be wrapped in polyethylene plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

3.3 MANAGEMENT OF INVESTIGATION DERIVED WASTES

3.3.1 Decontamination Fluids

Decontamination fluids will be collected in DOT approved 55-gallon drums. The drums will be labeled as investigation derived wastewater and temporarily stored in a secured area to be determined by Parsons/Honeywell and facility representatives. The drums will be placed on wooden pallets in a plastic-lined containment area pending characterization and proper disposal.

3.3.2 Drill Cuttings

Direct push drilling techniques will be used during the investigation; this method should minimize soil waste. Drill cutting containment methods will be implemented during drilling activities which may include the use of a sheet of plywood with a hole cut in the center for the drill stem. Drill cuttings will be contained in 55-gallon drums. The soils will be segregated by drill location to the extent practical. The drums will be labeled as investigation derived waste soils from the corresponding boring or source area, and temporarily stored in a secured area to be determined by Honeywell and facility representatives. The drums will be placed on wooden pallets in a plastic-lined containment area pending characterization and proper disposal.

3.3.3 Development and Purge Water

Well installation is proposed for this investigation. All development and purge water will be contained in 55-gallon drums. The drums will be labeled as investigation derived wastewater from the corresponding well and temporarily stored in a secured area to be determined by Honeywell and facility representatives. The drums will be placed on wooden pallets in a plastic-lined containment area pending characterization and proper disposal.

3.3.4 Personal Protective Equipment

All spent personal protective equipment (PPE) will be placed in 55-gallon drums or roll-off containers for proper disposal by Parsons

3.3.5 Disposable Dedicated Sampling Equipment

All spent disposable dedicated soil sampling equipment (Macrocore sampler liners and catchers) and disposable dedicated groundwater sampling equipment (polyethylene bailers, bailer twine, polypropylene tubing, etc.) will be placed in 55-gallon drums for disposal by Parsons

SECTION 4

DRILLING, SOIL SAMPLING, NAPL SAMPLING, AND MONITORING WELL INSTALLATION & DEVELOPMENT

4.1 INTRODUCTION

Investigation activities to be conducted at the Former Barrett Manufacturing Site and the Mica Roofing Site will consist of:

- Soil borings and soil sampling
- Monitoring well installation and development
- Groundwater sampling
- NAPL sampling
- Slug testing
- Vapor intrusion sampling
- Tidal survey

These procedures are described in the following sections. Equipment decontamination procedures are previously described in Section 3.

4.2 SOIL BORINGS AND SOIL SAMPLING

The following methods will be used for conducting the soil borings.

4.2.1 Suggested Equipment

- Field book
- Project plans
- Personal protective equipment in accordance with the HASP
- Metal detector
- Stakes and flagging
- One pint containers for lithology samples
- Tape measure
- Decontamination supplies including Simple Green or Alconox
- Water level indicator
- PID
- Dust Monitor
- Camera
- Clear tape, duct tape
- Aluminum foil
- Laboratory sample bottles
- Coolers and ice

- Shipping supplies

4.2.2 Drilling and Geologic Logging Method

- Drilling will be performed using sonic, Geoprobe®, or hollow stem auger (HSA) methods.
- Soil samples will be collected continuously to the bottom of the borings utilizing 5- or 10- foot long sonic cores, 5-foot long macrocore samplers or 2-foot long split spoons, depending on the type of drill rig used
- Soil samples retrieved from the borehole will be visually characterized for:
  1. percent recovery,
  2. soil type,
  3. color,
  4. moisture content,
  5. texture,
  6. grain size and shape,
  7. consistency,
  8. odor,
  9. visible evidence of staining,
  10. presence of VOCs, and
  11. any other observations.

  The descriptions will be in accordance with the Unified Soil Classification System (USCS).
- Soil samples will be immediately screened for the evolution of organic vapors with a PID.
- A representative portion of the sample will be placed in a sealable plastic bag or an eight-ounce sample jar filled approximately half full. The container will be labeled with the boring number and interval sampled. The containers will be sealed tightly.
- After a minimum of 10 minutes, the tip of the PID will be inserted into the plastic bag or under the cap to measure the headspace for organic vapors.
- Remaining soil will be disposed of in accordance with methods specified in Section 3.3.
- All borings not converted to monitoring wells will be sealed with bentonite or cement/bentonite grout following completion.
- All drilling equipment will be decontaminated between each boring in accordance with methods specified in Section 3.2.
- The designated field worker will log borehole geology and headspace measurements in the field book for later transfer to the Drilling Record shown in Figure 4.1, or similar form.

4.3.3 Soil Sampling

- The number and frequency of samples to be collected from each boring and the associated analytical parameters are summarized in the SCWP.
- Surface and subsurface soil samples will be collected and analyzed for Target Compound List (TCL) VOCs by EPA Method 8260. The samples collected for VOCs analysis will be collected directly from the sonic core barrel, split-spoons or the acetate liners, placed into appropriate containers, and compacted to minimize head space and pore space. Surface soil samples for VOCs will be collected from the 1 foot to 2 foot interval in the sampler. Care must be taken during transfer to minimize VOC loss and to minimize disturbance of the sample.
- Surface and subsurface soil samples will be also be collected and analyzed for TCL SVOCs by EPA Method 8270 (including phenol), Target Analyte List (TAL) metals by EPA Method 6010 (or updated), and cyanide by EPA Method 9012B (or updated). Selected soil samples will also be submitted for PCBs by EPA method 8082. The samples collected for these analyses will be collected from the sonic core barrel, split-spoons or the acetate liners, homogenized, and placed in appropriate containers.
- The soil samples that are most representative of the full subsurface stratigraphy and material will be selected from specific soil borings for geotechnical laboratory testing. The collected sample volume will placed in appropriate containers, and sent to a geotechnical laboratory for analysis of moisture content and grain size.
- All sample containers will be labeled, placed in a laboratory-supplied cooler, and packed with ice (to maintain a temperature of 4 ^{o}C). The coolers will be either be shipped overnight to the laboratory, picked up by a laboratory courier, or delivered directly to the laboratory by the field personnel.
- Chain-of-custody procedures will be followed as outlined in the Quality Assurance Project Plan (QAPP).
- The sampling equipment will be decontaminated between samples in accordance with procedures described in Section 3.
- Excess soil remaining after sampling will be contained in accordance with methods specified in Section 3.3.
- The sample locations, descriptions, and depths will be recorded in the field book.

4.3.4 Product (NAPL) Sampling from Boreholes

- If free phase NAPL is encountered, representative samples may be submitted for forensic fingerprinting analysis to a lab that specializes in analyzing and determining the origin of NAPL samples.
- It is anticipated that approximately 10 NAPL samples will be submitted for forensic fingerprinting analysis. Fingerprint analysis is expected to utilize GC/FID fingerprint and TPH by EPA Method 8100M.
- NAPL samples may also be submitted for PAHs, alkylated PAHs, and selected petroleum biomarkers by GC/MS by EPA Method 8270M should field observations warrant it.

- The NAPL samples collected for these analyses will be collected from the sonic core barrel, split-spoons or the acetate liners, homogenized, and placed in appropriate containers
- All sample containers will be labeled, placed in a laboratory-supplied cooler, and packed with ice (to maintain a temperature of 4 ^{o}C). The coolers will be either be shipped overnight to the laboratory, picked up by a laboratory courier, or delivered directly to the laboratory by the field personnel.
- Chain-of-custody procedures will be followed as outlined in the QAPP.
- The sampling equipment will be decontaminated between samples in accordance with procedures described in Section 3.
- Excess soil remaining after sampling will be contained in accordance with methods specified in Section 3.3.
- The sample locations, descriptions, and depths will be recorded in the field book.

4.3.5 Product (NAPL) Sampling from Seeps

- NAPL has been historically observed on the ground surface on and adjacent to the Site. It has been reported that this NAPL originates from the subsurface and seeps onto the ground. Based on a review of historical reports where NAPL seeps were sampled, it has been determined that this material has not been fully characterized.
- The seep NAPL sampled for these analyses will be collected decontaminated and/or disposable sampling equipment from depths between one and two feet bgs, homogenized, and then placed in appropriate containers.
- All sample containers will be labeled, placed in a laboratory-supplied cooler, and packed with ice (to maintain a temperature of 4 ^{o}C). The coolers will be either be shipped overnight to the laboratory, picked up by a laboratory courier, or delivered directly to the laboratory by the field personnel.
- Chain-of-custody procedures will be followed as outlined in the QAPP.
- The sampling equipment will be decontaminated between samples in accordance with procedures described in Section 3.
- Excess soil remaining after sampling will be contained in accordance with methods specified in Section 3.3.
- The sample locations, descriptions, and depths will be recorded in the field book.

4.4 MONITORING WELL INSTALLATION AND DEVELOPMENT

The following methods will be used for drilling, installing, and developing the monitoring wells.

4.4.1 Suggested Equipment

- Field book
- Project plans
- Personal protective equipment in accordance with the Project Safety Plan/PSHEP
- Metal detector

- One pint containers for lithology samples
- Tape measure
- Decontamination supplies
- Water level indicator
- PID
- Camera
- Clear tape, duct tape
- Aluminum foil
- Laboratory sample bottles
- Coolers and ice
- Shipping supplies
- Polyethylene disposable bailers (development)
- Polypropylene rope (development)
- Purge pump or trash pump (development)
- Turbidity meter (development)
- Temperature, conductivity, pH meter (development)

4.4.2 Monitoring Well Installation

Figure 4.2 shows a cross-section for a typical monitoring well. The monitoring wells will be installed in accordance with the following specifications:

- The monitoring well borings will be advanced with sonic, Geoprobe®, or HSA methods.
- As described above, continuous soil samples will be collected from monitoring well borings for visual description and PID screening.
- Wells will be constructed with two-inch ID, threaded, flush-joint, PVC casings and screens. In circumstances where a significant confining layer is encountered, a separate outer casing will be installed to isolate upper zone to prevent cross contamination in the groundwater zones prior to installing the well.
- Screens will be ten feet long with 0.02-inch slot openings. A two-foot sump will be installed at the base of the screen at locations where NAPL was observed during installation of the well boring. Alternatives may be used at the discretion of the field geologist and approval of Honeywell, based on site conditions.
- The annulus around the screens will be backfilled with silica sand having appropriate size (e.g., Morie No. 1) to a minimum height of two feet above the top of the screen. Auger flights will be withdrawn as sand is poured in a manner that will minimize boring collapse and bridging.
- A bentonite pellet seal or slurry seal with a minimum thickness of two feet will be placed above the sand pack. The bentonite seal (pellets) will be allowed to hydrate before placement of grout above the seal. Auger flights will be withdrawn in a manner that will minimize boring collapse and bridging.

- The remainder of the annular space will be filled with a cement-bentonite grout to near the ground surface. The grout will be pumped from the bottom up. The grout will be allowed to set for a minimum of 24 hours before wells are developed. Auger flights will be withdrawn in a manner that will minimize boring collapse and bridging.
- Each monitoring well will have a sealed cap (J-plug) and will be contained in a flush-mounted vault. The J-plug will be used to keep surface water from infiltrating into the well during rain events, high water conditions, etc.
- The concrete seal or pad will be sloped slightly to channel water away from the well, and be deep enough to remain stable during freezing and thawing of the ground. Monitoring wells will be installed so that the vault and concrete pad do not pose a trip hazard when completed.
- The top of the PVC well casing will be marked and surveyed to 0.01 foot, and the elevation will be determined relative to a fixed benchmark or datum.
- The measuring point on all wells will be on the innermost PVC casing.
- Monitoring well construction details will be recorded in the field book and on the Drilling Record shown in Figure 4.2, or similar form.

4.4.3 Monitoring Well Development

- After approximately 24 hours following completion, the monitoring wells will be developed by surging/bailing, using a centrifugal or peristaltic pump and dedicated polyethylene tubing, a Waterra positive displacement pump (or equivalent) and dedicated polyethylene tubing, or other methods at the discretion of the field geologist.
- Water levels will be measured in each well to the nearest 0.01 foot prior to development.
- The wells will be developed until the water in the well is reasonably free of visible sediment (50 NTU if possible) or until pH, temperature and specific conductivity stabilize. A maximum of one to hours of development time per well is anticipated. The level of effort, however, is dependent upon the nature of the soils at each location. NYSDEC field concurrence on the sufficiency of the development effort will be obtained, when needed.
- Development water will be contained in accordance with methods specified in Section 3.3.

Following development, wells will be allowed to recover for at least 14 days before groundwater is purged and sampled. All monitoring well development will be overseen by a field geologist and recorded in the field book.

Figure 4.1 Drilling Record

Contractor:					PARSONS DRILLING RECORD		BORING/ WELL NO.	Sheet of
Driller:							Location Description:	
Inspector:					PROJECT NAME:			
Rig Type:					PROJECT NUMBER:			
GROUNDWATER OBSERVATIONS							Location Plan	
Water Level					Weather:			
Date					Date/Time Start:			
Time								
Meas. From					Date/Time Finish:			
Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL		SCHEMATIC	COMMENTS
0								
1								
2								
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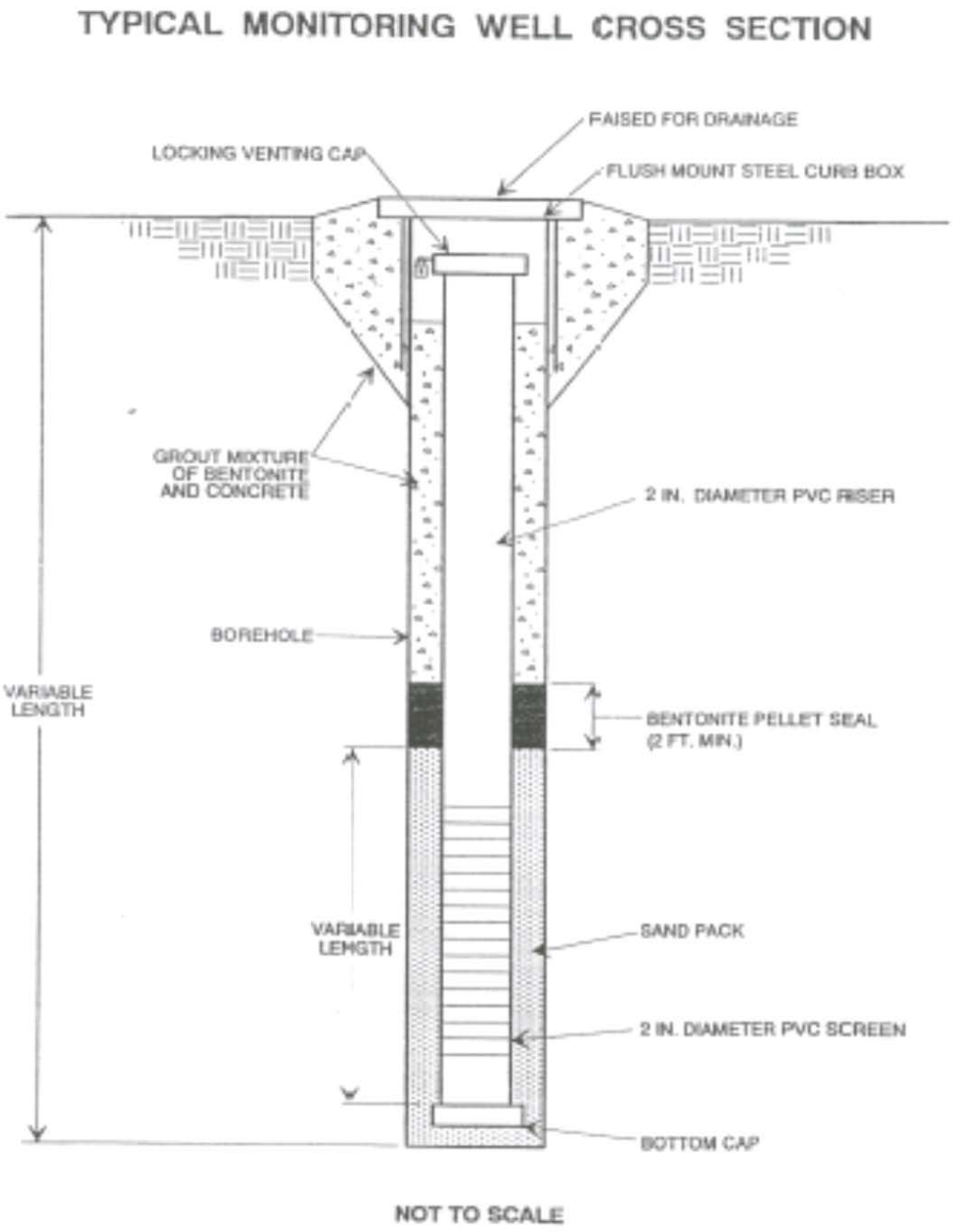
SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
GP = GEOPROBE - DIRECT PUSH

COMMENTS:

Figure 4.2 Monitoring Well Cross Section



SECTION 5

GROUNDWATER SAMPLING PROCEDURES

5.1 INTRODUCTION

Procedures for obtaining groundwater samples are described in this section. Sample handling procedures are described in Section 8.

5.2 GROUNDWATER SAMPLING

The following section explains the method that will be used to collect groundwater samples from monitoring wells.

5.2.1 Suggested Equipment and Supplies

- Field book
- Project plans
- Personal protective equipment in accordance with the HASP
- Oil/Water Interface Probe
- Temp, conductivity, pH meters
- Turbidity meter
- 250-mL beaker, or graduated cylinder
- Decontamination supplies
- Peristaltic or other low-flow purge pump
- Plastic tubing
- Plastic sheeting
- PID
- Clear tape, duct tape
- Coolers and ice
- Laboratory sample bottles
- Federal Express labels

5.2.2 Groundwater Sampling Method

<u>Purging</u>

- The number and frequency of groundwater samples to be collected and the associated analytical parameters are summarized in the SCWP.
- Prior to sampling, the static water level and thickness of any free product will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the PVC casing with a decontaminated oil/water interface probe (this includes measurements for free product at the bottom of the well). The measurement will be recorded in the field book.

- The probe will be decontaminated according to procedures outlined in Section 3.
- Purging will be conducted using low-flow sampling methods with a submersible pump as described in the USEPA *Region 1 Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (2010).
- If it is determined that low flow sampling is impractical due to low yielding wells, volume averaged (3-volume) purging will be implemented.
- For wells being purged via the volume average method, between three and five calculated well volumes shall be purged at a rate less than that of monitoring well development. Purging will be performed using a submersible pump and dedicated tubing.
- If a well goes dry before the required volumes are removed, it will be allowed to recover, purged a second time until dry or the required volumes are removed, and sampled when it recovers sufficiently. If field conditions (based on geology observed during drilling) indicate that water level recovery may be slow, then slow purging will be conducted. If the well goes dry during slow purging, it will be allowed to recover, and then sampled without a second purge.
- Purge water will be managed and disposed of in accordance with procedures described in Section 3.

Sampling

- Samples will be collected using low-flow sampling methods through dedicated polyethylene tubing with a submersible pump.
- Groundwater samples will be collected via low-flow sampling methods once groundwater quality parameters have stabilized within the following ranges:
  - Turbidity: 10% for values greater than 5 nephelometric turbidity units (NTU); if three consecutive readings are below 5 NTUs, the well is considered stable.
  - Dissolved oxygen: 10% for values greater than 0.5 mg/L if three consecutive readings are below 0.5 mg/L, the well is considered stable.
  - Specific conductance: 3%
  - Temperature: 3%
  - pH: $\pm$ 0.1 units
  - ORP: $\pm$ 10 milivolts
- If monitoring wells were purged via the volume averaged method, samples will be collected with a new, disposable, polyethylene, bottom-fill bailer.
- Prior to filling the sample bottles, one “clean” container will be filled with water. The temperature, pH, and conductivity will be measured with a pre-calibrated probe and recorded in the field book.
- Sample containers for VOCs will be filled first. Sample containers for the other analytes will follow. If turbidity is less than 50 NTU, the sample for metals analysis will not be filtered. If turbidity is greater than 50 NTU, one filtered and one unfiltered sample for metals analysis will be collected and placed in bottles provided by the laboratory.

- The sample containers will be labeled, placed in a laboratory-supplied cooler and packed on ice (to maintain a temperature of 4^{o} C). The coolers will be either be shipped overnight to the laboratory, picked up by a laboratory courier, or delivered directly to the laboratory by the field personnel.
- Chain-of-custody procedures will be followed as outlined in the QAPP.
- After all samples are collected, all disposable dedicated sampling equipment (i.e. polypropylene rope and bailer) will be disposed of in accordance with methods described in Section 3.3.
- Well sampling data will be recorded in the field log book and on the Groundwater Sampling Record shown in Figure 5.1, or a similar form.

Figure 5.1 Groundwater Sampling Record

PARSONS

GROUNDWATER SAMPLING RECORD

SITE NAME: _____

PROJECT NUMBER: _____

Purge Date: _____ _____

Sampling Date: _____

Samplers: _____ of _____

SAMPLE ID: _____

Sampling Method: _____

WELL PURGING

Static Water Level (TOC): _____

Depth to Well Bottom (TOC): _____

CALCULATIONS: Ft. of Water in Well _____ X (GAL / FT) = _____ Gallons

2-inch Casing: Ft. of Water in Wel _____ x 0.16 = _____ Gallons

3-inch Casing: Ft. of Water in Well _____ x 0.32 = _____ Gallons

4-inch Casing: Ft. of Water in Well _____ x 0.64 = _____ Gallons

Method: Low Flow Pump

SAMPLE DESCRIPTION

Odor : _____

Other : _____

FIELD TESTS

	PURGE	PURGE	PURGE	PURGE	PURGE	PURGE	SAMPLE
Time							
Depth To Water (TOC) (ft)							
Depth To Pump (TOC) (ft)							
Flow Rate (ml/min)							
Volume of Water Purged							
pH (s.u.)							
Conductivity (mS/cm)							
Turbidity (NTUs)							
Dissolved Oxygen (mg/L)							
Temperature (Degrees C)							
ORP (mV)							
Salinity (%)							
TDS (g/L)							

SAMPLE ANALYSIS / LABORATORY _____

Analyze For: _____

_____

_____

Shipped Via: _____

Laboratory

_____

Other Notes: _____

SECTION 6

AIR MONITORING AND SOIL GAS SAMPLING

6.1 BREATHING ZONE AIR MONITORING DURING DRILLING AND SAMPLING

Air monitoring of the breathing zone will be conducted during all intrusive activities in accordance with the Project Safety Plan (PSHEP) to assure proper health and safety protection for the team and nearby occupants and workers.

- A RaeSystems MiniRae 2000 photoionization detector (PID) or equivalent will be used to monitor for organic vapors in the breathing zone and to screen the samples.
- A MiniRAM Portable Aerosol Monitor will be used to monitor particulate dust and aerosolized vapors in the breathing zone.
- Cyanide color detector tubes will/CAN be used to monitor for hydrogen cyanide in the breathing zone.
- Additional air monitoring may be required as specified in the Health and Safety Plan.

The PID readings will be recorded in the field book during drilling activities and later transferred to the boring log form. The procedure for the PID operation and calibration is included in Section 7.

6.2 SOIL GAS SAMPLING

Soil vapor samples will also be collected during the RI field investigation from 8 locations. Further details regarding sampling methodology, soil vapor point IDs, analytical parameters and soil vapor point locations are discussed in the SCWP.

SECTION 7

FIELD INSTRUMENTS AND CALIBRATION

Field analytical equipment will be calibrated immediately prior to each day's use and more frequently if required. The calibration procedures will conform to manufacturer's standard instructions. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. All instrument calibrations will be documented in the project field book and in an instrument calibration log. Records of all instrument calibration will be maintained by the Field Team Leader and will be subject to audit by the Project Quality Assurance Manager (PQAM). Copies of all of the instrument manuals and/or instruction sheets will be maintained on-site by the Field Team Leader.

The following field instruments will be used during the investigation:

- PID;
- MiniRAM real-time aerosol monitor;
- pH Meter;
- Specific Conductivity Meter and Temperature Probe;
- Dissolved oxygen and ORP Meter, and
- Turbidity Meter.

7.1 PORTABLE PHOTOIONIZATION DETECTOR

- The photoionization detector (PID) will be a RaeSystems MiniRae 2000 (or equivalent), equipped with a 10.6 eV lamp. The MiniRae is capable of ionizing and detecting compounds with an ionization potential of less than 10.6 eV. This accounts for up to 73% of the volatile organic compounds on the Target Compound List.
- Calibration must be performed at the beginning of each day of use with a standard calibration gas having an approximate concentration of 100 parts per million of isobutylene. If the unit experiences abnormal perturbation or erratic readings, additional calibration will be required.
- All calibration data must be recorded in the field logbook.
- A battery check must be completed at the beginning and end of each working day.

7.2 MINIRAM

- The operator shall ensure that the instruments respond properly to the substances that they are designed to monitor. Real time aerosol monitors, such as the MiniRAM, must be zeroed at the beginning of each sampling period. The specific instructions for calibration and maintenance provided for each instrument should be followed.
- All calibration data must be recorded in field notebooks or on calibration log sheets to be maintained on-site.
- A battery check must be completed at the beginning and end of each working day.

7.3 PH METER

- Calibration of the pH meter must be performed at the start of each day of use, and after very high or low readings as required by this plan, according to manufacturer's instructions.
- National Institute of Standards and Technology - traceable standard buffer solutions which bracket the expected pH range will be used. The standards will be pH of 4.0, 7.0 and 10.0 standard units.
- The pH calibration must be used to set the meter to display the value of the standard being checked.
- The calibration data must be recorded on calibration sheets maintained on-site or with the piece of equipment.

7.4 SPECIFIC CONDUCTIVITY METER AND TEMPERATURE PROBE

- Calibration checks using the conductivity standard must be performed at the start of each day of use, after five to ten readings or after very high or low readings as required by this plan, according to manufacturer's instructions.
- The portable conductivity meter must be calibrated using a reference solution of 200 uohms/cm on a daily basis. Readings must be within five percent to be acceptable.
- The thermometer of the meter must be calibrated against the field thermometer on a weekly basis.

7.5 TURBIDITY METER

- The turbidity meter must be checked at the start of each day of use and at the end of the day, according to manufacturer's instructions.

SECTION 8

FIELD SAMPLE IDENTIFICATION AND CUSTODY

8.1 SAMPLE LOCATION NUMBERING SYSTEM

- Subsurface soil borings will be numbered consecutively beginning with SB-01 (soil borings) or MW-01 (monitoring well borings). Individual samples will also be designated with a depth code (see below).
- Monitoring wells will be numbered consecutively beginning with MW-01.

8.2 SAMPLE IDENTIFICATION

Each sample will be given a unique alphanumeric identifier in accordance with the following classification system:

SAMPLE IDENTIFICATION

LL*	NN*	N-N	LL
Sample Type	Sample Number	Depth Code	QC Identifier

	Solid	Water
Sample Type:	MW - Monitoring Well Boring SB – Soil Boring TP – Test Pit	MW - Monitoring Well
Sample Number:	Number referenced to a sample location map.	
Depth Code:	Depth of sample interval (0-2”, 0-2’, 2-4’, 10-12’, etc.)	
QC Identifier:	FB - Field Blank TB - Trip Blank WB - Wash or Rinse Blank	MS - Matrix Spike MD - Matrix Spike Duplicate MB - Matrix Blank

* L = Letter

* N = Number

Field duplicate samples will be assigned identifiers that do not allow the laboratory to distinguish them as field duplicates. Each sample container will be labeled prior to packing for shipment. The sample identifier, site name, date and time of sampling, and analytical parameters will be written on the label in waterproof ink and recorded in the field book.

8.3 CHAIN OF CUSTODY

- A Chain-of-Custody (COC) record (Figure 8.1 or similar) will accompany the sample containers during selection and preparation at the laboratory, during shipment to the field, and during return shipment to the laboratory.
- The COC will identify each sample container and the analytical parameters for each, and will list the field personnel that collected the samples, the project name and

number, the name of the analytical laboratory that will receive the samples, and the method of sample shipment.

- If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample shipment.
- The COC will be completed by field personnel as samples are collected and packed for shipment.
- Erroneous markings will be crossed-out with a single line and initialed by the author.
- The REMARKS space will be used to indicate if the sample is a matrix spike, matrix spike duplicate, or matrix duplicate.
- Trip and field blanks will be listed on separate rows.
- After the samples have been collected and sample information has been listed on the COC form, the method of shipment, the shipping cooler identification number(s), and the shipper air bill number will be entered on the COC.
- A second member of the field team will review the COC for completeness and accuracy whenever possible.
- Finally, a member of the sampling team will write his/her signature, the date, and time on the first RELINQUISHED BY space. Duplicate copies of each COC must be completed.
- One copy of the COC will be retained by sampling personnel. Blind duplicate samples will be identified on the copy retained by the sampling crew. The other copy and the original will be sealed in a plastic bag and taped inside the lid of the shipping cooler without the additional identification of blind duplicate samples.
- Sample shipments will be refrigerated at 4^{o}C, typically by packing with ice, to preserve the samples during shipment.
- After the shipping cooler is closed, custody seals provided by the laboratory will be affixed to the latch and across the front and back of the cooler lid, and signed by the person relinquishing the samples to the shipper.
- The seal will be covered with clear tape, and the cooler lid will be secured by wrapping with packing tape.
- The cooler will be relinquished to the shipper, typically an overnight carrier.
- The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the samples will not be analyzed.
- The samples must be delivered to the laboratory within 48 hours of collection.

8.4 SAMPLE DOCUMENTATION

The field team leader will be retaining a copy of the COC, and, in addition, the field team leader will ensure that the following information about each sample is recorded in the field book:

- Sample identifier;
- Identification of sampled media (e.g., soil, sediment, groundwater);
- Sample location with respect to known reference point;

- Physical description of sample location;
- Field measurements, (e.g., pH, temperature, conductivity, and water levels);
- Date and time of collection;
- Sample collection method;
- Volume of groundwater purged before sampling;
- Number of sample containers;
- Analytical parameters;
- Preservatives used; and
- Shipping information:
  - Dates and method of sample shipments;
  - Chain-of-Custody Record numbers;
  - Federal Express Air Bill numbers; and
  - Sample recipient (e.g., laboratory name).

Figure 8.1 Chain-of-Custody Form

CHAIN OF CUSTODY RECORD **NO:**

CLIENT:	PROJECT NO.	PROJECT MGR:	ANALYSES REQUIRED	Send results to: PARSONS 290 Elwood Davis Road-Suite 312 Liverpool, NY 13088 Telephone: (315) 451-9560 Fax: (315) 451-9570
PROJECT NAME:	NOTES - (Reference QAPP and/or analytical protocols to be used):			Lab Submitted to:
SAMPLERS:				

FIELD SAMPLE ID	LOCATION DESCRIPTION	DATE	TIME	GRAB	COMP	MATRIX	Number of Bottles	REMARKS

Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: ____°C Samples Intact: ___Yes ___No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: ____°C Samples Intact: ___Yes ___No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: ____°C Samples Intact: ___Yes ___No

TYPE CODES:

SOLID		WATER			MATRIX	QUALITY CONTROL
SD- Sediment	TP- Test Pit/Tank Pit	MW- Monitoring Well	FD- Fuel Dispenser	ST- Storm Water	W - Water	FB- Field Blank (with date)
SS- Surface Soil	DR- Drum Waste	LC- Leachate	MH- Manhole	WW- Waste Water	S - Soil	TB- Trip Blank (with date)
SB- Subsurface Soil	WA- Solid Waste	SW- Surface Water	OW- Oil Water Separator	OL- Other Liquid (eg. Drum liquid)		WB- Wash Blank (with date)

APPENDIX B

Quality Assurance Project Plan

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN FOR FOR SITE CHARACTERIZATION AT THE FORMER BARRETT MANUFACTURING AND MICA ROOFING SITE

Site Numbers 224197 & 224196

BROOKLYN, KINGS COUNTY, NEW YORK

Prepared For:

Honeywell

Prepared By:

PARSONS

200 Cottontail Lane
Somerset, NJ 08873
Phone: (732) 537-3500
Fax: (732) 537-3502

APRIL 2016

Revision 0

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SECTION 1

PROJECT DESCRIPTION

This Quality Assurance Project Plan (QAPP) specifies analytical methods and quality processes to be used to ensure that data from the remedial investigation are precise, accurate, representative, comparable, and complete.

1.1 INTRODUCTION

As described in a notification letter dated September 23, 2014, Honeywell International Inc. (Honeywell) has been identified by the New York State Department of Environmental Conservation (NYSDEC) as a predecessor to companies that occupied two potentially hazardous inactive waste disposal sites in Brooklyn, Kings County, New York. One of these facilities is the Former Barrett Manufacturing Site, which was historically occupied by the Barrett Manufacturing Company (a predecessor to Honeywell), located on municipal block 492, lots 15 and 20 (NYSDEC Site: 227197). Currently, Block 492, Lots 15 and 20 of the Smith Street at Former Barrett Manufacturing Site are owned by the Magrill Brothers, Inc. and 610 Smith St. Corp., respectively. The other potentially hazardous inactive waste disposal site is the Mica Roofing Site, historically occupied by the Mica Roofing Company and located on municipal Block 494, lot 1 (NYSDEC Site: 224196). The Mica Roofing Site is currently owned by Red Hook Realty Co.

This QAPP is a component of the Site Characterization Work Plan (SCWP) that was developed for the Former Barrett Manufacturing Site and the Mica Roofing Site. The SCWP has been developed based on a review of historical operations and the results of off-property investigations performed by others. As such, although the property to the east of the Former Barrett Manufacturing Site (i.e. Block 493, Lot 1) is not technically included in the scope of this SCWP, borings will also be installed on this property for NAPL assessment and historical comparative/calibration purposes.

1.2 PROJECT OBJECTIVES

The specific objectives of the SC are to assess:

- The horizontal and vertical extent of contaminants in soil and groundwater, including non-aqueous phase liquid (NAPL), if present;
- Subsurface characteristics including groundwater flow direction;
- The potential for vapor intrusion into buildings that exist on-site.

1.3 SCOPE OF WORK

The investigative work outlined in the (SCWP) includes the following tasks:

- Locating underground utilities in the new investigation areas;
- Community air monitoring during invasive drilling activities;
- Advancement of soil borings and collection of subsurface soil samples for laboratory analysis;

- Soil vapor point installation and sampling;
- Monitoring well installation and development;
- NAPL seep sampling;
- Water level monitoring;
- Slug Tests;
- Tidal Study;
- Groundwater sampling and analysis;
- Surveying of all new sampling points; and
- Investigation residuals management.

The scope of work at this site is described in the project SCWP. Samples will be collected from soil borings, groundwater monitoring wells, and NAPL seeps. The majority of these samples will be analyzed using the United States Environmental Protection Agency (USEPA) SW-846 "Test Methods for Evaluating Solid Waste," November 1986, 3rd edition (and subsequent updates).

Soil and groundwater samples will be analyzed for Target Compound List (TCL) volatile organic compounds (VOCs) by USEPA Method 8260C, TCL semivolatile organic compounds (SVOCs) by USEPA Method 8270D, Target Analyte List (TAL) metals by EPA Method 6010 (or updated), PCBs using USEPA Method 8082, and cyanide by USEPA Method 9012B.

Additionally, if NAPL is encountered, representative samples may be submitted for forensic fingerprinting analysis to a lab that specializes in analyzing and determining the origin of NAPL samples. It is anticipated that approximately 10 NAPL samples will be submitted for forensic fingerprinting analysis. Fingerprint analysis is expected to utilize GC/FID fingerprint and TPH by EPA Method 8100M. NAPL samples may also be submitted for PAHs, alkylated PAHs, and selected petroleum biomarkers by GC/MS by EPA Method 8270M should field observations warrant it. Additionally, in order to assess NAPL specific gravity, saturation, and mobility physical properties, NAPL samples from anticipated worst-case locations PSB01 and PSB02 will be submitted to PTS Laboratories for a NAPL physical properties suite analysis.

1.4 DATA QUALITY OBJECTIVES AND PROCESSES

Data Quality Objectives (DQOs) are qualitative and quantitative statements to ensure that data of known and appropriate quality are obtained during sampling and analysis activities. Data developed during the remedial investigation will be used to fulfill the overall objectives of the program as described in Section 1.2.

1.4.1 DATA QUALITY LEVELS

There are analytical data quality levels which may be used to accomplish these site objectives. They are typically designated as follows:

- **Level I, Field screening or analysis using portable instruments (e.g., photoionization detector [PID]):** Results are often not compound-specific but results are available in real time. Depending on the analysis being performed and the instrumentation used, the results may be considered qualitative, semi-quantitative, or quantitative.

- **Level II, Field analysis using more sophisticated portable analytical instruments (e.g., on-site mobile laboratory):** There is a wide range in the quality of data that can be generated depending on the use of suitable calibration standards, reference materials, and sample preparation equipment. Results are available in real-time or typically within hours of sample collection.
- **Level III, All analyses performed in an off-site analytical laboratory using methods other than USEPA-approved analytical methods**: These data generally do not include the level of formal documentation required under Level IV and are not subject to formal data validation. These data are typically used for engineering studies (e.g., treatability testing), site investigations and remedial design.
- **Level IV, Data generated using USEPA methods and enhanced by a rigorous QA program, supporting documentation, and data validation procedures:** These data are typically used for engineering studies (e.g., treatability testing), risk assessment, site investigations, and remedial design, and may be suitable for litigation/enforcement activities. Results are both qualitative and quantitative.

To meet the specific objectives of this project, Levels I and IV data quality levels will be utilized.

Level I – Field Screening Methods

Level I screening will be performed for health and safety purposes according to procedures provided in the site specific Project Safety, Health, and Environmental Plan (PSHEP). The tests are classified as field screening evaluations, even though the results are not typically used as part of any site characterization. Level 1 screening will also be used to determine the presence (and relative concentration) of volatile organic compounds in soil samples collected during drilling.

Level IV – CLP/ASP Methodologies

Soil and groundwater samples will be analyzed according to USEPA SW-846 protocols and the most recent edition of the New York State Analytical Services Program (ASP). Laboratory data will be reported in the New York State Department of Environmental Conservation (NYSDEC) ASP Category B deliverables format. Level IV data will also be provided for the hazardous waste classification.

SECTION 2

PROJECT ORGANIZATION

This SC will be completed for Honeywell by Parsons, an environmental contractor (the Contractor), who will arrange for the drilling and analytical services and provide an on-site field representative to perform the soil logging, soil sampling, surveying, and groundwater sampling. The Contractor will also perform the data interpretation and reporting tasks.

Key contacts for this project are as follows:

Honeywell Project Manager	Steve Coladonato Telephone: (302) 791-6738 Fax:
Contractor Project Manager (Parsons):	Daniel Martoccia Telephone: (732) 537-3557 Fax: (732) 537-3502
Laboratory Representatives:	Test America

SECTION 3

QUALITY ASSURANCE/QUALITY CONTROL OBJECTIVES FOR MEASUREMENT OF DATA

3.1 INTRODUCTION

The quality assurance and quality control (QA/QC) objectives for all measurement data include precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). These objectives are defined in the following subsections. They are formulated to meet the requirements of the USEPA SW-846. The analytical methods and their Contract Required Quantitation Limits (CRQLs) are provided in Section 7.

3.2 PRECISION

Precision is an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation (relative standard deviation), range (maximum value minus minimum value), relative range, and relative percent difference (RPD) are common.

For this project, field sampling precision will be determined by analyzing coded duplicate samples (labeled so that the laboratory does not recognize them as duplicates) for the same parameters, and then, during data validation (Section 8), calculating the RPD for duplicate sample results. For the evaluation of field duplicate precision, soil samples will be evaluated using a 50%RPD QC limit and aqueous samples will be evaluated using a 30%RPD QC limit.

Analytical precision will be determined by the laboratory by calculating the RPD for the results of the analysis of internal QC duplicates and matrix spike duplicates. The formula for calculating RPD is as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where:

RPD	=	Relative Percent Difference.
V1, V2	=	The two values to be compared.
$\|V1 - V2\|$	=	The absolute value of the difference between the two values.
$(V1 + V2)/2$	=	The average of the two values.

The data quality objectives for analytical precision, calculated as the RPD between duplicate analyses, are presented in Tables 3.1 and 3.2

TABLE 3.1

QUALITY CONTROL LIMITS FOR WATER SAMPLES

Laboratory Accuracy and Precision

Analytical Parameters	Analytical Method [a]	Matrix Spike (MS) Compounds	MS/MSD [b] % Recovery	MS/MSD RPD [c]	LCS [d] % Recovery	Surrogate Compounds	Surrogate % Recovery
Cs [e]	8260C	All target volatile compounds	Laboratory determined QC limits	Laboratory determined QC limits	Laboratory determined QC limits	Toluene-d8 Bromofluorobenzene 1,2-Dichloroethane-d4 Dibromofluoromethane	Laboratory determined QC limits
SVOCs [f]	8270D	All target semivolatile compounds	Laboratory determined QC limits	Laboratory determined QC limits	Laboratory determined QC limits	Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Phenol-d5 2-Fluorophenol 2,4,6-Tribromophenol	Laboratory determined QC limits
PCBs [h]	8082A	PCB-1016 and PCB-1260	30-150	20 [g]	65-135	TCMX DCB	42-133 30-141
Inorganics [i]	6010C,7470/7471A, 9012B, OIA-1677	Inorganic Analytes	75-125 [j]	20 [k]	80-120	NA	NA

Notes:

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990; any subsequent revisions shall supersede this information
(b) Matrix Spike/Matrix Spike Duplicate
(c) Relative Percent Difference
(d) Laboratory Control Sample
(e) Target Compound List Volatile Organic Compounds
(f) Target Compound List Semivolatile Organic Compounds
(g) Limits are advisory only
(h) Polychlorinated Biphenyls
(i) Inorganics (RCRA metals and cyanide)
(j) Matrix spike only
(k) Laboratory duplicate RPD
NA - Not Applicable

TABLE 3.2

QUALITY CONTROL LIMITS FOR SOIL SAMPLES

			Laboratory Accuracy and Precision				
Analytical Parameter	**Analytical Method [a]**	**Matrix Spike (MS) Compounds**	**MS/MSD [b] % Recovery**	**MS/MSD RPD [c]**	**LCS [d] % Recovery**	**Surrogate Compounds**	**Surrogate % Recovery**
VOCs [e]	8260B	All target volatile compounds	Laboratory determined QC limits	Laboratory determined QC limits	Laboratory determined QC limits	Toluene-d8 Bromofluorobenzene 1,2-Dichloroethane-d4 Dibromofluoromethane	Laboratory determined QC limits
SVOCs [f]	8270C	All target semivolatile compounds	Laboratory determined QC limits	Laboratory determined QC limits	Laboratory determined QC limits	Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Phenol-d5 2-Fluorophenol 2,4,6-Tribromophenol 2-Chlorophenol-d4 1,2-Dichlorobenzene-d4	Laboratory determined QC limits
PCBs[h]	8082	PCB-1016 and PCB-1260	55-150	20 [g]	67-128	TCMX DCB	44-141 34-145
Inorganics [i]	6010C, 7471B, 9012B	Inorganic Analyte	75-125 [j]	20 [k]	80-120	NA	NA

Notes:

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990, any subsequent revisions shall supersede this information
(b) Matrix Spike/Matrix Spike Duplicate
(c) Relative Percent Difference
(d) Laboratory Control Sample
(e) Target Compound List Volatile Organic Compounds
(f) Target Compound List Semivolatile Organic Compounds
(g) Limits are advisory only
(h) Polychlorinated Biphenyls
(i) Inorganics (RCRA metals and cyanide)
(j) Matrix spike only
(k) Laboratory duplicate RPD
NA - Not Applicable

3.3 ACCURACY

Accuracy is a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern (Taylor, 1987), or the difference between a measured value and the true or accepted reference value. The accuracy of an analytical procedure is best determined by the analysis of a sample containing a known quantity of material, and is expressed as the percent of the known quantity which is recovered or measured. The recovery of a given analyte is dependent upon the sample matrix, method of analysis, and the specific compound or element being determined. The concentration of the analyte relative to the detection limit of the analytical method is also a major factor in determining the accuracy of the measurement. Concentrations of analytes which are close to the detection limits are less accurate because they are more affected by such factors as instrument "noise". Higher concentrations will not be as affected by instrument noise or other variables and thus will be more accurate.

Sampling accuracy may be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy is typically assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. Additionally, initial and continuing calibrations must be performed and accomplished within the established method control limits to define the instrument accuracy before analytical accuracy can be determined for any sample set.

Accuracy is normally measured as the percent recovery (%R) of a known amount of analyte, called a spike, added to a sample (matrix spike) or to a blank (blank spike). The %R is calculated as follows:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where:

%R = Percent recovery.

SSR = Spike sample result: concentration of analyte obtained by analyzing the sample with the spike added.

SR = Sample result: the background value, i.e., the concentration of the analyte obtained by analyzing the sample.

SA = Spiked analyte: concentration of the analyte spike added to the sample.

The acceptance limits for accuracy for each parameter are presented in Tables 3.1 and 3.2.

3.4 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter which is most concerned

with the proper design of the sampling program (USEPA, 1987). Samples must be representative of the environmental media being sampled. Selection of sample locations and sampling procedures will incorporate consideration of obtaining the most representative sample possible.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree that is technically possible, that the data derived represents the in-place quality of the material sampled. Every effort will be made to ensure chemical compounds will not be introduced into the sample via sample containers, handling, and analysis. Decontamination of sampling devices and digging equipment will be performed between samples as outlined in the Field Sampling Plan. Analysis of field blanks, trip blanks, and method blanks will also be performed to monitor for potential sample contamination from field and laboratory procedures.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. Sampling heterogeneity will be evaluated during data validation through the analysis of coded field duplicate samples. The analytical laboratory will also follow acceptable procedures to assure the samples are adequately homogenized prior to taking aliquots for analysis, so the reported results are representative of the sample received.

Chain-of-custody procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment, and sampling. Details of blank, duplicate and Chain-of-custody procedures are presented in Sections 4 and 5.

3.5 COMPLETENESS

Completeness is defined as the percentage of measurements made which are judged to be valid (USEPA, 1987). The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested. Completeness is defined as follows for all sample measurements:

$$\%C = \frac{V}{T} \times 100$$

where:

%C = Percent completeness.

V = Number of measurements judged valid.

T = Total number of measurements.

3.6 COMPARABILITY

Comparability expresses the degree of confidence with which one data set can be compared to another (USEPA, 1987). The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Requiring traceability of all analytical standards and/or source materials to the U.S. Environmental Protection Agency (USEPA) or National Institute of Standards and Technology (NIST);
- Requiring that all calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable);
- Using standard reporting units and reporting formats including the reporting of QC data;
- Performing a complete data validation on a representative fraction of the analytical results, including the use of data qualifiers in all cases where appropriate; and
- Requiring that all validation qualifiers be used any time an analytical result is used for any purpose.

These steps will ensure all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

3.7 SENSITIVITY

When selecting an analytical method during the DQO process, the achievable detection limit (MDL) and method reporting limit (RL) must be evaluated to verify that the method will meet the project quantitation limits necessary to support project decision making requirements. This process ensures that the analytical method sensitivity has been considered and that the methods used can produce data that satisfy users' needs while making the most effective use of resources. The concentration of any one target compound that can be detected and/or quantified is a measure of sensitivity for that compound. Sensitivity is instrument-, compound-, method-, and matrix-specific and achieving the required project quantitation limit (RL) and/or method detection limit (MDL) objectives depends on instrument sensitivity and potential matrix effects. With regard to instrument sensitivity, it is important to monitor the instrument performance to ensure consistent instrument performance at the low end of the calibration range. Instrument sensitivity will be monitored through the analysis of method/prep blanks, calibration check samples, and low standard evaluations.

Laboratories generally establish limits that are reported with the analytical results; these results may be called reporting limits, detection limits, quantitation limits, or other terms. These laboratory-specific limits, apply undiluted analyses and must be less than or equal to the project RLs. The RL, also known as the practical quantitation limit (PQL), represents the concentration of an analyte that can be routinely measured in the sampled matrix within stated limits and with

confidence in both identification and quantitation. Throughout various documents RL and PQL may be interchanged, but they effectively have the same meaning. The RLs are established based on specific knowledge about the analyte, sample matrix, project specific requirements, and regulatory requirements. The RL is typically established by the laboratory at the level of the lowest calibration standard and is generally in the range of two to ten times the MDL.

The method detection limit (MDL) is defined as "the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero" (40 CFR 136 Appendix B). The MDL is the lowest concentration at which a specific analyte in a matrix can be measured and reported with 99% confidence that the analyte concentration is greater than zero. MDLs are experimentally determined and verified for each target analyte of the methods in the sampling program. The laboratory will determine MDLs for each analyte and matrix type prior to analysis of project samples. In addition, when multiple instruments are employed for the analysis of the same method, each individual instrument will maintain a current MDL study. MDLs are based on the results of seven matrix spikes at the estimated MDL, and are statistically calculated in accordance with the Title 40, Code of Federal Regulations Part 136 (40 CFR 136) Appendix B. The standard deviation of the seven replicates is determined and multiplied by 3.14 (i.e., the 99% confidence interval from the one-sided student t-test). If risk-based project objectives are developed, then where practicable, MDLs must be lower than the risk-based criteria determined for the project.

The MDLs to be used are intended to allow that both nondetected and detected target compound results will be usable to the fullest extent possible for the project. An MDL check sample an (interference-free MS with all method target compounds) must be analyzed following the MDL study to determine if reasonable MDL concentrations have been achieved. The MDL check sample should be at a concentration in the range of two to four times the MDL. If any target compound is not recovered, the MDL study must be repeated. In this case, the repeated MDL should be performed with a higher concentration, based on the analyst's judgment, of the target compounds that failed in the MDL check sample. MDLs must be determined annually at a minimum, and verified by analyzing an MDL check sample on each instrument used for the applicable method.

Laboratory RLs and MDLs for all analyses will meet at a minimum the standards criteria specified in the NYSDEC 6 NYCRR Part 375 Soil Cleanup Objectives for Unrestricted Use or the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) “Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations” or the NYSDEC Division of Fish, Wildlife, and Marine Resources, “Screening and Assessment of Contaminated Sediment,” DRAFT 1/24/2013**.**

All analytical results will be reported to the MDL. Analytical results below the MDL will be flagged with a *U* to indicate the data are non-detect. However, the laboratory will flag analytes detected at a level less than the RL but greater than the MDL (or the laboratory’s determined minimum reportable concentration) with a *J* to denote an estimated concentration.

When results are corrected for dry weight, the reporting limits are then elevated accordingly. To compensate for the low solids, modifications are made either to increase the initial volume extracted/digested or to reduce the final volume of extract/digestate.

For samples that do not meet the project-specified RLs or MDLs, (taking into consideration elevated detection limits due to percent solids or percent moisture and aliquots used for the designated analysis), the laboratory must make available compelling documentation (e.g., screening data) and a justifiable explanation for its inability to meet the specified limits using the project protocols. It must also provide an appropriate, justifiable explanation of the issues and resolution in the analytical report/data package (dilution factor, interference, etc.). Excessive, unnecessary dilutions on any sample for a project are unacceptable. The laboratory will analyze all samples initially undiluted, unless for GC/MS analyses (i.e., SW8260C and SW8270D), a preliminary GC-screen is performed and indicates that GC/MS instrument damage or compromise may occur if the sample is not analyzed initially at dilution. In this instance, the sample will be analyzed at the lowest possible dilution factor. If multiple extractions/ analyses are performed (such as undiluted and diluted analyses), resulting in several data sets for the same sample, the laboratory will report all data and results from each of the multiple analyses in the data package.

Quantitation limits for all definitive data quality level laboratory analytical methods, compounds, and matrices are to be addressed for each work assignment in the Work Assignment Scoping Documents. Individual soil sample RLs and MDLs will be adjusted accordingly based on moisture and aliquots used for analysis.

SECTION 4

SAMPLING PROGRAM

4.1 INTRODUCTION

The sampling program will provide data concerning the presence and the nature and extent of contamination of groundwater and soil. This section presents sample container preparation procedures, sample preservation procedures, sample holding times, and field QC sample requirements. Sample locations, and the number of environmental and QC samples to be taken as part of the Supplemental Remedial Investigation are given in Table 4.1. The sampling procedures are presented in the Field Sampling Plan.

4.2 SAMPLE CONTAINER PREPARATION AND SAMPLE PRESERVATION

Sample containers will be properly washed and decontaminated prior to their use by either the analytical laboratory or the container vendor to the specifications required by the USEPA. Copies of the sample container QC analyses will be provided by the laboratory for each container lot used to obtain samples. The containers will be tagged and the appropriate preservatives will be added. The types of containers are provided in Tables 4.2, 4.3, and 4.4.

Samples shall be preserved according to the preservation techniques given in Tables 4.2 and 4.3. Preservatives will be added to the sample bottles by the laboratory prior to their shipment in sufficient quantities to ensure that proper sample pH is met. Following sample collection, the sample bottles should be placed on ice in the shipping cooler, cooled to 4^{o}C with ice, and delivered to the laboratory in accordance with laboratory specified holding times. Chain-of-custody procedures are described in Section 5.

4.3 SAMPLE HOLDING TIMES

The sample holding times for organic and inorganic parameters are given in Tables 4.2 and 4.3 and must be in accordance with the NYSDEC ASP requirements. Holding times for TCLP samples are given in table 4.4. The NYSDEC ASP holding times must be strictly adhered to by the laboratory. Any holding time exceedances must be reported to Honeywell.

4.4 FIELD QC SAMPLES

To assess field sampling and decontamination performance, two types of "blanks" will be collected and submitted to the laboratory for analyses. In addition, the precision of field sampling procedures will be assessed by collecting coded field duplicates and matrix spike/matrix spike duplicates (MS/MSDs). The blanks will include:

a. Trip Blanks - A trip blank will be prepared before the sample containers are sent by the laboratory. The trip blank will consist of a 40-ml VOA vial containing distilled, deionized water, which accompanies the other water sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples for target compound list (TCL) volatiles analysis. The trip blank will be analyzed for TCL volatile organic compounds to assess any contamination from sampling and transport, and internal laboratory procedures.

b. Field Blanks - Field blanks will be taken at a minimum frequency of one per 20 field samples per sample matrix. Field blanks are used to determine the effectiveness of the decontamination procedures for sampling equipment. It is a sample of deionized, distilled water provided by the laboratory that has passed through a decontaminated bailer or other sampling apparatus. It is usually collected as a last step in the decontamination procedure, prior to taking an environmental sample. The field blank may be analyzed for all or some of the parameters of interest.

The duplicates will consist of:

a. Coded Field Duplicate - To determine the representativeness of the sampling methods, coded field duplicates will be collected. The samples are termed "coded" because they will be labeled in such a manner that the laboratory will not be able to determine that they are a duplicate sample. This will eliminate any possible bias that could arise.

b. Matrix Spike/Matrix Spike Duplicate (MS/MSD) - MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes. The percent recoveries and RPDs are given in Tables 3.1 and 3.2.

TABLE 4.1
SUMMARY OF SAMPLES AND ANALYSES

Parameter	Analytical Method	Field Samples				QC		Total
		Normal Sample	Field Duplicate	MS/MSD	Subtotal	Trip Blanks	Rinse Blanks	
TCL VOCs	EPA 8260	44	5	3/3	55	0	5	60
TCLSVOCs	EPA 8270	48	5	3/3	59	0	5	64
TAL Metals	EPA 6010 (or updated)	44	5	3/3	55	0	5	60
Cyanide	EPA 9012B (or updated)	44	5	3/3	55	0	5	60
PCBs	EPA 8082	28	2	2/2	42	0	2	44
Moisture Content & Grain Size	ASTM D2216/ASTM D422	32	0	0	32	0	0	32
TCL VOCs	EPA 8260	26	2	2/2	32	10	8	50
TCLSVOCs	EPA 8270	26	2	2/2	32	0	8	40
TAL Metals / Cyanide	EPA 6010 (or updated) / EPA 335.2	26	2	2/2	32	0	8	40
PCBs	EPA 8082	8	1	1/1	11	0	8	19
Fingerprint	EPA 8100M	8	0	0	8	0	0	8
Specific Gravity		6	0	0	6	0	0	6
Viscosity		6	0	0	6	0	0	6
VOCs	EPA TO-15 with added compounds	8	1	1/1	11	0	0	11

Notes:
(1) Matrix spike/matrix spike duplicate for organic analyses.
(2) NAPL Saturation Package at PTS consists of the following:
(3) NAPL Mobility Package at PTS consists of the following: Pore fluid saturation profile, lithology characterization, capillary pressure, fluid properties, and core photo log
(4) If an updated EPA method is available, that updated method will be used for sample analysis.

TABLE 4.2

Water Sample Containerization, Preservation, and Holding Times

Analysis	Bottle Type	Preservation [a]	Holding Time [b]
Volatile Organic Compounds (VOCs)	2-40 mL glass vial w/ Teflon septum	HCl to pH < 2 Cool to 4ºC	14 days
Semivolatile Organics Compounds (SVOCs)	1000 mL glass w/ Teflon lined cap	Cool to 4ºC	7 days for extraction, 40 days for analysis
Polychlorinated Biphenyls (PCBs)	1000 mL glass amber Teflon lined screw cap	Cool to 4ºC	7 days for extraction, 40 days for analysis
Metals	1000 mL plastic bottle	Nitric Acid to pH < 2 Cool to 4ºC	6 months, except mercury (28 days)
Cyanide	500 mL plastic bottle	NaOH to pH > 12 Cool to 4ºC	14 days

Notes

(a) All samples to be preserved in ice during collection and transport.

(b) Days from sample collection.

TABLE 4.3

SOIL AND WASTE SAMPLE CONTAINERIZATION AND HOLDING TIMES

Analysis	Bottle Type	Preservation [a]	Holding Time [b]
Volatile Organic Compounds (VOCs)	TerraCores	Cool to 4ºC	14 days
Other Organic Compounds [c]	Wide-mouth glass w/teflon lined cap	Cool to 4ºC	14 days for extraction, 40 days for analysis
Metals	Wide-mouth plastic or glass	Cool to 4ºC	6 months, except mercury (28 days)
Cyanide	Wide-mouth plastic	Cool to 4ºC	14 days
RCRA Characteristics	32 oz. wide-mouth glass w/Teflon® lined cap		
Ignitability		Cool to 4ºC	Not Regulated
Corrosivity		Cool to 4ºC	Not Regulated
Reactivity		Cool to 4ºC	Not Regulated
TCLP Organic	Wide Mouth Plastic	Cool to 4ºC	See Table 4.4
Compounds	w/Teflon lined cap		
TCLP Metals	Wide mount plastic or Glass	Cool to 4ºC	See Table 4.4
Hydrocarbon Fingerprint	8 oz. wide mouth glass Teflon lined cap	Cool to 4ºC	7 days

Notes

(a) All samples to be preserved in ice during collection and transport.

(b) Days from sample collection.

(c) Semivolatile organic compounds or PCBs.

TABLE 4.4

TCLP SAMPLE HOLDING TIMES

Analytical Parameter	From: Sample Collection To: TCLP [(a)] Extraction	From: TCLP Extraction To: Preparative Extraction	From: Preparative Extraction To: Determinative Analysis
Volatiles	14 days	NA	14 days
Semivolatiles	14 days	7 days	40 days
Mercury	28 days	NA	28 days
Metals (except Mercury)	180 days	NA	180 days

Notes:

(a) Toxicity Characteristic Leaching Procedure.

NA - Not Applicable.

SECTION 5

SAMPLE TRACKING AND CUSTODY

5.1 INTRODUCTION

This section presents sample custody procedures for both the field and laboratory. Implementation of proper custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in the Chain-of-custody (COC) and transfer of samples will be trained as to the purpose and procedures prior to implementation.

Evidence of sample traceability and integrity is provided by COC procedures. These procedures document the sample traceability from the selection and preparation of the sample containers by the laboratory, to sample collection, to sample shipment, to laboratory receipt and analysis. The sample custody flowchart is shown in Figure 5.1. A sample is considered to be in a person's custody if the sample is:

- In a person's possession;
- Maintained in view after possession is accepted and documented;
- Locked and tagged with Custody Seals so that no one can tamper with it after having been in physical custody; or
- In a secured area which is restricted to authorized personnel.

5.2 FIELD SAMPLE CUSTODY

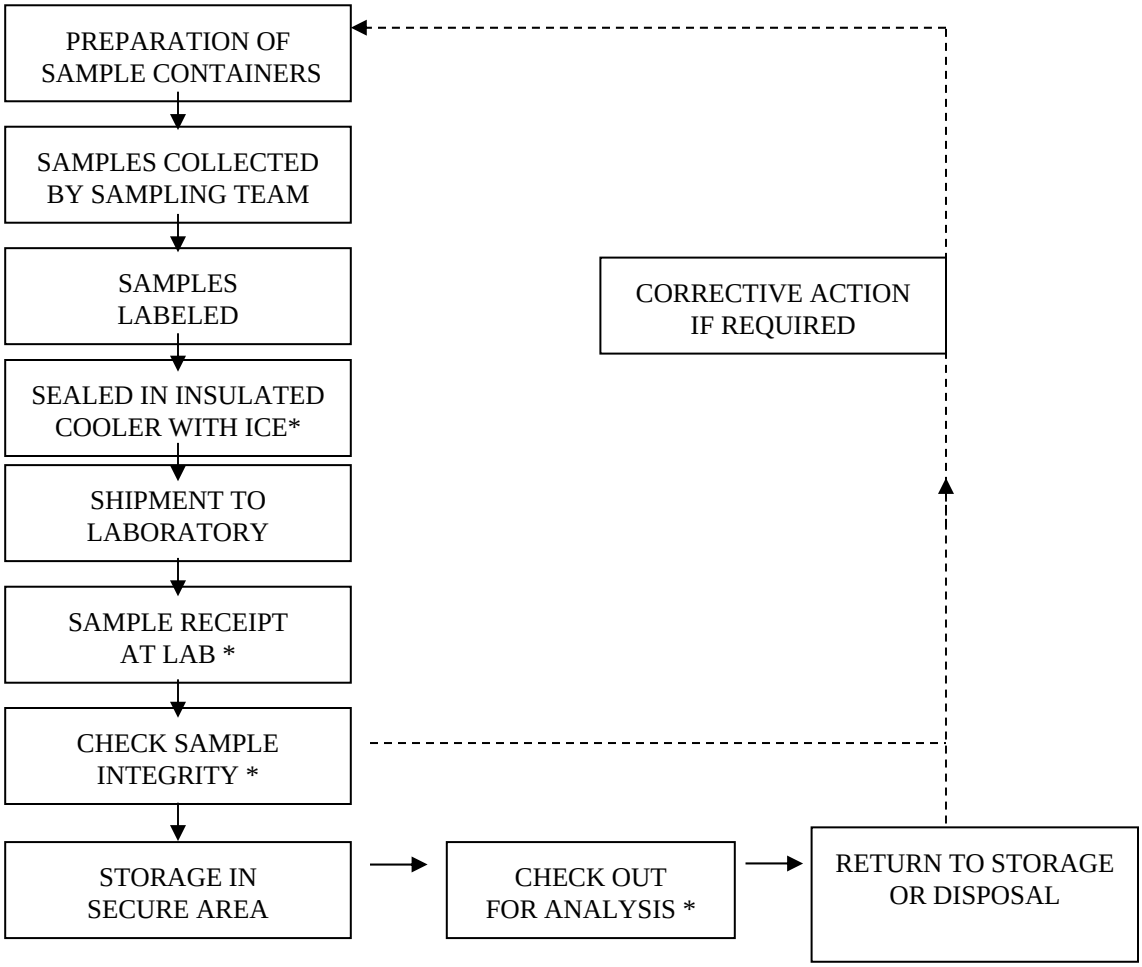
A COC record (Figure 5.2 or similar) accompanies the sample containers from selection and preparation at the laboratory, during shipment to the field for sample containment and preservation, and during return to the laboratory. Triplicate copies of the COC must be completed for each sample set collected.

The COC lists the field personnel responsible for taking samples, the project name and number, the name of the analytical laboratory to which the samples are sent, and the method of sample shipment. The COC also lists a unique description of every sample bottle in the set. If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample.

The REMARKS space on the COC is used to indicate if the sample is a matrix spike, matrix spike duplicate, or any other sample information for the laboratory. Since they are not specific to any one sample point, trip and field blanks are indicated on separate rows. Once all bottles are properly accounted for on the form, a sampler will write his or her signature and the date and time on the first RELINQUISHED BY space. The sampler will also write the method of shipment, the shipping cooler identification number, and the shipper airbill number on the top of the COC. Mistakes will be crossed out with a single line in ink and initialed by the author.

FIGURE 5.1

SAMPLE CUSTODY



* REQUIRES SIGN-OFF ON CHAIN-OF-CUSTODY FORM

FIGURE 5.2 CHAIN-OF-CUSTODY RECORD

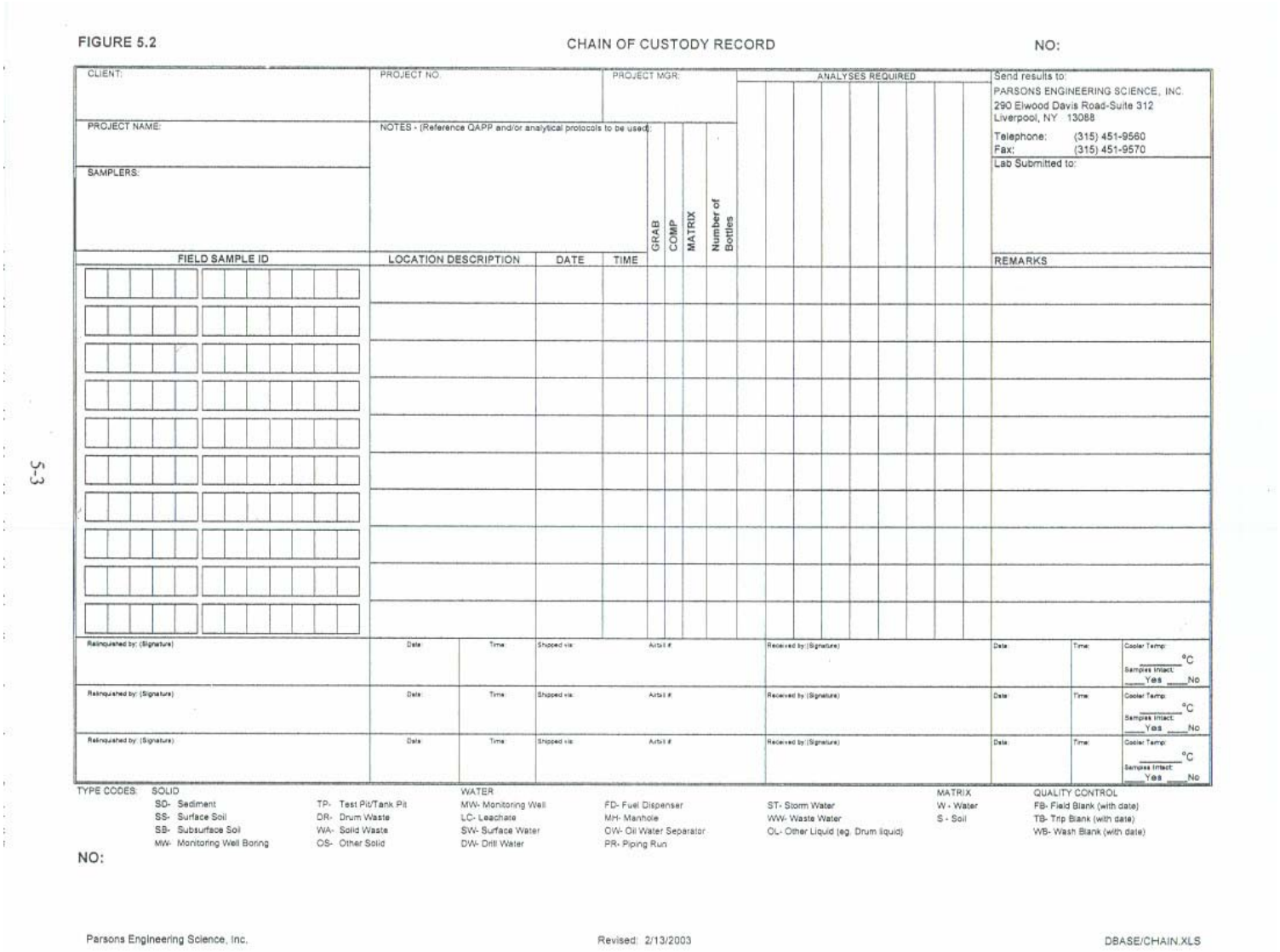


FIGURE 5.2

CHAIN OF CUSTODY RECORD

NO:

CLIENT:	PROJECT NO.	PROJECT MGR:	ANALYSES REQUIRED	Send results to: PARSONS ENGINEERING SCIENCE, INC. 290 Elwood Davis Road-Suite 312 Liverpool, NY 13088 Telephone: (315) 451-9560 Fax: (315) 451-9570
PROJECT NAME:	NOTES - (Reference QAPP and/or analytical protocols to be used):			Lab Submitted to:
SAMPLERS:				

FIELD SAMPLE ID	LOCATION DESCRIPTION	DATE	TIME	GRAB	COMP	MATRIX	Number of Bottles	REMARKS

Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: ____°C Samples Intact: ____Yes ____No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: ____°C Samples Intact: ____Yes ____No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by: (Signature)	Date:	Time:	Cooler Temp: ____°C Samples Intact: ____Yes ____No

TYPE CODES:

SOLID		WATER			MATRIX	QUALITY CONTROL
SD- Sediment	TP- Test Pit/Tank Pit	MW- Monitoring Well	FD- Fuel Dispenser	ST- Storm Water	W - Water	FB- Field Blank (with date)
SS- Surface Soil	DR- Drum Waste	LC- Leachate	MH- Manhole	WW- Waste Water	S - Soil	TB- Trip Blank (with date)
SB- Subsurface Soil	WA- Solid Waste	SW- Surface Water	OW- Oil Water Separator	OL- Other Liquid (eg. Drum liquid)		WB- Wash Blank (with date)
MW- Monitoring Well Boring	OS- Other Solid	DW- Drill Water	PR- Piping Run			

NO:

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One copy of the COC is retained by sampling personnel (notations identifying blind duplicate samples will be added to this copy of the COC but not the others that will go to the laboratory) and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the latch and across the back and front lids of the cooler, and the person relinquishing the samples signs their name across the seal. The seal is taped, and the cooler is wrapped tightly with clear packing tape. It is then relinquished by field personnel to personnel responsible for shipment, typically an overnight carrier. The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the sample will not be analyzed.

5.3 LABORATORY SAMPLE CUSTODY

The Project Manager or Field Team Leader will notify the laboratory of upcoming field sampling activities, and the subsequent shipment of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The following laboratory sample custody procedures will be used:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples, and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check cooler temperature, and check the original COC documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian will sign the COC record and record the date and time received.
- Care will be exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the Project Manager or Field Team Leader as part of the corrective action process. A qualitative assessment of each sample container will be performed to note any anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming chain-of-custody procedure.
- The samples will be stored in a secured area at a temperature of approximately 4 degrees Celsius until analyses commence.
- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.
- A copy of the tracking record will accompany the laboratory report and will become a permanent part of the project records.

SECTION 6

CALIBRATION PROCEDURES

6.1 FIELD INSTRUMENTS

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures will conform to manufacturer's standard instructions and are described in the Smith Street SC Field Sampling Plan. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Records of all instrument calibration will be maintained by the Field Team Leader. Copies of all the instrument manuals will be maintained on-site by the Field Team Leader.

Calibration procedures for instruments used for monitoring health and safety hazards (e.g., photoionization detector) are provided in the Health and Safety Plan.

6.2 LABORATORY INSTRUMENTS

The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods identified in Section 7.

SECTION 7

ANALYTICAL PROCEDURES

7.1 INTRODUCTION

Most samples will be analyzed according to the USEPA SW-846 "Test Methods for Evaluating Solid Waste," November 1986, 3rd edition and subsequent updates. The methods to be used for the laboratory analysis of water and soil samples are presented in Table 7.1. These methods were selected because they attain the quantitation limits and DQOs.

TABLE 7.1
PROJECT QUANTITATION LIMITS

			Quantitation Limits		State of New York Standards	
	Analysis/Compound	Method	Water (µg/L)	Soil (µg/kg)	Water (µg/L) [a]	Soil (µg/kg) [b]
	Volatile Organics					
1	1,1,1-Trichloroethane	SW8260B	5	5	5	680
2	1,1,2,2-Tetrachloroethane	SW8260B	5	5	5	
3	1,1,2-Trichloroethane	SW8260B	5	5	1	
4	1,1,2-Trichlorotrifluoroethane	SW8260B	5	5	5	
5	1,2-Dibromoethane	SW8260B	5	5		
6	1,2-Dibromo-3-chloropropane	SW8260B	5	5	0.04	
7	1,1-Dichloroethane	SW8260B	5	5	5	270
8	1,1-Dichloroethene	SW8260B	5	5	5	330
9	1,2-Dichloroethane	SW8260B	5	5	0.6	20
10	cis-1,2-Dichloroethene	SW8260B	5	5	5	250
11	trans-1,2-Dichloroethene	SW8260B	5	5	5	190
12	1,2-Dichloropropane	SW8260B	5	5	1	
13	1,2-Dichlorobenzene	SW8260B	5	5	3	1100
14	1,3-Dichlorobenzene	SW8260B	5	5	3	2400
15	1,4-Dichlorobenzene	SW8260B	5	5	3	1800
16	1,4-Dioxane	SW8260B	125	100		100
17	1,2,3-Trichlorobenzene	SW8260B	5	5	5	
18	1,2,4-Trichlorobenzene	SW8260B	5	5	5	
19	2-Butanone (MEK)	SW8260B	25	25	50	120
20	2-Hexanone	SW8260B	25	25	50	
21	4-Methyl-2-pentanone(MIBK)	SW8260B	25	25		
22	Acetone	SW8260B	25	25	50	50
23	Benzene	SW8260B	5	5	1	60
24	Bromochloromethane	SW8260B	5	5	5	
25	Bromodichloromethane	SW8260B	5	5	50	
26	Bromoform	SW8260B	5	5	50	
27	Bromomethane	SW8260B	5	5	5	
28	Carbon Disulfide	SW8260B	5	5		
29	Carbon Tetrachloride	SW8260B	5	5	5	760
30	Chlorobenzene	SW8260B	5	5	5	1100
31	Chloroethane	SW8260B	5	5	5	
32	Chloroform	SW8260B	5	5	7	370
33	Chloromethane	SW8260B	5	5	5	

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

			Quantitation Limits		State of New York Standards	
	Analysis/Compound	**Method**	**Water (µg/L)**	**Soil (µg/kg)**	**Water (µg/L)**	**Soil (µg/kg)**
	Volatile Organics, cont.					
36	Dibromochloromethane	SW8260B	5	5	50	
37	Dichlorodifluoromethane	SW8260B	5	5	5	
38	Ethyl Benzene	SW8260B	5	5	5	1000
39	Isopropylbenzene	SW8260B	5	5	5	
40	Methyl tert-Butyl ether	SW8260B	5	5		930
41	Methyl Acetate	SW8260B	5	5		
42	Methylcyclohexane	SW8260B	5	5		
43	Methylene Chloride	SW8260B	5	5	5	50
44	Styrene	SW8260B	5	5	930	
45	Tetrachloroethene	SW8260B	5	5	5	1300
46	Toluene	SW8260B	5	5	5	700
47	trans-1,3-Dichloropropene	SW8260B	5	5	0.4	
48	Trichloroethene	SW8260B	5	5	5	470
49	Trichlorofluoromethane	SW8260B	5	5	5	
50	Vinyl Chloride	SW8260B	5	5	2	20
51	Xylenes (total)	SW8260B	10	10	5	260
52	n-Propylbenzene	SW8260B	5	5	5	3900
53	n-Butylbenzene	SW8260B	5	5	5	12000
54	sec-Butylbenzene	SW8260B	5	5	5	11000
55	tert-Butylbenzene	SW8260B	5	5	5	5900
56	1,2,4-Trimethylbenzene	SW8260B	5	5	5	3600
57	1,3,5-Trimethylbenzene	SW8260B	5	5	5	8400
	Semivolatile Organics					
1	1,1-Biphenyl	SW8270C	10	330	5	
2	2,2'-oxybis(1-chloropropane)	SW8270C	10	330	5	
3	2,4,5-Trichlorophenol	SW8270C	10	330	1	
4	2,4,6-Trichlorophenol	SW8270C	10	330	1	
5	2,4-Dichlorophenol	SW8270C	10	330	1	
6	2,4-Dimethylphenol	SW8270C	10	330	1	
7	2,4-Dinitrophenol	SW8270C	10	330	1	
8	2,4-Dinitrotoluene	SW8270C	10	330	5	
9	2,6-Dinitrotoluene	SW8270C	10	330	5	
10	2-Chloronaphthalene	SW8270C	10	330	10	
11	2-Chlorophenol	SW8270C	10	330	1	

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

			Quantitation Limits		State of New York Standards	
	Analysis/Compound	**Method**	**Water (µg/L)**	**Soil (µg/kg)**	**Water (µg/L)**	**Soil (µg/kg)**
	Semivolatile Organics, cont.					
12	2-Methylnaphthalene	SW8270C	10	330		
13	2-Methylphenol	SW8270C	10	330	1	330
14	2-Nitroaniline	SW8270C	10	330	5	
15	2-Nitrophenol	SW8270C	10	330	1	
16	3,3'-Dichlorobenzidine	SW8270C	10	330	5	
17	3-Nitroaniline	SW8270C	10	330	5	
18	4-Bromophenyl-phenyl ether	SW8270C	10	330		
19	4-Chloro-3-methylphenol	SW8270C	10	330		
20	4-Chloroaniline	SW8270C	10	330	5	
21	4-Chlorophenyl-phenyl ether	SW8270C	10	330		
22	3&4-Methylphenol	SW8270C	10	330	1	330
23	4-Nitroaniline	SW8270C	10	330	5	
24	4-Nitrophenol	SW8270C	10	330	1	
25	4,6-Dinitro-2-methylphenol	SW8270C	10	330		
26	Acenaphthene	SW8270C	10	330	20	20000
27	Acenaphthylene	SW8270C	10	330		100000
28	Anthracene	SW8270C	10	330	50	100000
29	Atrazine	SW8270C	10	330	7.5	
30	Benzaldehyde	SW8270C	10	330		
31	Benzo(a)anthracene	SW8270C	10	330	0.002	1000
32	Benzo(a)pyrene	SW8270C	10	330		1000
33	Benzo(b)fluoranthene	SW8270C	10	330	0.002	1000
34	Benzo(g,h,i)perylene	SW8270C	10	330		100000
35	Benzo(k)fluoranthene	SW8270C	10	330	0.002	800
36	bis(2-Chloroethoxy) methane	SW8270C	10	330	5	
37	bis(2-Chloroethyl) ether	SW8270C	10	330	1	
38	bis(2-ethylhexyl)phthalate	SW8270C	10	330	5	
39	Butylbenzylphthalate	SW8270C	10	330	50	
40	Caprolactam	SW8270C	10	330		
41	Carbazole	SW8270C	10	330		
42	Chrysene	SW8270C	10	330	0.002	1000
43	Di-n-butylphthalate	SW8270C	10	330	50	
44	Di-n-octylphthalate	SW8270C	10	330	50	

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

			Quantitation Limits		State of New York Standards	
	Analysis/Compound	**Method**	**Water (µg/L)**	**Soil (µg/kg)**	**Water (µg/L)**	**Soil (µg/kg)**
	Semivolatile Organics, cont.					
45	Dibenz(a,h)anthracene	SW8270C	10	330		330
46	Dibenzofuran	SW8270C	10	330		7000
47	Diethylphthalate	SW8270C	10	330	50	
48	Dimethylphthalate	SW8270C	10	330	50	
49	Fluoranthene	SW8270C	10	330	50	100000
50	Fluorene	SW8270C	10	330	50	30000
51	Hexachlorobenzene	SW8270C	10	330	0.04	330
52	Hexachlorobutadiene	SW8270C	10	330	0.5	
53	Hexachlorocyclopentadiene	SW8270C	10	330	5	
54	Hexachloroethane	SW8270C	10	330	5	
55	Indeno(1,2,3-cd)pyrene	SW8270C	10	330	0.002	500
56	Isophorone	SW8270C	10	330	50	
57	N-Nitroso-di-n-propylamine	SW8270C	10	330		
58	N-nitrosodiphenylamine	SW8270C	10	330	50	
59	Naphthalene	SW8270C	10	330	10	12000
60	Nitrobenzene	SW8270C	10	330	0.4	
61	Pentachlorophenol	SW8270C	10	330	1	800
62	Phenanthrene	SW8270C	10	330	50	100000
63	Phenol	SW8270C	10	330	1	330
64	Pyrene	SW8270C	10	330	50	100000
	PCBs					
1	PCB-1016	SW8082	0.5	17	0.09	100
2	PCB-1221	SW8082	0.5	17	0.09	100
3	PCB-1232	SW8082	0.5	17	0.09	100
4	PCB-1242	SW8082	0.5	17	0.09	100
5	PCB-1248	SW8082	0.5	17	0.09	100
6	PCB-1254	SW8082	0.5	17	0.09	100
7	PCB-1260	SW8082	0.5	17	0.09	100
8	PCB-1262	SW8082	0.5	17	0.09	100
9	PCB-1268	SW8082	0.5	17	0.09	100

TABLE 7.1 (Continued)
PROJECT QUANTITATION LIMITS

			Quantitation Limits		State of New York Standards	
	Analysis/Compound	**Method**	**Water (mg/L)**	**Soil (mg/kg)**	**Water (mg/L)**	**Soil (mg/kg)**
	Inorganics					
1	Antimony	SW6010B	0.025	2.5	0.006	
2	Arsenic	SW6010B	0.01	1	0.050	13
3	Barium	SW6010B	0.05	5	2	350
4	Beryllium	SW6010B	0.003	0.3	0.003	7.2
5	Cadmium	SW6010B	0.003	0.3	0.010	2.5
6	Chromium	SW6010B	0.005	0.5	0.1	See below for Cr(VI), Cr(III)
7	Copper	SW6010B	0.01	1	1	50
8	Lead	SW6010B	0.006	0.6	0.05	63
9	Mercury	SW7470A/7471A	0.0002	0.01	0.0014	0.18
10	Nickel	SW6010B	0.02	2	0.2	30
11	Selenium	SW6010B	0.01	1	0.02	3.9
12	Silver	SW6010B	0.005	0.5	0.1	2
13	Thallium	SW6010B	0.02	2	0.0005	
14	Zinc	SW6010B	0.02	2	5	109
15	Vanadium	SW6010B	0.02	2		
16	Cobalt	SW6010B	0.015	1.5		
17	Aluminum	SW6010B	0.05	5	2	
18	Calcium	SW6010B	1	100		
19	Iron	SW6010B	0.05	5	0.6	
20	Magnesium	SW6010B	1	100	35	
21	Manganese	SW6010B	0.01	1	0.6	1600
22	Potassium	SW6010B	1	100		
23	Sodium	SW6010B	1	100		
24	Cyanide	SW9012A/E335.2/OIA-1677	0.01	0.01	0.4	27
25	Chromium, Hexavalent	SW7196A		0.5	0.1	1
26	Chromium, Trivalent	SW7196A		0.5	0.1	30

Notes:

(a) – Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, NYSDEC, June 1998

(b) – 6 NYCRR Part 375 Soil Cleanup Objectives for Unrestricted Use, December 2006

SECTION 8

DATA REDUCTION, VALIDATION, AND REPORTING

8.1 INTRODUCTION

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format.

The completed copies of the Chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

8.2 DATA REDUCTION

Two copies of the analytical data packages and an electronic disk deliverable will be provided by the laboratory approximately 30 days after receipt of a complete sample delivery group. The Project Manager will immediately arrange for filing one package; a second copy, and the disk deliverable, will be used to generate summary tables. These tables will form the database for assessment of the site contamination condition.

The electronic data management system will be implemented to process the information effectively without loss or alteration. As of April 1, 2011, the New York State Division of Environmental Remediation (DER) has implemented an Environmental Information Management System (EIMS). The EIMS uses the database software application EQuIS™ from EarthSoft® Inc. In an effort to improve the management of environmental data and reduce paper quantities, all laboratory analytical data minus instrument raw data must be submitted in the DEC-approved Electronic Data Deliverable (EDD).

Data providers must download and install the EQuIS Data Processor (EDP) to check their properly formatted EDD as well as the NYSDEC DER Format file. The EDP performs a series of formatting checks on the EDD and identifies any errors in the data file prior to submission. All EDDs are to be error free when submitted. It is important that the most recent version of the EDP and NYSDEC format file are employed since the valid values used by EIMS are periodically updated for the EDP.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

8.3 DATA VALIDATION

Data validation will be performed in accordance with the USEPA **Region 2 Data Validation SOPs** for organic and inorganic data review (USEPA, 2012a, 2012b, 2012c, 2013c, 2013d, 2013e, 2013f). Data validation will be conducted using the USEPA guidelines (USEPA, 2008, 2010, 2013a, 2013b, 2013g, 2013h) as supplementary guidelines. Where CLP guidelines and SW-846 disagree, this QAPP and data validation professional judgment will prevail. Validation will include the following:

- Verification of 100% of all QC sample results (both qualitative and quantitative);
- Verification of the identification of 100% of all sample results (both positive hits and non-detects);
- Recalculation of 10% of all investigative sample results; and
- Preparation of a Data Usability Summary Report (DUSR).

A DUSR will be prepared and reviewed by the QAO before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and COC procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each SDG will follow. For each of the organic analytical methods, the following will be assessed:

- Holding times;
- Instrument tuning;
- Instrument calibrations;
- Blank results;
- Laboratory control sample recoveries;
- System monitoring compounds or surrogate recovery compounds (as applicable);
- Internal standard recovery results;
- MS and MSD results;
- Target compound identification;
- Chromatogram quality;
- Pesticide cleanup (if applicable);
- Compound quantitation and reported detection limits;
- System performance; and
- Results verification.

For each of the inorganic compounds, the following will be assessed:

- Holding times;
- Calibrations;
- Blank results;
- Interference check sample;
- Laboratory check samples;

- Laboratory control sample recoveries;
- Duplicates;
- Matrix Spike;
- Furnace atomic absorption analysis QC;
- ICP serial dilutions; and
- Results verification and reported detection limits.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected at given value;
- "UJ" - Estimated not detected at given value;
- "J" - Estimated value;
- “J+” – Estimated biased high value;
- “J-“ – Estimated biased low value;
- “N” – Presumptive evidence at the value given;
- "R" - Result not useable; and
- No Flag - Result accepted without qualification.

SECTION 9

INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

9.1 QUALITY ASSURANCE BATCHING

Each set of up to 20 samples will be analyzed concurrently with calibration standards, method blanks, matrix spikes (MS), matrix spike duplicates (MSD) or laboratory duplicates, and QC check samples (if required by the protocol). The MS/MSD samples will be designated by the field personnel. If no MS/MSD samples have been designated, the laboratory will contact the Parsons Project Manager for corrective action.

9.2 CALIBRATION STANDARDS AND SURROGATES

All organic standard and surrogate compounds are checked by the method of mass spectrometry for correct identification and gas chromatography for degree of purity and concentration. All standards are traceable to a source of known quality certified by the USEPA or NIST, or other similar program. When the compounds pass the identity and purity tests, they are certified for use in standard and surrogate solutions. Concentrations of the solutions are checked for accuracy before release for laboratory use. Standard solutions are replaced monthly or more frequently, based upon data indicating deterioration.

9.3 ORGANIC BLANKS AND MATRIX SPIKE

Analysis of blank samples verifies that the analytical method does not introduce contaminants or detect "false positives". The blank water can be generated by reverse osmosis and Super-Q filtration systems, or distillation of water containing $KMnO_4$. The matrix spike is generated by addition of surrogate standard to each sample.

9.4 TRIP AND FIELD BLANKS

Trip blanks and field blanks will be used in accordance with the specifications in Section 4. These blanks will be analyzed to provide a check on sample bottle preparation and to evaluate the possibility of atmospheric or cross contamination of the samples.

SECTION 10

QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

10.1 INTRODUCTION

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the project QAO. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning as an independent body and reporting directly to corporate quality assurance management, the QAO may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

10.2 SYSTEM AUDITS

System audits may be performed by the QAO or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may occur.

10.3 PERFORMANCE AUDITS

The laboratory may be required to conduct an analysis of Performance Evaluation (PE) samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

10.4 FORMAL AUDITS

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Noncompliances will be logged, and documented through audit findings which are attached to and are a part of the integral audit report. These audit finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be

submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

SECTION 11

PREVENTIVE MAINTENANCE PROCEDURES AND SCHEDULES

11.1 PREVENTIVE MAINTENANCE PROCEDURES

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedure developed by the operators.

A list of critical spare parts will be established by the operator. These spare parts will be available for use in order to reduce the downtime. A service contract for rapid instrument repair or backup instruments may be substituted for the spare part inventory.

11.2 SCHEDULES

Written procedures will establish the schedule for servicing critical items in order to minimize the downtime of the measurement system. The laboratory will adhere to the maintenance schedule, and arrange any necessary and prompt service. Required service will be performed by qualified personnel.

11.3 RECORDS

Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the operators at the laboratories. The QAO may audit these records to verify complete adherence to these procedures.

SECTION 12

CORRECTIVE ACTION

12.1 INTRODUCTION

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

12.2 PROCEDURE DESCRIPTION

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 12.1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her

signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

FIGURE 12.1

CORRECTIVE ACTION REQUEST
Number: _____ Date: _____
TO: _____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____
CONDITION:
REFERENCE DOCUMENTS:
RECOMMENDED CORRECTIVE ACTIONS:
_____ _____ _____ _____ _____ _____ Originator Date Approval Date Approval Date
RESPONSE
CAUSE OF CONDITION
CORRECTIVE ACTION (A) RESOLUTION (B) PREVENTION (C) AFFECTED DOCUMENTS
C.A. FOLLOWUP: CORRECTIVE ACTION VERIFIED BY: _____ DATE:_____

SECTION 13

REFERENCES

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APPENDIX C

Project Safety, Health, and Environment Plan

APPENDIX C

PROJECT SAFETY, HEALTH, AND ENVIRONMENTAL PLAN (PSHEP)

Site Characterization at the Former Barrett Manufacturing and Mica Roofing Site

Block 492, Lot 15; Block 492, Lot 20; Block 494, Lot 1; Block 493, Lot 1
Brooklyn, New York

Prepared For:

Honeywell

6100 Philadelphia Pike
Claymont, Delaware 19703

Prepared By:

PARSONS

200 Cottontail Lane
Somerset, NJ 08873

APRIL 2016

Project Key Personnel

Reporting Requirements	
All incidents/near misses	Enter into IndustrySafe within 4 hours (Project Manager – Dan Martoccia (908) 625-5376
Worker injury or illness	Enter into IndustrySafe within 4 hours (Project Manager – Dan Martoccia (908) 625-5376
Environmental spill/release	Enter into IndustrySafe within 4 hours (Project Manager – Dan Martoccia (908) 625-5376
Medical (non-emergencies)	WorkCare (888) 449-7787

Company Executive responsible for Project	**Contact Information**
Ed Andrechak	Direct Line: (302) 468-5567 Cell Phone: (302) 438-5743 Email: Ed.Andrechak@parsons.com
Project Manager	**Contact Information.**
Dan Martoccia	Direct Line: 732-537-3557 Cell Phone: 908-625-5376 Email: daniel.martoccia@parsons.com
Project Safety Manager / Field Team Leaders	**Contact Information.**
John Scurek (Project Safety Manager)	Direct Line: (315) 451-9560 Cell Phone (315) 313-3781 Email: John.Scurek@parsons.com
Zohar Lavy (Well and Boring Installation, Soil Gas)	Direct Line: (732) 537-5536 Cell Phone (732) 796-5536 Email: zohar.lavy@parsons.com
Matt Bruno (Hand Clearing, Groundwater Sampling, Slug Tests)	Direct Line: (732) 537-3545 Cell Phone: (732) 757-5488 Email: Matthew.Bruno@parsons.com
Project SH&E Representative	**Contact Information**
Greg Beck	Direct Line: (908) 887-1973 Cell Phone: (908) 887-1973 Email: Gregory.Beck@parsons.com
Client Project Management POC	**Contact Information**
Steve Coladonato	Direct Line: (973) 722.1656 Cell Phone: (973) 722.1656 Email: Steven.Coladonato@Honeywell.com

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SECTION 1 – INTRODUCTION

1.1 PARSONS SAFETY, HEALTH & ENVIRONMENT POLICY

Exhibit P-1 – Parsons Corporate SH&E Policy

PARSONS

Corporate Safety, Health & Environment Policy Statement

As an industry-leading engineering, construction, and technical services firm, Parsons is firmly committed to maintaining a safe, healthy, and environmentally compliant workplace at all its offices and project facilities, guided by the following tenets:

- Safety, Health and Environment (SH&E) is a core value.
- Executive management will lead the SH&E process.
- SH&E will be a responsibility shared by all.
- SH&E performance will be a key business performance indicator.
- SH&E performance will be communicated openly.
- Employees will be given the knowledge and skills necessary to perform their jobs in a high-performance SH&E manner.
- We will extend our SH&E efforts beyond the workplace to include travel, homes, and communities.
- We will continually strive to improve our SH&E processes.

To meet our SH&E objectives, all employees are expected to be actively engaged with regard to SH&E issues. This requires the combined efforts of a concerned management, responsible and knowledgeable supervision, and conscientious, well-trained employees.

Executive Management shall lead and monitor and improve the performance of the organization's Safety, Health and Environmental Management System, at regular intervals, to ensure its continuing suitability, adequacy, and effectiveness.

Parsons will meet or exceed the applicable SH&E legal and other requirements and will continuously monitor and improve operations, procedures, technologies, and programs that are conducive to maintaining a safe, healthy, and environmentally compliant workplace.

Charles L. Harrington
Chairman and Chief Executive Officer
January 2012

1.2 THE PROJECT SAFETY, HEALTH, AND ENVIRONMENTAL PLAN (PSHEP)

Parsons goal is zero incidents using control measures designed to minimize or eliminate hazards to personnel, processes, equipment, the general public and the environment. This PSHEP outlines safety, health, and environment (SH&E) requirements and guidelines developed by Parsons for client-specific work. When implemented, these requirements will help protect site personnel, visitors, the public, and the environment from incidents caused due to SH&E hazards. Parsons employees should never perform a task that may endanger their own safety and health, the safety and health of coworkers or the public, or damage the environment.

This plan should be updated as conditions change or situations change, usually by addenda to the PSHEP. All Parsons and subcontractor personnel must understand and implement the PSHEP and any addenda. Parsons documents this process by having employees sign an acknowledgement form stating that they understand the PSHEP and its requirements.

1.3 SUBCONTRACTOR SAFETY, HEALTH, AND ENVIRONMENTAL PLANS (SSHEPS)

Subcontractors must establish their own safety program for their work and employees. Contract specifications require all subcontractors to accept the Parsons' PSHEP and prepare their own subcontractor safety, health, and environment plan (SSHEP) for work activities the subcontractor has responsibility for performing. The subcontractor will present the SSHEP to the Parsons' Project Manager at least 10 days before site mobilization. At a minimum, subcontractor plans must meet the requirements of this PSHEP and provide SH&E equipment and safeguards suitable for the hazards involved. This PSHEP may not cover all potential hazards on every project, and subcontractors must ensure that appropriate SH&E information is available for all of the subcontractor's project tasks.

All PSHEP requirements for Parsons' personnel (e.g., training, substance abuse screening, incident reporting, etc.) also apply to subcontractor personnel, and do not need to be repeated in the SSHEP. Since the SSHEP is part of the PSHEP, subcontractor personnel will be required to receive an Orientation that covers information from both documents, and sign off accepting the PSHEP. For this project, there **will be** subcontractors directly hired by Parsons.

1.4 MANAGEMENT OF CHANGE (MOC)

Modifications may be made to this PSHEP document after discussion and approval by the Parsons GBU/Division SH&E Manager. Once the subcontractor has been determined, and as necessary, the following sections of this PSHEP will be modified:

PSHEP Section	SH&E Initials	Date	Description/Comments
2.1			Scope of Work Contractors
4.4			Stakeholder PSHEP Alignment Meeting
4.5			Training – to be updated once project team has been determined
5.2			Subcontractor Prequalification Review
6.3			Activity Hazard Analysis
6.5			Site Inspections
7.2			ESHARP Training
Attachment 10.1.1			Training-Medical Records

SECTION 2 – SCOPE OF WORK

2.1 SCOPE OF WORK

Parsons, in their contracted role with Honeywell International, Inc. (Honeywell), is providing site characterization (SC) services associated with the Former Barrett Manufacturing Site and Mica Roofing Site (subject sites). The work is being performed under the Parsons Environment & Infrastructure (PE&I) division, and is the responsibility of the Program Manager (Mr. James O'Loughlin), and Project Manager (Mr. Daniel Martoccia).

The specific objectives of the SC are to assess:

- The horizontal and vertical extent of contaminants in soil and groundwater, including non-aqueous phase liquid (NAPL), if present;
- Subsurface characteristics including groundwater flow direction;
- If impacts to soil and groundwater exist and are migrating off-site;
- The potential for vapor intrusion into buildings that exist on-site; and
- Potential for impact to human health via a Qualitative Human Health Exposure Assessment.

A summary of these efforts is as follows:

Field Activities (Geophysical Survey)

- The geophysical survey is non-intrusive and will be conducted to identify potential/possible underground conduits/utilities in the area of the proposed boring, monitoring well, soil gas, and test pit locations.

The selected subcontractor to support this field effort is to be determined.

Field Activities (Utility Hand Clearances, Soil Borings, Monitoring Well Installation, Soil Vapor Point Installations)

- Parsons to provide oversight of the hand clearances, drilling activities, and soil gas point installations.
- Parsons will also collect soil, groundwater, and soil gas samples from the proposed SC sampling locations as well as existing onsite monitoring wells.

The following subcontractors will support the field effort:

- Drilling Subcontractor – To Be Determined

Field Activities (Site Survey)

- At the conclusion of drilling activities, a licensed New York state land surveyor will identify the horizontal and vertical location of each new soil boring, monitoring well, soil gas, and test pit location.

The following subcontractors will support the field effort:

- Site Survey Subcontractor – To Be Determined

Office Activities

- Project management

A copy of this PSHEP will be provided to Parsons Subcontractors for reference; it provides minimum health and safety requirements to be followed for the above described field activities. However, Parsons subcontractors are responsible for independently assessing this PSHEP for adequacy prior to accepting it and for developing and implementing their own Health and Safety Plan / procedures for work activities they are performing.

2.2 PROJECT SAFETY, HEALTH, AND ENVIRONMENTAL PLAN APPLICATION

This PSHEP and its referenced documents apply to all locations, facilities, operations, and projects associated with contract work performed by Parsons and its subcontractors. Locations/sites covered under this contract include the above reference subject sites which encompasses Block 492, Lot 15, Block 492, Lot 20, Block 494, Lot 1, Block 493, Lot 1, and adjacent right-of-ways located in Brooklyn, NY.

SECTION 3 – PROJECT SH&E MANAGEMENT RESPONSIBILITIES AND AUTHORITY

3.1 SH&E RESPONSIBILITY MATRIX

Exhibit 3-1 summarizes the responsibilities of selected roles related to the primary SH&E activities identified in the PSHEP.

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Exhibit 3-1 – Project Responsibility Matrix

Project Responsibility Matrix		Project												GBU							Corporate					
Phases	Work Elements	Project Manager	Safety & Health	Environmental	Construction/Site Management	Engineering	First Line Supervision	Facilities and Maintenance	Training	Contracts/Procurement	Security	Sustainability	Quality	President	Operations/Risk Management	Division Management	Sector Management	Safety, Health & Environment	Quality	Business Development	CEO	Operations/Risk Management	Safety, Health & Environment	Security	Workers' Compensation	Insurance
Introduction to ESHARP for Project	1. ESHARP Project Management	R	D	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P
Business Development	2. Business Development	R	P	P	P	P				P				P	P	A	P	P	P	D	P	P	P			P
Startup	3. Initial Hazard Analysis and Planning	A	R	D	D	D												P					P			
	4. Project Safety Health, and Environmental Plan (PSHEP)	A	D	D	D	D									P	P	P	R					P			
	5. Stakeholder PSHEP Alignment Meeting	A	D	D	D	D												R								
Construction and/or Field	6. Preconstruction Safety, Health & Environment Activities	A	D	P	P	P	P										P	R	P							
	7. Project/Site Orientation, Training, and Recurring Field SH&E Meetings	A	D	P	P	P	P	P										R								
	8. SH&E Committee	A	D	P	P	P	P	P										R								
	9. Meet Building Trades, Safety, Health, Environmental Regulatory Agencies, & Others	A	D		D	P												R							P	
	10. Review Contractor/Subcontractor SH&E Programs	A	D	P	P	P				P								R								
	11. Subcontractor Premobilization Meeting	A	D	P	D	P				P								R								
	12. Risk Mitigation Planning (2-week look ahead)	A	P	P	D	P												R								
	13. Activity Hazards Analysis	A	D	P	D	P	P	P										R								
	14. Project Management Site Safety, Health, & Environmental Inspections	A	D	P	D	P										P	P	R	P							
	15. Audits, Inspections, and Recordkeeping	A	D	P	D	P	P						P			P	P	R	P							
	16. Incident Management Process	A	D	P	D	P	P						P		P	P	P	R	P							P

Project Responsibility Matrix		Project												GBU							Corporate					
Phases	Work Elements	Project Manager	Safety & Health	Environmental	Construction/Site Management	Engineering	First Line Supervision	Facilities and Maintenance	Training	Contracts/Procurement	Security	Sustainability	Quality	President	Operations/Risk Management	Division Management	Sector Management	Safety, Health & Environment	Quality	Business Development	CEO	Operations/Risk Management	Safety, Health & Environment	Security	Workers' Compensation	Insurance
Testing, Commissioning, Operations, and Decommissioning	17. Management Systems and Transition																									
	18. Equipment and Systems Integrity																									
	19. Operations Training and Education																									
	20. Assessments and Corrective Action																									
	21. Operations Emergency Management																									
	22. Safe and Environmentally Compliant Work Practices																									
Closeout	23. Lessons Learned and Final SH&E Report	A	D	P	D	P										P	P	R	P				P			
	24. Records Retention	A	P	P	D	P			P				P					R	P				P			

R – Responsible and accountable for ensuring the project develops and implements the work element.
D – Develops the plan, tool, training, document, or other item needed for the work element.
P – Participates by providing advice, assisting in the implementation or development, reviewing and providing comments, or otherwise supporting the development or implementation effort.
A – Approval at the management level with responsibility for the project; establishes requirements for the project or serves as sponsor for the item.

SECTION 4 – ADMINISTRATIVE PHASE

4.1 PROJECT SAFETY, HEALTH & ENVIRONMENT (SH&E) COMMITTEE

If a project has less than five (5) Parsons employees or a total of 25 Parsons and subcontractors, then the project staff will utilize information from the Parsons' office responsible for the project as a resource for SH&E committee information. The Project SH&E Representative will be responsible for obtaining and communicating information from the Parsons' Office SH&E Committee meeting minutes, with the project personnel on a monthly basis.

For this project, there **will not be** a Project SH&E Committee.

4.2 EMPLOYEE ORIENTATION

All new employees on a project, including new hires and transfers, must attend the site orientation program on their first day and sign an acknowledgment form indicating they attended and understood the orientation. Any employee who is unsure of any information presented in the orientation must request clarification. Employees who do not participate in the orientation or refuse to sign the acknowledgment cannot work on site. Site-specific safety procedures and training requirements are covered in Section 7.

4.3 AWARENESS CAMPAIGN

If a project is less than 3 months in duration or has less than five (5) Parsons employees, then the project will fall under the Parsons' office responsible for the project as a resource for SH&E awareness. The Project Manager may also provide training, presentations, or informational materials as part of the awareness campaign. This project has **less than five (5)** full time Parsons employees.

SH&E bulletin boards maintained by the Project Manager are primary information points for the project awareness campaign. Bulletin boards are to be located at **the Somerset Parsons Office.**

4.4 STAKEHOLDER PSHEP ALIGNMENT MEETING

A stakeholder alignment meeting should be held before beginning any field work.

The following representatives should attend the meeting for the field effort:

1. Honeywell – Steve Coladonato, Honeywell Project Manager
2. Parsons – Dan Martoccia, Project Manager
3. Parsons – John Scurek, Project Safety Manager
4. Parsons – Zohar Lavy, Drilling Field Team Leader
5. Drilling Subcontractor – To Be Determined General Manager
6. Parsons – Field Team

Parsons will present an overview of the PSHEP and obtain stakeholders concurrence with the approach outlined in the document. The meeting should include a review of stakeholder roles and responsibilities and elements of control appropriate to project risks.

4.5 TRAINING

The project has a comprehensive SH&E training program tailored to the client requirements and scope of work. All office-based employees or field employees who spend a significant portion of their time in an office or trailer must receive specialized office training consisting of proper lifting techniques, ergonomics, housekeeping, common office hazards, waste management and office emergencies. All projects should be associated with a Parsons office, and the Office SHE Plan should be reviewed for additional information.

All personnel shall be listed in the PSHEP Training-Medical Records spreadsheet (see **Attachment 10.1.1**), which will identify the training requirements and expiration dates for applicable certifications. Safety training for project personnel will be based primarily on their work activities and corresponding exposure to hazardous substances and health hazards. The Parsons Corporate Safety and Health Manual (CSHM) and applicable sections will be used as a reference for determining the minimum training requirements based on the project scope of work.

Applicable	Corporate Safety and Health Manual Section/Topic
No	CSHM-1 Medical Qualification and Surveillance
Yes	CSHM-2 First Aid – See **Attachment 10.1.1** for a list of personnel with the current qualification; see Section 6.9 of the PSHEP for additional information on first responders.
Yes	CSHM-3 Ergonomics
Yes	CSHM-4 Concrete and Masonry Construction
Yes	CSHM-5 Field and Office Facilities
Yes	CSHM-6 Personal Protective Equipment
No	CSHM-7 Hearing Conservation –site personnel will not be exposed to noise at levels greater than 85 decibels over an 8 hour time period, which require annual training and audiograms. However, hearing protection will be required within 25 ft of an active drill rig.
Yes	CSHM-8 Respiratory Protection – **Attachment 10.1.1** lists all site personnel who will have medical screening and respirator fit tests to allow for upgrade to Level C PPE in the event contaminants above a permissible exposure limit (PEL) are detected based on onsite monitoring. Personnel are required to have annual training, medical clearance and a fit test in order to wear a respirator.
Yes	CSHM-9 Air Monitoring – **Table 6-1.1** identifies chemicals of concern, air monitoring equipment, action levels (based on OSHA PELs) and corresponding PPE/Action to be taken in the event of exceedances.
Yes	CSHM-10 Hazard Communication: See Section 6.2 for the chemicals to be used.
Yes	CSHM-11 Emergency Procedures
Yes	CSHM-12 Fire Protection
Yes	CSHM-13 Hazardous Waste Operations – site personnel who are listed in the PSHEP Training-Medical spreadsheet (**Attachment 10.1.1**), may be engaged in

	hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards (such as entering an exclusion zone), which are required to receive appropriate training as required by 29 CFR 1910.120, including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher training.
No	CSHM-14 Process Safety Management
No	CSHM-15 Confined Space - list all site personnel in the PSHEP Training-Medical spreadsheet that will be involved with confined spaces, which will require proof of training.
Yes	CSHM-16 Signs, Barricades and Traffic Control
Yes	CSHM-17 Materials Handling, Transportation, Storage and Disposal of Wastes. Investigation derived wastes will be disposed of by Honeywell. Parsons will label contents and collect samples for waste profiling. Parsons staff with the required DOT training to perform the activities are listed in **Attachment 10.1.1**. Samples being sent for analysis to determine whether they are hazardous are considered non-hazardous, but classified as "Other Regulated Material" in the Hazardous Materials Table.
Yes	CSHM-18 Walking/Working Surfaces
No	CSHM-19 Ladders
No	CSHM-20 Scaffolds - list all site personnel in the PSHEP Training-Medical spreadsheet that will be involved with erecting, moving, dismantling, or altering scaffolds, which are required to show a scaffold competent person certification.
No	CSHM-21 Aerial Lifts - list all site personnel in the PSHEP Training-Medical spreadsheet that will be involved with operating an aerial lift, which will require proof of training and competency.
No	CSHM-22 Fall Protection - list all site personnel in the PSHEP Training-Medical spreadsheet that will be involved with activities at heights greater than six feet, which will require proof of training.
Yes	CSHM-23 Lockout/Tagout (LOTO) - Subcontractor personnel that will be involved with operating or performing maintenance on equipment that has stored, pneumatic, hydraulic or electrical energy will be listed in the attached subcontractor safety plan. The staff will require proof of training and competency.
No	CSHM-24 Electrical – Electrical work is subcontracted; subcontractor safety plan to be attached.
Yes	CSHM-25 Motor Vehicles and Equipment
No	CSHM-26 Cranes, Hoists, and Lifts
No	CSHM-27 Pressure Vessels
No	CSHM-28 Welding, Cutting and Brazing
Yes	CSHM-29 Tools
No	CSHM-30 Underground Construction
No	CSHM-31 Blasting
No	CSHM-32 Demolition
Yes	CSHM-33 Excavations –See Appendix 10.1.17 for Subsurface Soil Disturbance Protocol.

No	CSHM-34 Steel Erection
No	CSHM-35 Asbestos and Lead - list all site personnel in the PSHEP Training-Medical spreadsheet that will be involved
Yes	CSHM-36 Temperature Extremes – see Section 6.1 for mandatory information on all projects that must be reviewed prior to starting work.
No	CSHM-37 Ventilation
Yes	CSHM-38 Substance Abuse
Yes	CSHM-39 Bloodborne Pathogens - see Section 6.1 for additional information and **Attachment 10.1.1** for personnel with current training.
Yes	CSHM-40 Recordkeeping

Field-based employees and office employees who spend a significant portion of their time in the field also receive field training as described in Section 7 of this PSHEP.

For this project, the client **does not** require specific training for site personnel. However, the site manager requires a site orientation before workers enter the site for the first time.

4.6 AUDITS AND INSPECTIONS

The Project Manager must implement an audit and inspection program in conjunction with the GBU and Corporate SH&E and Quality Assurance Departments. The Project Manager conducts weekly site inspections. If the Project Manager is not on—site, the most senior person onsite person will conduct the inspection. A weekly inspection report will be complete and saved in the project files. For this project, there **will not** be a field trailer.

Additional information on audits and inspections is provided in Section 6.5 of this PSHEP.

4.7 SH&E MEETINGS

All project meetings that include five or more people must begin with a SH&E moment. The meeting chairperson may present the SH&E topic or ask for a volunteer to open the discussion. In general, these "SH&E moments" are brief, perhaps a minute or two, and should be directly relevant to the work of the day or applicable to most employees (e.g., nonwork-related injuries, waste management procedures, effects of stormwater discharges, home exposure to hazardous materials).

During weekly progress meetings, all Parsons Field Team Leaders/Supervisors or subcontractors submit written summaries of upcoming work tasks and associated risks and control measures to the Project Manager. Progress meetings discuss the risks of the upcoming work tasks and the planned mitigation measures. The weekly summaries identify upcoming mobilization or demobilization tasks, audits and inspections, competent person changes, and training requirements. Subcontractors add activities to these summaries at least two weeks in advance of the work. The Risk Mitigation Two-Week Look-Ahead Form (**Attachment 10.1.4**) should be used to plan mitigation strategies at weekly progress meetings.

Monthly all hands SH&E meetings are held to review critical safety procedures, discuss safety incidents, and celebrate safety milestones. The Project Manager announces the time and schedule of these meetings at least one week in advance.

4.8 REWARDS AND RECOGNITION

4.8.1 Rewards and Recognition Program

Each project with a duration of at least 6 months must follow the Rewards and Recognition Procedure for developing a "Rewards and Recognition" program to foster continuous improvement in SH&E performance. If a project is less than 6 months in duration, then the project can choose to fall under the "Rewards and Recognition" Program for the Parsons' office responsible for the project.

The "Rewards and Recognition" program for this project will be **office** based.

4.8.1.1 Rewards and Recognition Corporate Policy Procedure

Parsons Corporate Safety Rewards and Recognition Policy recognizes Parsons employees and project teams who make a performance contribution to Parsons SH&E. This policy recognizes achievements or accomplishments that contribute to the overall SH&E objectives of the company.

This policy outlines acceptable methods of rewards and recognition and provides sample plans that focus on leading indicators rather than lagging indicators. Projects and programs are encouraged to reward their teams and individual employees with items from the Parsons Online Safety Products Store and are encouraged to base incentives on leading SH&E indicators.

4.8.1.2 Examples of Leading Indicators

Examples of leading indicators or actions to reward and recognize are as follows:

Participating in or leading a safety meeting.
Providing suggestions for improving workplace SH&E.
Serving on a SH&E committee.
Creating or revising an activity hazard analysis (AHA) worksheet.

Celebrations of achievements at a project or office level are still important. Project luncheons at milestone achievements are encouraged and are the appropriate place to recognize the collective achievements of working without incident.

4.9 WORK-RELATED INJURIES, MEASUREMENT AND REPORTING

4.9.1 Work-related Injury Procedures

4.9.1.1 Emergencies

Call 911

4.9.1.2 Non-Emergencies

For work-related injuries or illnesses that may require physician direction on appropriate treatment, Parsons employees should then promptly contact WorkCare, ideally before seeking medical care, as this will provide the greatest opportunity for appropriate intervention.

WorkCare's Incident Intervention is available 24 hours a day, 7 days a week (24/7), and 365 days per year. The contact number is **1-888-449-7787.**

If an injured employee requires medical care for a work related injury/illness, the Order for Treatment of Work-Related Injury/Illness Form MUST be sent with the injured worker and/or faxed to the occupational medicine clinic at the time of the initial evaluation.

For U.S. facilities, here is the link to the document on ParShare: Order for Treatment of Work-Related Injury or Illness **(Attachment 10.1.13)**. NOTE: The Workers Compensation carrier and Policy number for each State may be different.

When contacting WorkCare, be prepared to provide the following:

Injured employee's name and Parsons ID number

Injured employee's contact number

Injured employee's location (at a minimum include the city and state)

Employee's GBU and client/project name

Functional manager's name

If the WorkCare physician or nurse determines that an employee should be evaluated by a local physician, then an occupational clinic will be used whenever possible (i.e. during normal business hours). A secondary facility must be able to provide treatment during all hours of operations (i.e. hospital). The facilities are listed below:

- **Primary Facility** –
  South Brooklyn Health Center
  120 Richards Street, Brooklyn, NY 11231, (718) 834-8202

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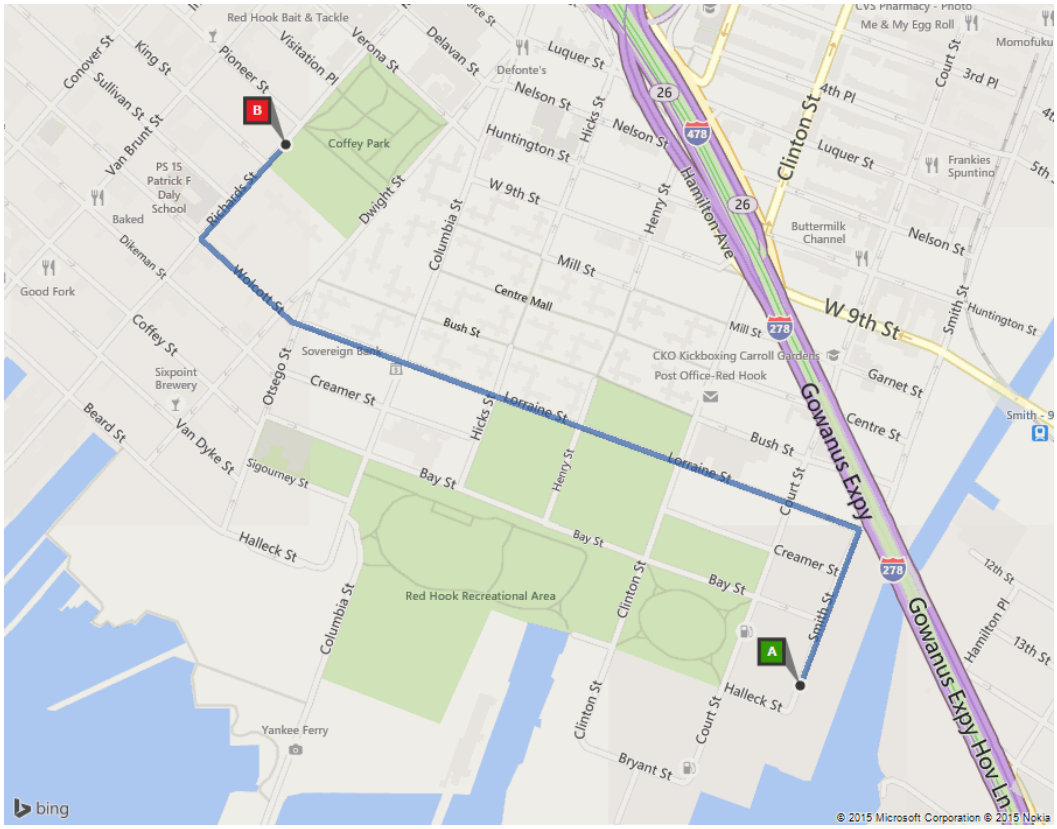


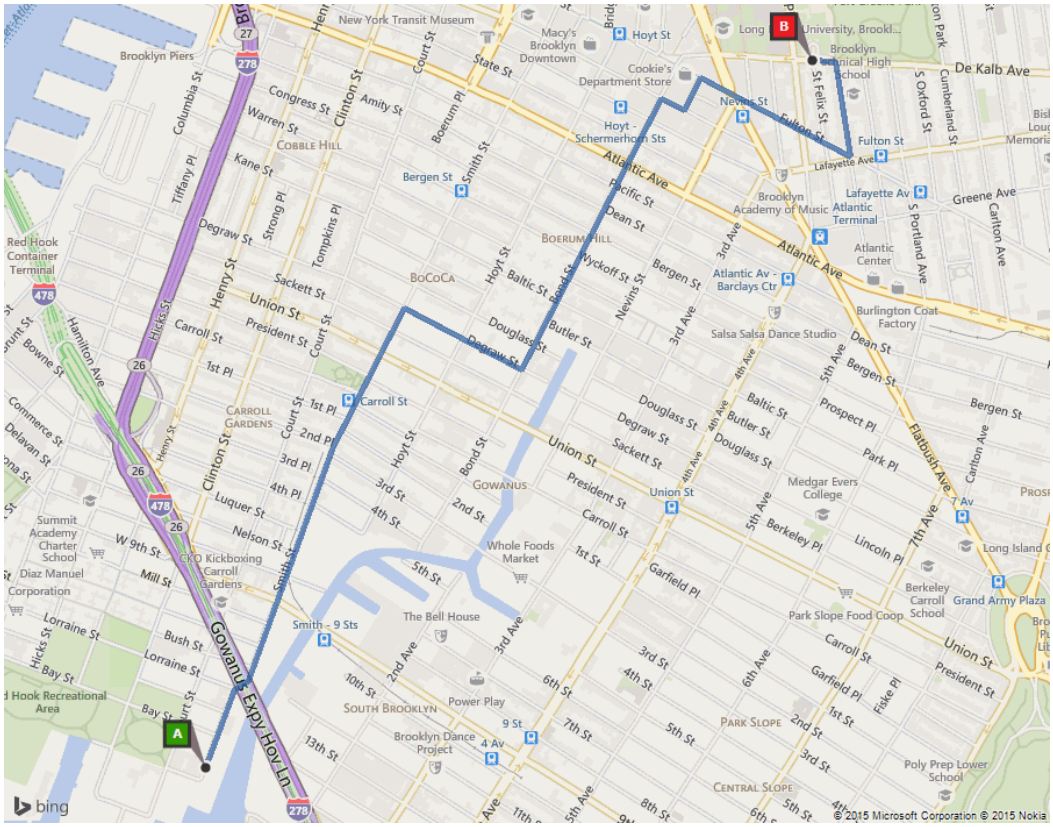
Directions to South Brooklyn Health Center

1. *Head North on Smith Street*
2. *Turn Left on Lorraine Street*
3. *Lorraine Street turns into Wolcott*
4. *Turn Right onto Richards Street*

4 minutes/1 mile

Secondary Facility –

The Brooklyn Hospital Center (718) 250-8000
121 Dekalb Avenue, Brooklyn, NY 11205



Directions to The Brooklyn Hospital Center

1. *Head north on Smith Street - 1 mile*
2. *Turn Right on Degraw Street – 0.3 Mile*
3. *Turn Left onto Bond Street – 0.6 mile*
4. *Turn Right onto Livingston Street and then immediate Left onto Hanover Place*
5. *Turn Right onto Fulton Street – 0.3 mile*
6. *Turn Left onto Brooklyn Tech Place/Fort Green Place – 0.2 Mile*
7. *Turn Left onto DeKalb Ave – 227 feet*

13 minutes/2.5 miles

NOTE: Transportation of an injured worker to a medical facility for non-emergency treatment must be done by at least two (2) individuals (i.e. driver and observer). If a driver is not available, then a cab service is acceptable as long as an observer is present.

4.9.2 Measurement and Compliance

To accurately measure performance and comply with corporate and regulatory requirements, Parsons and its subcontractors have an emergency communications system to contact the following onsite offices for the events listed below:

All incidents	Project Manager/Dan Martoccia (908) 625-5376 Safety Manager/Greg Beck (908) 887-1973
Worker injury or exposure	Project Manager/Dan Martoccia (908) 625-5376 Safety Manager/Greg Beck (908) 887-1973
Environmental release	Project Manager/Dan Martoccia (908) 625-5376 Safety Manager/Greg Beck (908) 887-1973
Fires/explosions	911
Medical emergencies	911
Site/industrial security	Project Manager/Dan Martoccia (908) 625-5376

The Project Manager establishes a measurement system to provide indicators of SH&E performance, including the following metrics:

Hours worked since the last recordable injury and previous record
Consecutive days without a recordable incident and previous record
Consecutive days without a days-away-from-work incident and previous record
Recordable incident rate
Days-away-from-work incident rate

These metrics are collected on a program-wide basis for the Honeywell program.

4.9.3 Incident Reporting

Employees involved in or witnessing an injury, worker exposure, environmental incident, or near miss must immediately report it to the responsible supervisor or foreman, who in turn immediately relays the report to Parsons ***Project Manager, Dan Martoccia (908) 625-5376***, or Project SH&E Representative, ***Greg Beck (908) 887-1973***. No supervisor may decline to accept or relay a report of SH&E incident or significant near miss from a subordinate.

Each Project Manager must ensure that all SH&E incidents are reported to the GBU SH&E Director and other management personnel (as required) within four hours using the Industry Safe Online SH&E Reporting System. The online SH&E reporting system includes an Incident Investigation Form, which can only be viewed by system administrators, designated managers, and the assigned investigator. The GBU SH&E Director serves as the default investigator and may assign that role on a case-by-case basis.

Incident investigation link folder on ParShare is as follows: Incident Investigation.

Procedures for investigating workplace accidents and hazardous exposures include the following:

Emergency Response Team responds to the accident scene as soon as possible.

Report all injuries to the Parsons Workers' Compensation Claims Analyst.

Report on PWeb using the online IndustrySafe Reporting System.

Report to appropriate client point of contact in accordance with contractual requirements.

Interview injured workers and witnesses.

Have employee complete the Employee Accident Report and the Individual Statement Report within 24 hours. If the employee is unable to complete the statement, the functional manager must complete the form. (Note: The Individual Statement Report is also known as the Narrative Statement form.)

Report to the Division or Project SH&E Manager (or Parsons Project Manager) immediately.

Examine the workplace for factors associated with the accident/exposure.

Determine the cause of the accident/exposure.

Take corrective action to prevent the accident/exposure from recurring.

Record the findings and corrective actions taken.

The Division or Project SH&E Manager must notify the local OSHA office and/or regional, municipal and/or local regulations office in writing within 8 hours if an accident involves the death of an employee or hospitalization of three or more workers. In addition, spills/releases of reportable quantities and other reporting required by environmental regulation are the responsibility of the Project Manager.

Subcontractors must submit a monthly report of exposure hours (hours worked on the project, paid or unpaid) to the Parsons Project Manager within four (4) days after the end of each month, or as specified by the contract. The Project Manager compiles the figures and submits them via the online safety reporting system. If necessary, estimated figures are acceptable, but the reports must be filed.

4.10 INCIDENT INVESTIGATIONS

All accidents, worker over exposures, environmental incidents and significant near misses are investigated by an individual or team with training in incident investigation and root cause analysis. Subcontractors must investigate incidents involving their employees or activities and submit an investigation report to the Parsons Project Manager within 48 hours of an incident.

In Parsons, the GBU SH&E Director investigates or assigns an investigator to each significant incident. The investigator submits a final investigation report using the online safety reporting system within 72 hours of the incident. Each Project Manager maintains the investigation file.

4.11 RESPONSIBILITY/IDENTIFICATION OF KEY LINE PERSONNEL

For project responsibility and identification of key personnel

Project Key Personnel

Company Executive responsible for Project	**Contact Information**
Ed Andrechak	Direct Line: (302) 468-5567 Cell Phone: (302) 438-5743 Email: Ed.Andrechak@parsons.com
Project Manager	**Contact Information.**
Dan Martoccia	Direct Line: 732-537-3557 Cell Phone: 908-625-5376 Email: daniel.martoccia@parsons.com
Project Safety Manager / Field Team Leaders	**Contact Information.**
John Scurek (Project Safety Manager)	Direct Line: (315) 451-9560 Cell Phone (315) 313-3781 Email: John.Scurek@parsons.com
Zohar Lavy (Well and Boring Installation, Soil Gas)	Direct Line: (732) 537-5536 Cell Phone (732) 796-5536 Email: zohar.lavy@parsons.com
Project SH&E Representative	**Contact Information**
Greg Beck	Direct Line: (908) 887-1973 Cell Phone: (908) 887-1973 Email: Gregory.Beck@parsons.com
Client Project Management POC	**Contact Information**
Steve Coladonato	Direct Line: (973) 722.1656 Cell Phone: (973) 722.1656 Email: Steven.Coladonato@Honeywell.com

The personnel listed above have the authority and responsibility for implementing the provisions of this PSHEP.

4.12 MEDICAL REQUIREMENTS AND WORKERS' COMPENSATION

In accordance with corporate requirements, the Project SH&E Manager has established and implemented the following medical requirements for the project:

4.12.1 Functional Capacity Evaluations (FCEs)

FCEs **may be** applicable for Parsons personnel and the drill crew working on this project and will be based on assessment conducted during field operations. During the well installation, the area and the drill cuttings will be monitored for hydrogen cyanide and volatile organic compound (VOC) vapors. If hydrogen cyanide or VOC concentrations exceed action levels that require engineering controls or respirators **(Table 6-1.1)**, the project manager and/or project safety

officer will be informed and efforts will be made to control and reduce the concentrations. If hydrogen cyanide or VOCs cannot be controlled and the concentrations reduced, the situation will be further evaluated by the project manager and project SH&E Representative, and field team members may be directed to wear the appropriate respirator until the work is completed.

4.12.2 Substance Abuse Tests

The Talent Management Department administers required substance abuse tests. For this project, the client requires the following types of drug and/or alcohol testing:

- Pre-access – the PM shall require project personnel to have pre-access drug and alcohol screening within 2 weeks of commencement of field work.
- Post-incident – applicable for incidents involving medical treatment or reasonable suspicion, and all accidents regarding Parsons Company or leased vehicles.
- Reasonable suspicion – NOTE: Supervisor must have training in Controlled Substance and/or Alcohol Awareness Training, and a Reasonable Suspicion form must be completed.

4.12.3 Workers Compensation Program

This project **does NOT** participate in an Owner's Controlled Insurance Program (OCIP) or project-specific insurance program. The workers' compensation policy covering Parsons employees on this project is as follows:

Workers' compensation carrier –

Insurer: Insurance Company of the State of Pennsylvania. Insurance carrier: AIG P.O. Box 1821 Alpharetta, GA 30023 Phone 813-218-3090	Policy number: WC015656170 Policy effective date: 1/1/14-1/1/15

4.12.4 Medical Monitoring

All personnel engaged in activities that results in the exposure to chemicals at or above the OSHA Permissible Exposure Limit (PEL) or wear a respirator for more than 30 days in a year, must comply with 29 CFR 1910.120(f) – Medical Surveillance. All personnel who wear a respirator must be medically qualified by a physician, trained and fit-tested on an annual basis, even if they are not required to participate in a medical surveillance program under 29 CFR 1910.120(f).

A medical surveillance program **may be** applicable for Parsons personnel and the drill crew working on this project and will be based on assessment conducted during field operations. Vapors (volatile organic compounds (VOCs) or hydrogen cyanide) liberated during well drilling may potentially exceed action levels, necessitating the use of engineering controls or the use of a

respirator. The use of the respirators will require medically qualified users with current fit testing. The Division or Program SH&E Manager administers the medical surveillance program.

SECTION 5 – PRE-FIELD WORK

5.1 RISK ANALYSIS AND SAFETY SPECIFICATION DEVELOPMENT

The Project Manager has led an analysis using the prebid risk analysis checklist to document existing exposures that may impact the work, surrounding facilities, equipment, workers, or the public at large. The checklist is included in the Appendix **(Attachment 10.1.15)**.

5.2 SUBCONTRACTOR PREQUALIFICATION REVIEW

For this project, there **will be** subcontractors directly hired by Parsons for the drilling effort, but not for groundwater monitoring.

The subcontractors directly hired by Parsons that will be working on the project are included in Exhibit 5-1. This table will be updated as additional information is obtained.

Exhibit 5-1 – Hired Subcontractors

SUBCONTRACTOR	WORK ACTIVITIES	DATE OF EVALUATION
To Be Determined	Drilling, monitoring well installation, soil vapor point installation, test pitting, utility clearance. Subcontract pending.	To Be Determined
To Be Determined	Post Drilling Surveying	To Be Determined
To Be Determined	Geophysical Survey	To Be Determined

5.3 PRE-FIELD WORK MEETING

A copy of the Pre-Field Work SH&E Meeting and Site-Specific SH&E Review Checklist is part of the Appendix **(Attachment 10.1.2)** and will be reviewed by all project personnel before work begins. The meeting includes the Parsons Project Manager and subcontractor representatives, including safety.

5.4 COMPETENT PERSON SUBMISSION REVIEW

Copies of signed Competent Person forms **(Attachment 10.1.10)** for subcontractor personnel will be saved to project folder on ParShare. Exhibit 9-1 represents regional, municipal, provincial, local, and/or OSHA regulations, owner, and Parsons corporate regulations and requirements applicable to the project.) The subcontractor Competent Person forms will be saved to project folder on ParShare.

5.5 SUBCONTRACTOR SAFETY PLAN SUBMISSION REVIEW

Once the subcontractor has been selected, the subcontractor SH&E plan (SSHEP) will be posted on ParShare (PE&I Safety > Project Safety Plans > Environmental Division > and this section of the PSHEP will be updated. The Parsons Project Manager and Project SH&E Representative

will review the SSHEP for adequacy in accordance with the Subcontractor SHE Plan Review form posted on ParShare. A Subcontractor Safety Plan Template is provided as **Attachment 10.2**. A Subcontractor Safety Plan Review Form is provided as **Attachment 10.2.1**.

5.6 MOBILIZATION/KICKOFF SH&E MEETING

Project Managers conduct the Mobilization/Kickoff SH&E Meeting on or before the first day of subcontractor mobilization in the field at each work site. The meeting includes a review of the prebid site/area risk analysis and a walk through of the work area to locate items on the prebid risk analysis checklist.

SECTION 6 – CONSTRUCTION PHASE

6.1 SITE RISK ANALYSIS

Before work begins, PM and/or field team leads lead a team that performs a risk analysis at each work site to identify hazards and risks that require specific control measures. During project progress meetings, the field team leader will submit a written summary of upcoming work tasks and associated risks and control measures to the PM, should they differ from previous tasks. The summaries identify upcoming mobilization or demobilizations tasks, audits and inspections, competent person changes, training and new activities requiring an AHA.

6.1.1 Drilling

- **Heavy Equipment Operation**: Use of heavy equipment (e.g., drill rigs) to be performed by an experienced licensed operator. AHA – Operation – Heavy Equipment
- **Struck by**: Risks associated with being struck by moving equipment will be discussed during site orientation and daily safety briefings. AHA – Site Visit
- **Overhead Utility Lines or Obstructions**: Overhead utility lines or obstructions will be assessed prior to raising rig derrick for each well installation. AHA – Operation – Heavy Equipment
- **Underground Utilities or Obstructions**: If subsurface soil disturbance more than 6 inches below grade surface will occur, then the Parsons Subsurface Soil Disturbance Protocol must be followed, including consulting the results of underground utility survey performed at the site. (See Attachment – 10.1.17 for protocol).

6.1.2 Groundwater Sampling, Slug Tests, Tidal Study, Gauging

- Task-related hazards, including:
  - Exposure to NAPL and other COCs;
  - Slip/trip/fall;
  - Weather-related hazards;
  - Other physical hazards (cutting tubing, plastic sheeting)

See *Groundwater Sampling AHA*.

Below is a discussion of potential hazards on the project:

6.1.3 Chemical Hazards

The subject sites include contaminated sub-surface soils and groundwater originating from former industrial processes which took place throughout the area. Contaminants present in soils and groundwater under the site are expected to include, and may not be limited to benzene, toluene, ethylbenzene, xylenes, chlorinated benzenes, polycyclic aromatic hydrocarbons, PCBs, and NAPL. During intrusive activities, monitoring will be conducted in the workers breathing zone using a photoionization detector and Real-Time Aerosol Monitor if there is the presence of visible dust that can't be eliminated by implementation of engineering controls. Personal air sampling will be conducted periodically to validate real time results.

Health hazards and the exposure limits associated with chemicals of concern are presented in Table 6.1.1.

6.1.4 Physical Hazards

Physical hazards that may be encountered during the construction activities include, but are not limited to heat stress, cold-related illness, ultra-violet radiation, and biological and noise hazards.

Heat Related Illness

Project activities may take place during time periods where exposure to temperature extremes could occur. In order to minimize exposure to temperature extremes, project personnel shall be familiar with the health effects of exposure to temperature extremes and the control measures that can minimize exposure. Personnel wearing impermeable protective clothing when ambient temperatures exceed 70F will be subject to a heat stress monitoring program (see **Attachment 10.1.16**).

Training shall be provided to all employees to recognize heat illness hazards before starting to work outdoors. Any employee experiencing or witnessing signs and/or symptoms of a heat related illness shall report the findings to their supervisor immediately. Supervisors shall understand the procedures to follow when an employee exhibits symptoms consistent with heat illness, including emergency response.

Definitions

Acclimatization - a temporary adaption of the body to work in the heat that occurs gradually when a person is exposed to it. Acclimatization peaks in most people within 4-14 days of regular work for at least 2 hours per day in the heat.

Environmental Risk Factors - working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as the ground, air movement, workload severity and duration, protective clothing and personal protective equipment worn by employees.

Heat Illness - a serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat cramps, heat exhaustion, heat syncope and heat stroke.

Heat Wave - a sudden and temporary rise of temperature above the seasonal average for a particular region, which lasts for a prolonged period of time. A heat wave can greatly increase the risk of heat related illnesses.

Personal Risk Factors - an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body's water retention or other physiological responses to heat.

Preventive Recovery Period - a period of time to recover from the heat in order to prevent heat illness.

Shade - blockage of direct sunlight. Canopies, umbrellas and other temporary structures or devices may be used to provide shade. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with air conditioning.

Signs and Symptoms of Heat Illnesses

Heat Rash – or prickly heat, occurs in hot and humid environments where sweat is not removed from the skin. Usually disappears when worker returns to cool environment.

Heat Cramps – muscle contractions from the loss of fluids /electrolytes due to sweating. Occurs when workers perform hard physical labor in a hot environment. Most common in the arms and legs. Cramping can occur after work has stopped.

Heat Exhaustion – inadequate blood circulation from stress due to constant heat. The whole body, especially the circulatory system, is extremely stressed. Possible symptoms include: pale, flushed face and neck; clammy skin; heavy sweating; fatigue; shortness of breath; headache; dizziness or fainting; nausea and vomiting; and rapid heartbeat and breathing.

Heat Stroke – body's failure to regulate its' temperature. The most serious stage of heat illness. Symptoms include: dizziness and confusion, red, hot, dry skin; nausea and vomiting; very little sweating; rapid pulse; high body temperature, 105° F or higher; convulsions, and fainting.

Heat Illness Prevention

Prevention of heat related illness in extreme temperature project personnel shall consider implement a Physiological monitoring program, include monitoring with a WBGT (wet bulb globe temperature) meter and implementing work rest regimens. The field team shall be encouraged to drink plenty of liquids to replenish electrolytes. The drill crew may construct a sun shade with tarps or umbrellas as long as it does not interfere with safe rig operations. The sampling crew may set up a pop-up shelter to provide shade. Breaks may also be taken in air conditioned vehicles.

Prevention of heat related illness may call for establishing work teams to rotate to minimize heat related illnesses.

Heat Illness Treatment

Heat Cramps - take water every 15 to 20 minutes. Drinking an electrolyte replacement (like Gatorade) may help.

Heat exhaustion - Get medical help. Don't leave the person alone. While waiting, remove worker to cool place to rest; remove as much clothing as possible; give water and electrolytes; and don't allow person to get chilled.

Heat Stroke – Call 911 immediately. While awaiting medical help, get victim into cool area, fan vigorously, apply cool water to clothing or skin, and apply ice packs under arms and to the groin area.

Heat Waves

Heat illness prevention during heat waves means taking extra measures.

More vigilance - supervisors/employees watch others very closely and provide more frequent feedback during work activities. Site workers shall avoid working alone and utilize the "Buddy System", watch each other and closely monitor/report an employees' condition. Personnel shall be accounted for their whereabouts throughout the work shift and at the end of the day.

More water - employees should drink small quantities of water more frequently before, during and after work. There should be extra supplies of water for replenishment, encourage employees to consult with their doctor on salt/mineral replacement.

More cooling - use other cooling measures in addition to shade, spraying body with water/wiping with wet towels and taking additional/longer breaks in the shade.

Change schedule - work activities may be started earlier or later in the evening, split-up work shifts and avoid working during the hotter parts of the day. Work shifts can be cut short or stop work.

Change meals - encourage employees to eat smaller/or more frequent meals (less body heat during digestion than with big meals), choose foods with higher water content (for example, fruits, vegetables and salads).

Acclimatization warning - personnel should allow the body time to adjust to sudden, abnormally high temperatures or other extreme conditions. Even employees previously fully acclimatized are at risk for heat illness.

Environmental and Physiological Factors

- Average ambient air temperature 96ºF (75-116ºF)
- Average humidity 29% (12% - 55%)
- Average wind speed 7 mph
- Average core body temperature 104ºF (98 -108ºF)

Provision of Water

Sufficient amounts of cool water shall be available and replenished at all times w/at least one quart per employee per hour for the entire shift.

Easy access to clean and cool water shall be available to encourage frequent drinking.

Access to Shade

A Preventative Recovery Period (PRP) is necessary if an employee is suffering from heat illness or believes that a rest break is needed to recover from the heat.

Access to shade shall be permitted at all times. Employees shall have access to an area with shade that is either open to the air or provided with ventilation or cooling for a period of no less than 5 minutes.

Measurement

Portable heat stress meters or monitors are used to measure heat conditions. These instruments can calculate both the indoor and outdoor WBGT Index according to established ACGIH Threshold Limit Value equations. With this information and information on the type of work being performed, heat stress meters can determine how long a person can safely work or remain in a particular hot environment.

Exhibit 6-2
Suggested Frequency of Physiological Monitoring
For Fit and Acclimated Workers(A)

Adjusted Temperature(B)	*Normal Work Ensemble(C)*	*Impermeable Ensemble*
90°F or above (32.2°C) or above	*After each 45 min. of work*	*After each 15 min. of work*
87.5°F (30.8°-32.2°C)	*After each 60 min. of work*	*After each 30 min. of work*
82.5°-87.5°F (28.1°-30.8°C)	*After each 90 min. of work*	*After each 60 min. of work*
77.5°-82.5°F (25.3°-28.1°C)	*After each 120 min. of work*	*After each 90 min. of work*
72.5°-77.5°F (22.5°-25.3°C)	*After each 150 min. of work*	*After each 120 min. of work*

A. For work levels of 250 kilocalories/hour.

B. Calculate the adjusted air temperature (ta adj) by using this equation: ta adj $^{\circ}$F = ta $^{\circ}$F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

C. A normal work ensemble consists of cotton or breathable Tyvek coveralls or other cotton clothing with long sleeves and pants.

Impermeable ensemble includes wearing polycoated Tyvek suits, cloth (woven material) overalls, and half or full face piece respirators.

EXHIBIT 6-3
HEAT INDEX

	ENVIRONMENTAL TEMPERATURE (Fahrenheit)										
	70	**75**	**80**	**85**	**90**	**95**	**100**	**105**	**110**	**115**	**120**
RELATIVE HUMIDITY											
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	**130**
30%	67	73	78	84	90	96	104	113	123	**135**	**148**
40%	68	74	79	86	93	101	110	123	**137**	**151**	
50%	69	75	81	88	96	107	120	**135**	**150**		
60%	70	76	82	90	100	114	**132**	**149**			
70%	70	77	85	93	106	124	**144**				
80%	71	78	86	97	113	**136**					
90%	71	79	88	102	122						
100%	72	80	91	108							

*Combined Index of Heat and Humidity...what it "feels like" to the body

Source: National Oceanic and Atmospheric Administration
How to use Heat Index:

1. Across top locate Environmental Temperature
2. Down left side locate Relative Humidity
3. Follow across and down to find Apparent Temperature
4. Determine Heat Stress Risk on chart at right

Note: Exposure to full sunshine can increase Heat Index values by up to 1 degrees F.

Apparent Temperature	**Heat Stress Risk with Physical Activity and/or Prolonged Exposure**
90-105	Heat Cramps or Heat Exhaustion Possible
105-130	Heat Cramps or Heat Exhaustion Likely, Heat Stroke Possible
>130	Heat Stroke Highly Likely

Additional Guidance

NIOSH - http://www.cdc.gov/niosh/topics/heatstressCold-Related Illness:

If work on this project is conducted during the winter months, thermal injury due to cold exposure can become a problem for field personnel.

Cold weather conditions can be hazardous to the safety and health of employees, endanger the stability of the body system, and cause conditions such as hypothermia and frostbite. It is vitally important that adequate precautions be taken to alleviate the effect of cold environments and to ensure that personnel can work safely and efficiently.

Prevent the deep body temperature from dropping below 36^0 C (96.8^0 F) and the core temperature from dropping below 35^0C (95^0F).

The following factors may contribute to a cold injury:

- Age
- Contact with wetness or metal
- Exposure to high winds
- Exposure to humidity
- General health
- Inadequate clothing

The following physical conditions worsen the effects of cold exposure:

- Allergies
- Excessive drinking
- Excessive smoking
- Specific drugs and medicines
- Vascular disease (e.g., Raynaud's phenomenon, acrocyanosis)

To monitor cold stress:

- At air temperatures below 20F (-10C) measure and record the wind chill index at least every 4 hours. The equivalent wind chill temperature and frostbite precautions will be determined using the Wind Chill Index (Table 6.1.3).
- In indoor workplaces, measure and record the wind speed at least every 4 hours when the rate of air movement exceeds 5 mph (2.2 meters per second); in indoor work situations, measure and record the wind speed with the air temperature.
- The wind chill index takes into account the wind velocity. If no anemometer is available, use the following to estimate wind speed:
    - 5 mph: light flag moves
    - 10 mph: light flag fully extended
    - 15 mph: raises newspaper sheet
    - 20 mph: causes blowing and drifting snow

To prevent cold stress:

- Use general or spot heating to increase temperature at the site.
- If work is being performed with bare hands for 10 or more minutes, to keep the worker's hands warm supply warm air jets, radiant heaters, or contact warm heaters.

- If the air velocity at the site is increased by the wind, draft, or ventilation equipment, shield the work area.
- At temperatures below 40^0F, cover metal handles of tools and control bars with

Table 6.1.3 - WIND CHILL INDEX

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Wind Speeds greater than 40 mph have little additional effect	LITTLE DANGER in < 1 hr with dry skin. Maximium danger of false sense of security.				INCREASING DANGER danger of freezing exposed flesh within 1 minute.			GREAT DANGER flesh may freeze within 30 seconds.				

thermal insulation.

Additional measures that may be taken to prevent cold stress:

- When necessary, substitute, isolate, relocate, or redesign equipment and processes to reduce cold stress.
- Use power tools, hoists, cranes, and lifting aids to reduce the metabolic work load.
- If work is performed continuously in an equivalent chill temperature of 30^0F or below, supply heated warming shelters such as tents, cabins, automobiles, or trucks and encourage workers to use them.

Any person developing moderate hypothermia (a core temperature of 92^oF) cannot return to work for 48 hours.

Ultraviolet Radiation:

The sun emits ultraviolet radiation (UV) as heat and light. The skin's natural defense mechanisms attempt to reject the UV by distributing melanin pigmentation where needed. However, overexposure to direct sunlight can cause inflammation or blistering of the skin (sunburn). The use of sunscreen, long sleeve shirts, and wide brim hats can help prevent sunburn. Chronic exposure to UV radiation is known to cause skin cancer. In case of sunburn, do not apply burn ointment, cold cream, or butter to relieve pain. Use a dry dressing and get medical attention for severe, extensive sunburns. Also watch for dehydration. If a person is dehydrated, try and keep their fluid volume at their normal level.

Electrocution:

All drilling and excavation equipment will be kept a safe distance from live sources of electricity in accordance with Parsons Pre-drilling protocol and CSHM-24 (Electrical). No equipment or machinery may be moved under energized overhead high voltage lines unless the following clearances are maintained and any installed boom or mast is unloaded and lowered to transport position:

Normal Voltage (kV) phase-to-phase	Minimum Required Clearance (ft)
0 to 0.75	10
> 0.75 to 50	10
> 50 to 345	10 to 19.8 *
> 345 to 750	19.8 to 33.3 *
> 750 to 1,000	33.3 to 41.7 *

*An additional 0.4 inches of clearance, above 10 ft clearance, is required for every 1-kV above 50 kV.

All crossovers where equipment or machinery is moved under energized high voltage line(s) must be posted with signs. The signs must be located 50 feet from, and on each side of, the line(s). Signs must provide the following information:

1. Warning of the high-voltage line.
2. Line voltage.
3. Maximum height of equipment that can pass under the line. (The maximum height of equipment is determined by subtracting the applicable clearance distance shown above from the actual line to ground distance during maximum sag conditions.

If any digging or saw cutting (e.g., using a road saw) is performed over electrical faclilities or unknown facilities, a 1 kV glove with gauntlet must be used during the work.

New York law requires that a utility clearance be performed at least two (2) days prior to initiation of any subsurface work. The contractor must contact the New York City Long Island One Call Center (1-800-272-4480) to request a mark-out of natural gas, electric, telephone, cable television, water and sewer lines in the proposed drilling locations. Work must not begin until the required utility clearances have been performed. Public utility clearance organizations typically do not mark-out underground utility lines that are located on private property. As such, contractors must exercise due diligence and identify the location of any private utilities on the properties being investigated with a geophysical investigation of the areas to be disturbed.

For this investigation, the following actions must be performed, which comply with regulatory and Parsons requirements:

- Review subsurface utility drawings for the areas being investigated, if available;
- Pre-mark proposed investigation locations and contact the New York City Long Island One Call Center (1-800-272-4480);
- Visually inspect the proposed investigation areas to identify any visual hazards;

- Perform a geophysical survey (e.g., GPR survey) to locate utilities, especially on private properties where one-call utility locators do not enter;

- Clearly identify and mark no-work zones; and
- For the first 5 feet, minimally, below the ground surface, hand-dig (using tools with non-conductive handles) and/or vacuum-excavate.

In general, vacuum excavation or hand-digging will be used to either over-bore (i.e., drill a larger size diameter clearance hole) or create an U-trench around each soil boring location to facilitate utility clearance.

Noise:

Noise is generated during construction activities in such operations as transportation of materials and operation of heavy construction equipment. Hearing protection will be worn by personnel to protection against the effects of hazardous noise exposure whenever sound-pressure levels exceed 85 dB(A) steady-state expressed as a time-weighted average (TWA). Personnel operating or working around heavy equipment should wear hearing protection.

Vehicle Traffic:

Vehicle traffic may include cars, trucks, and heavy equipment operated by contractors, subcontractors, or businesses throughout the site. Drivers should approach building corners with extreme caution as many of the buildings have blind corners making it extremely difficult to see intersection traffic. All heavy equipment should have a back-up alarm or drivers should honk to signal when they are backing up or when approaching blind corners.

Drivers are not permitted to use any communications device (e.g., cell phone) while driving. The driver and all passengers must use seatbelts in all moving vehicles at all times. A vehicle inspection of the tires, lights, horn, wipers and backup alarm should be completed each day.

Project activities include installing road-side safety barriers along select public roadways. Road-side safety barrier work shall be completed by a NYDOT registered contractor. NYDOT specified traffic control safety protocols will be implemented in association with all works performed within NYDOT alignment property.

6.1.5 Biological Hazards

Biological hazards can result from encounters with mammals, insects, snakes, spiders, ticks, plants, parasites, and pathogens. Mammals can bite or scratch when cornered or surprised. The bite or scratch can result in local infection or infection with systemic pathogens or parasites. Insect and spider bites can result in severe allergic reactions in sensitive individuals. Exposure to poison ivy, poison oak, or poison sumac results in skin rash. Ticks carry a number of serious diseases. Dead animals, organic wastes, and contaminated soil and water can harbor parasites and pathogens.

Poison Ivy:

Some of the most common and severe allergic reactions result from contact with poison ivy, poison oak, and poison sumac. Contact with the poisonous sap of these plants produces a severe rash characterized by redness, blisters, swelling, and intense burning, and itching. The victim also may develop a high fever and may be very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

Ticks:

Two types of ticks may be encountered: the dog tick and the deer tick. The dog tick is the larger, more common tick. After biting, the dog tick will remain attached to the victim until engorged with blood. Dog ticks may transmit Rocky Mountain spotted fever and other diseases. The deer tick is much smaller, ranging from poppy seed to grape seed size, and does not remain attached to the skin for very long after biting. Deer ticks can transmit Lyme disease, which can have serious, long-term health effects if left untreated. Lyme disease is often characterized by a bulls-eye type rash; light in the center with an outer red area. Flu-like symptoms may also occur. These signs may occur at different times and the rash may not appear. If you discover any bites on the skin, wash the affected area and seek medical attention if a rash or flu-like symptoms appear.

Bees, Wasps, Hornets, and Other Insects:

Symptoms of an insect bite are normally a sharp, immediate pain in the body part bitten. Poisonous insects and insect-like creatures that may be encountered around the work areas include the following:

- Bees (honeybees, bumble bees, sweat bees, wasps, and hornets)
- Caterpillars
- Beetles/Bugs
- Mosquitoes

Spiders:

The two poisonous spiders that may be encountered during the construction project are the Brown Recluse and the Black Widow. The Brown Recluse is up to one inch long with a violin or “fiddle” shaped mark on the top of the head. The Black Widow is a smaller, bulbous black spider with a red hourglass-shaped mark on the underside.

Reactions to a Brown Recluse spider bite include mild to severe pain within two to eight hours and a star shaped area around the bite within three to four days. Significant tissue death and loss accompanies a Brown Recluse spider bite. Reactions to a Black Widow spider include intense pain at the site of the bite after approximately 15 to 60 minutes, followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils, and generalized swelling of face and extremities.

Persons that have been bitten by a Brown Recluse or Black Widow spider should be immediately transported to a hospital. The spider should be collected (if possible) for confirmation of the species.

Personnel will be alert to the potential for spider bites. Spiders sometimes establish residence in stored clothing and PPE. It is advisable for personnel to inspect clothing and PPE for spiders prior to donning.

Blood borne Pathogens:

Bloodborne pathogens include human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and others. All occupational exposure to blood or other potentially infectious materials (OPIM) place workers at risk for infection with bloodborne pathogens. OSHA defines blood to mean human blood, human blood components, and products made from human blood. Other potentially infectious materials (OPIM) means: (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

Understanding simple precautions can greatly minimize your chances of contracting a bloodborne disease. Practicing universal (standard) precautions refers to assuming that any and all blood or body fluids are contaminated and taking all safety measures to avoid transmission of a disease. Properly cover open cuts and skin abrasions. Never eat, drink, store food, smoke, handle contact lenses or apply cosmetics or lip balm in potential exposure areas. Wash hands and exposed skin immediately after an exposure incident, and after removing gloves. Utilize engineering controls to reduce exposure to bloodborne pathogens by removing, eliminating or isolating the hazard. Wear gloves, eye/face protection and mask when working with blood or a splash potential. Check gloves for tears, holes or punctures, and remove immediately when penetrated. Clean up spills and body fluids by carefully covering with a paper towel, gently pouring a 10% bleach solution over towels, and leaving it in place for 10 minutes. Use mechanical means, not your hands to pick up broken glass that is tainted with blood. Dispose of blood products, medical waste, gloves and equipment in properly labeled and approved biohazard containers. Clean wounds with soap and water. Flush eyes and mucous membranes with water or normal saline solution. Notify the site safety representative or your supervisor immediately and complete an incident report.

6.1.6 Environmental Hazards

Slip, Trip, and Fall Hazards:

The site may contain slip, trip, and fall hazards for site workers, such as:

- Wet and slippery surfaces
- Holes, pits, tree roots, or ditches
- Slippery surfaces
- Steep grades
- Uneven grades

- Carry only a load that you can see over
- Sharp objects, such as nails, metal shards, needles and broken glass

Thunderstorm Hazards:

Refer to the Honeywell Program Lightning Safety SOP (2/28/2014).

Working On or Near Water:

During the course of the project some of the work may be conducted close to the waters edge. Any work conducted within six (6) feet of the water's edge will require workers to wear a Coast Guard approved PFD.

6.1.7 Fire Hazards

Although fires and explosions may arise spontaneously, they are more commonly the result of carelessness during the conduct of site activities, such as moving drums, mixing/bulking of site chemicals and during refueling of heavy or hand held equipment. Some potential causes of explosions and fires include:

- Mixing of incompatible chemicals, which cause reactions that spontaneously ignite due to the production of both flammable vapors and heat
- Ignition of explosive or flammable chemical gases or vapors by external ignition sources
- Ignition of materials due to oxygen enrichment
- Agitation of shock or friction-sensitive compounds
- Sudden release of materials under pressure

Activities that could result in exposure to soils or groundwater with NAPL or other COCs (drilling, groundwater monitoring) will be conducted in with appropriate PPE (tyvek, faceshields, rubber boots) as described in Section 6.2. Additionally:

- NAPL and Stained Soils in Excavations: If non-aqueous phase liquid (NAPL), stained soils, or other evidence of contamination (e.g., odor, VOC exceedances) is observed in an excavation, an exclusion zone will be established and personnel will upgrade to modified Level D. The excavated soils will be segregated and VOC monitoring will continue. If necessary as indicated by monitoring, engineering controls will be implemented followed by an upgrade to Level C PPE as directed by the project manager and project safety officer.

Air monitoring will be conducted as described in Section 6-10. Additionally, the air monitoring program will be revised as appropriate based on data obtained:

- Drilling: The breathing zone in the vicinity of drilling operations will be monitored during drilling using a photoionization detector, personal dust meter, and MultiRae (with an HCN sensor) . Additionally, split spoon samples or Macrocore samples will be screened for the presence of COCs. If COCs are detected above action levels in the soil samples, additional breathing zone monitoring will be conducted. If COCs are detected in the breathing zone above action levels listed in Table 6-1.1, engineering controls and PPE upgrades will be implemented or work will be stopped. If necessary as indicated by

monitoring, engineering controls will be implemented followed by an upgrade to Level C PPE as directed by the project manager and project safety officer.

- Groundwater Sampling: The breathing zone will be monitored during groundwater sampling using a photoionization detector. If COCs are detected above action levels listed in Table 6-1.1, engineering controls and PPE upgrades will be implemented or work will be stopped.

Table 6-1.1 – Chemicals of Concern – Drilling / GW Sampling

Chemical of Concern	Groundwater Concentrations	Monitoring Equipment	Action Levels	PPE/Action Taken
Hydrogen Cyanide	NA	Multi-gas Meter	< 5 ppm	Level D None
			> 5 ppm	Stop work activities until engineering controls are implemented to suppress levels
Dust and Constituents on Dust	NA	Aerosol Monitor	0 - 5 mg/m3	Level D Normal operations
			>5 mg/m3	Level C Implement engineering controls, then take 3 consecutive readings. If confirmed, upgrade to Level C. Continue engineering controls to suppress dust levels.
VOCs	< 1 ppm	Photoionization Detector	< 1 ppm	Level D None
			1 - 5 ppm	Level D Implement engineering controls to suppress vapor levels.
			6 - 10 ppm	Level C (qualitative fit test) Take 3 consecutive readings. If confirmed, wear half or full facepiece respirator. Implement engineering controls to suppress vapor levels
			11 - 50 ppm	Level C (quantitative fit test) Take 3 consecutive readings. If confirmed, wear full facepiece respirator. Continue engineering controls to suppress mercury levels.
			> 50 ppm	Level B Stop work activities. Take 3 consecutive readings to confirm. If trained and fit tested, don supplied air respirator.

* If levels are outside of the action levels, the area will be evacuated (workers move up-wind), sparging will be stopped, the project manager will be notified, the cause(s) of the exceedance will be ascertained, and the need for procedural modifications, engineering controls and/or PPE upgrades will be determined.

6.2 CONTROL MEASURES

Site hazards and hazards resulting from investigation and remediation activities are controlled using one or more of the control measures listed below. The order of precedence is as follows:

Engineer/design to eliminate or minimize hazards:

Drilling: The choice of drilling method (i.e., rotary mud) may potentially minimize VOC vapors. Potential NAPL will be contained within drill mud as opposed to air rotary methods which would blow potential vapors into the air. Additional engineering controls may include selecting rig orientation to take advantage of natural wind or industrial fans to move potential vapors from the drilling area or cover the mud tub with a tarp to contain vapors.

Guard the hazard:

Hazards that cannot be eliminated by design must be reduced to an acceptable risk level by safety guards or isolation devices like Tyvek suits, face shields, and respirators. The drill rig will have guards to protect workers from contacting moving parts and that render equipment inactive including the emergency stop buttons on the drill rigs.

Drilling / Groundwater Sampling: Workers will wear protective PPE to guard against splashes and vapors during drilling and groundwater sampling and upgrade as risks are identified by health and safety monitoring.

Modified Level D PPE is required for drilling and groundwater sampling including breathable Tyvek coveralls, over boots or rubber boots that can be decontaminated, safety glasses, and hard hat. A full face shield is required when drilling personnel could be exposed to NAPL in soil cuttings or groundwater. The face shield may be removed if the requirements detailed in **Table 6-1.1** are met. Hearing protection are also required when working in close proximity (i.e., within 25 ft) of the drill rig.

The level of PPE may be upgraded to **Level C** if HCN vapors greater than action levels are detected. Please reference **Table 6-1.1** for the appropriate action levels.

Breathable Tyvek coveralls will be changed out twice daily or if ripped or torn. The Tyvek coveralls are to be disposed of when leaving the exclusion zone. Rubber overboots will be washed with an Alconox solution for decontamination purposes when leaving the exclusion zone.

All down borehole apparatuses must be steam cleaned before drilling begins and then upon completion of the drilling program. A decontamination pad is required and all decontamination fluids must be contained.

LEVEL D

Level D protection will be worn for initial entry on-site and for all activities unless otherwise noted by the SSO. Level D protection will consist of:

- Standard work clothes
- Steel-toe safety boots
- Safety glasses with attached sideshields (goggles must be worn when splash hazard is present)
- Hearing protection (when working within 25 feet of vacuum excavation equipment, drill rigs, sawing, or jack hammering)
- Metatarsal foot protectors (when sawing or jack hammering)
- Traffic safety vests, reflective (when working on streets, sidewalks, parking lots, and driveways)
- Nitrile outer gloves and nitrile inner gloves (sampling operations)
- One (1) kV dielectric glove protectors (i.e., leather gauntlets), currently tested and stamped (when saw-cutting and jackhammering, or performing soil intrusive activities using electrically-conductive equipment). Proximity to electric lines up in excess of 1,000 volts will require higher rated dielectric protection – and possibly another control method to prevent contact with live electric. Reflective traffic safety vests (when working on streets, sidewalks, parking lots, and driveways).
- Hard hat (must be worn during all site activities and cannot be blue or white)
- Disposable boot covers will be worn when in contact with disturbed soils

MODIFIED LEVEL D

Modified Level D protection, unless otherwise specified by the SSO, will consist of Level D equipment and the following additional equipment:

- Nitrile outer gloves and nitrile inner gloves
- Tyvek coveralls if particulate hazards only are present, poly-coated Tyvek coveralls if liquid hazards are present

LEVEL C

Level C protection, unless otherwise specified by the SSO, will consist of Level D equipment and the following additional equipment:

- Full-face air-purifying respirator
- Combination HEPA filter/organic vapor cartridges
- Tyvek coveralls if particulate hazards only are present, poly-coated Tyvek coveralls if liquid hazards are present
- PVC or nitrile inner and nitrile outer gloves

LEVEL B

If the concentration of volatile organics or cyanide equals or exceeds the specified action levels, all field personnel associated with the project will immediately retreat to a location up-wind of the source of contamination. At this point the SSO must consult with Honeywell to discuss appropriate actions. Level B PPE will not be worn until authorization is given by the Parsons Safety Manager.

Drilling: Hand-held air monitoring equipment will be used to detect elevated HCN vapors or VOC concentrations during drilling; breathing zone air to be continuously monitored. All heavy equipment will be outfitted with backup alarms. Site vehicles that do not have backup alarms will sound their horn before backing or will have a spotter.

Provide special procedures or training:

AHAs have been developed for drilling oversight, groundwater sampling, soil sampling; subcontractors will develop their own AHAs with procedures to operate equipment or handle materials to ensure the safe completion of work. Site workers will be HAZWOPER and First Aid trained as required; see **Attachment 10.1.1** for training status of site personnel.

Chemicals used on site:

Chemicals to be used onsite during drilling and groundwater sampling could include (See **Attachment 10.1.20** for MSDS):

- Diesel fuel will be used to operate the drill rig and heater on the steam cleaner.
- Gasoline fuel will be used to operate the development pump and steam cleaner pump.
- Alconox will be used for decontamination of equipment and PPE (over boots)
- Isobutylene – will be used for calibrating the PID
- Groundwater sampling calibration chemicals (pH, specific conductance)

6.3 ACTIVITY HAZARDS ANALYSIS

Below is a list of Activity Hazards Analyses (AHAs) for the hazards identified in Section 6.1, and all aspects of the work. See Attachment 10.1.21 for AHAs.

- Activities - Field
- Site Visit or Site Walk
- Operation- Motor Vehicle
- Operation- Heavy Equipment or Machinery
- Fueling- Motor Vehicle
- Fueling- Heavy Equipment
- Sampling Soil
- Sampling- Processing

- Decontamination- Large Equipment
- Decontamination- Personnel
- Decontamination- Portable Tools
- Utility Clearance Keyholing
- Lifting/Hoisting
- Sampling- Water
- Survey- Geophysical Investigation
- Decontamination – Area Set Up

6.4 SAFETY SYSTEMS AUDIT PROTOCOL

GBU SH&E Directors use the Safety Systems Audit Protocol for field staff and subcontractors whose work on a project site will be more than six (6) months.

The work at the site is completed in discrete phases with no phase lasting more than six (6) months in duration.

6.5 SITE INSPECTION

Each Inspection Category below will be assigned the following employees.

Inspection Category [a]	Parsons Corporate Safety & Health Manual	Title of Assigned Employee	Minimum Frequency
Sanitary facilities, drinking water	5	Site Sup	Daily
SH&E, Housekeeping	See 6.6 below	Site Sup	Weekly
Waste material storage	17	Site Sup	Weekly
Motor vehicles and equipment	25	Operator	Each Shift

6.6 WEEKLY SH&E SITE INSPECTIONS

The Project Manager or most senior onsite person conducts a weekly site walk to identify problem areas using the Weekly SH&E Inspection Checklist (see **Attachment 10.1.7**). Items found to be out of compliance must be assigned corrective action and tracked to completion.

6.7 SH&E ENFORCEMENT

Parsons and its subcontractors enforce all applicable SH&E requirements of regional, federal, municipal, state, local, and all other regulations; and where applicable OSHA 1910 and 1926 and Engineering Manual (EM) 385.1, where applicable. Subcontractors must also comply with and enforce Parsons site requirements.

Parsons and its subcontractors must have written progressive disciplinary systems available for review in their Human Resources departments.

6.8 NOTICE OF VIOLATION OF SAFETY AND HEALTH REGULATIONS

The Notice of Subcontractors Noncompliance to SH&E Regulations form (see **Attachment**

10.1.5) documents poor performance and requires a response from subcontractor senior management. The notice contains five distinct levels of discipline, from submission of a recovery plan to contract termination.

A Notice of Subcontractor Violation of SH&E Regulations form (see **Attachment 10.1.6**) will be used document immediately dangerous to life and health (IDLH) situation, respiratory airborne hazards (RDLH), and/or when the subcontractor repeatedly fails to comply with SH&E requirements.

6.9 COMPETENT FIRST AID PERSON

The response time for Emergency Medical Services (EMS) when dialing 911 has not been determined. Based on the activities provided in the Scope of Work (Section 2.1) and the list of Activity Hazard Analysis (AHA) included in Section 6.3, the project must be prepared for a potential accident involving slips, trips, or falls resulting in lacerations or broken bones, crushing injuries, cuts, struck by, severe bleeding, heat stress injuries, or other life threatening or permanently disabling injury or illness.

At least one Parsons personnel at a given time will be first responders due to the insufficient response time of EMS personnel; during drilling activities, the drilling subcontractor will also have two responders on site. The employee(s) and contractors listed in the PSHEP Training-Medical Records spreadsheet (see **Attachment 10.1.1**) are assigned to the project and will have a valid certificate in AED, CPR, first aid and bloodborne pathogens.

6.10 COMMUNITY AIR MONITORING PLAN

Community air monitoring will be conducted in compliance with the New York State Department of Health's (NYSDOH's) Generic Community Air Monitoring Plan (CAMP). Real-time air monitoring for volatile compounds and particulates at the perimeter of the hot zone will be performed as described below.

VOC Monitoring

Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of soil, sediment, and groundwater samples. Periodic monitoring may include obtaining measurements upon arrival at a location, while opening a monitoring well cap, when overturning soil, when bailing/purging a well, and upon leaving the location. In some instances, depending on the proximity of exposed individuals, continuous monitoring may be conducted during these activities.

Continuous monitoring for VOCs will be conducted during all ground intrusive activities (i.e., hand clearing, soil boring and monitoring well installation). Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the hot zone. Monitoring will be conducted with a PID equipped with a 10.6 eV lamp capable of calculating 15-minute running average concentrations.

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If

levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the hot zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. The corrective actions may include physically covering the source area and/or application of foam. After these steps work activities will resume provided that the total organic vapor level 200 feet downwind of the hot zone or half the distance to the nearest potential receptor or residential /commercial structure, whichever is less – but in no case less than 20 feet, is below 5 ppm above background for the 15-minute average.
- If the total organic vapor level is above 25 ppm at the perimeter of the hot zone, activities will be shutdown.

All 15-minute readings will be recorded and available for New York State Department of Environmental Conservation (NYSDEC) and NYSDOH personnel to review. Instantaneous readings, if any, will also be recorded.

Particulate Monitoring

Particulate concentrations will be monitored continuously at the downwind perimeter of the hot zone with a portable real-time particulate monitor capable of measuring particulate matter less than 10 micrometers in size and capable of integrating over a period of 15 minutes (or less). The equipment will include an audible alarm to indicate exceedence of the action level. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations.

- If the downwind particulate level is 100 micrograms per cubic meter (µg/m3) above background for the 15-minute period or if dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression provided that the downwind particulate level does not exceed 150 µg/m3 above background and no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, the downwind particulate level is greater than 150 µg/m3 above background, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind particulate level to within 150 µg/m3 of the background (upwind) level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review.

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SECTION 7 – SAFETY TRAINING

7.1 PROJECT SAFETY ORIENTATION

The Parsons Project Manager, Field Engineer, or Project SH&E Representative will conduct an orientation for all new Parsons staff and subcontractor management personnel using the completed HASP Orientation.

All visitors must receive a site orientation on site risks and emergency procedures. Visitors must be escorted by the Project Manager, Project Engineer, Project SH&E Representative or a designee familiar with the potential hazards on the project, and who has received a full safety orientation. Visitors will stay outside the exclusion zones at all times.

7.2 PARSONSU MODULES AND START TRAINING – ZERO INCIDENT TECHNIQUES

All Parsons field personnel will be current in the completion of safety modules on ParsonU prior to beginning of the drilling effort.

The Project Manager and following supervisors have completed START training:

- Dan Martoccia – Project Manager – June 4, 2014
- John Scurek – Project Safety Manager

7.3 DAILY HUDDLE

Daily Planners such as Daily SH&E Planner or the Take 5 Card enable supervisors and employees to formally document SH&E huddle participation as well as the day's activities, associated risks, and relevant control measures. The daily safety huddle must be documented using either one of these forms, or an alternate means of documentation to be determined by the Project Manager.

7.4 WEEKLY TOOLBOX SH&E MEETINGS

The Field Team Leader documents toolbox SH&E meetings and attendance and retains all records. Subcontractors shall lead the portion of the meeting that involves their scope of work. Meetings shall be documented and signed by all individuals accessing the site using a Toolbox Safety Meeting form (Safety Meeting Sign-In Sheet), **(Attachment 10.1.11)**

7.5 ACTIVITY HAZARDS ANALYSIS TRAINING

When the Activity Hazards Analysis (AHA) is complete, the Parsons supervisor or subcontractor conducts a training session with all individuals involved with the task. Individuals should be given an opportunity to provide input regarding task steps, hazards identified, and appropriate control measures.

7.6 REGULATORY TRAINING PROGRAMS

Regional, municipal, provincial, local, and OSHA regulations require specific training in certain circumstances. Based on the scope of work and meetings with regulatory officials, the following

training topics are provided on the project:

Yes Hazard Communication – as per 29 CFR 1910.1200

Yes HAZWOPER – all workers engaged in activities which are potentially exposed to hazardous substances and health hazards must be trained to meet 1910.120(e)(1). Annual 8-hour refresher training as per 29 CFR 1910.120(e)(3) is required for workers and supervisors must be trained to meet 29 CFR 1910.120(e)(4).

Yes AED/CPR/First aid/Bloodborne Pathogens – provided to personnel based on project activities identified in the Scope of Work (i.e. life threatening) and EMS response time (i.e. less than 15 minutes). See Section 6.9.

No Emergency response – only applicable to workers engaged in emergency response as per 29 CFR 1910.120(q).

TBD Respiratory protection – as per 29 CFR 1910.134. The necessity for respiratory protection will be determined in the field as detailed in **Table 6-1.1**. Medical qualification by a physician is required to wear a respirator. Annual fit testing and training is also required.

No Signaling

No Process safety management – as per 29 CFR 1910.119.

No Power-operated hand tools

No Gas welding and cutting

No Confined space entry – Supervisor must be trained to meet 29 CFR 1926.651(j).

No Lockout/tagout – as per 29 CFR 1910.147.

No Asbestos abatement – as per 29 CFR 1926.1101.

No Scaffold use – as per 29 CFR 1926.451.

No Excavation/Trenching – as per 29 CFR 1926.651.

7.7 OUTREACH PROGRAMS

The project will use qualified instructors and online courses to conduct regional, municipal, provincial and local training, as well as OSHA 10-/30-hour construction safety training.

7.8 SPECIALIZED TRAINING AND ORIENTATIONS

Personnel receive specialized training on client rules and requirements as well as the unique tools, equipment, and procedures used to perform the work. At this time, specialized training is **not** required.

Description	Attendees	Schedule
General rules and safety requirements	All workers assigned to the site	Half-hour training session, provided to new employee on the first day of work at the site.
Honeywell Contractor Safety Handbook (**Attachment 10.3**)	All workers assigned to the site	Handbook should be provided for review during site orientation training.

SECTION 8 – RECORDKEEPING AND POSTING

Parsons and its subcontractors must comply with the recordkeeping requirements of the regional, municipal, local, and/or OSHA regulations, Owner, Parsons Corporation, and this PSHEP, including:

- OSHA 300 and/or applicable regional, municipal, and local regulation logs
- Medical treatment and follow-up
- Cranes
- Heavy equipment inspection logs
- Fall protection
- Training
- Inspections
- Audits
- Others, as required

Parsons Talent Management and the Division or Program SH&E Manager are the official recordkeepers for files relating to Parsons employees. Each subcontractor maintains its own files.

For this project, safety bulletin boards used for displaying regional, municipal, provincial, local and/or OSHA posters in conspicuous places will be located at the Boston, Syracuse and Tampa offices.

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SECTION 9 – SAFETY AND HEALTH REQUIREMENTS

9.1 COMPETENT PERSON AND ACTIVITY HAZARDS ANALYSIS

Parsons and its subcontractors are individually responsible for training their respective employees and for complying with all project requirements. Failure to comply could lead to disciplinary actions against Parsons employees and subcontractors or their employees. Further guidance is available in the Parsons Corporate Safety and Health Manual; ParShare link is as follows: Corporate Safety and Health Manual.

Competent Person forms will be submitted for subcontractor personnel for applicable Safety and Health Requirements in Exhibit 9-1. The subcontractor Competent Person forms will be saved to the project folder on Parshare.

Exhibit 9-1 – Competent Person and Activity Hazards Analysis Requirements

Safety and Health Requirement	Parsons Safety, Health, and Environmental Manual	OSHA Regulation	EM 385-1-1 Regulation	Competent/ Qualified Person	Training Required	Written Plan and AHA Required
General Safety and Health		1926.20	01.A	*Yes*	*Yes*	*Yes*
Safety Training		1926.21	01.B.01	*Yes*	*Yes*	*Yes*
First Aid and Medical	2	1926.23, 50	03.A	*Yes*	*Yes*	*Yes*
Personal Protective Equipment	6	1926.28, 95-98, 100-107	05.A	*Yes*	*Yes*	*Yes*
Motor Vehicles, Mechanized Equipment	25	1926.600-603	18.A	*Yes*	*Yes*	*Yes*

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SECTION 10 – APPENDIX

10.1 ATTACHMENTS/FORMS

Project Specific

10.1.1 PSP Training-Medical Record

Forms

10.1.2 Pre-Field Work Safety Meeting

10.1.3 Employee/Contractor Training Acknowledgement

10.1.4 Risk Mitigation Two-Week Look-Ahead Form

10.1.5 Notice of Noncompliance with Safety and Health Regulations

10.1.6 Notice of Subcontractor Violation of Safety and Health Regulations

10.1.7 Weekly SH&E Inspection Checklist

10.1.8 Activity Hazard Analysis Training Record

10.1.9 Mobilization/Kickoff Safety Meeting

10.1.10 Subcontractor Competent Person Form

10.1.11 Safety Meeting Sign-in Sheet

10.1.12 Competent Person and Activity Hazard Analysis Requirements

10.1.13 Order for Treatment of Work-related Injury or Illness

10.1.14 Reserved

Project Specific

10.1.15 Site-Specific Risk Review Checklist

10.1.16 Heat Stress and Heat Stress Monitoring Protocol

10.1.17 Subsurface Soil Disturbance Protocol

10.1.18 Reserved

10.1.19 Reserved

10.1.20 Material Safety Data Sheets (MSDS)

10.1.21 Activity Hazard Analyses (AHAs)

10.2 SUBCONTRACTOR SAFETY PLANS (SSPS) TEMPLATE

10.2.1 Subcontractor Safety Plan Review

10.3 HONEYWELL CONTRACTOR SAFETY HANDBOOK

Attachment 10.1.1

10.1.1 PSHEP Training-Medical Records Spreadsheet

Remedial Investigation at the Former Barrett Manufacturing Site and Mica Roofing Site Brooklyn, NY

Name	Hazwoper Refresher (Expires)	First Aid (Expires)	CPR (Expires)	AED (Expires)	BBP (Expires)	Respirator Fit Test (Expires)	Hazwoper Supervisor	DOT General Awareness (Expires)
Zohar Lavy	3/31/16	8/1/16	8/1/16	8/1/16	10/21/15	NA	8/4/09	NA
Matt Bruno	11/30/15	8/31/16	8/31/15	8/31/2015	7/10/14	N/A	N/A	N/A
Reserved								

----- Potentially expires within project period of performance
----- Pending
----- Confirm Date

UPDATED 9/25/14

Attachment 10.1.2

PARSONS

Pre-Field Work SH&E Meeting
Site-Specific SH&E Review Checklist
(Sheet 1 of 3)

Date:
Subcontractor Representative:
Phone:
Project Location:
Parsons Project Manager:
Phone:
Subcontractor SH&E Representative:
Phone:
Parsons SH&E Representative:
Phone:

This checklist supports the identification of work activities and programs in a pre-field work SH&E meeting. This list also includes items identified through the subcontractor review and high-risk activities identified through the project specification review.

High-risk activities must be followed up during the field work with training, written plans and/or a specific Activity Hazard Analysis (AHA).

This list should be reviewed with prospective bidders during the pre-bid meeting.

NOTE: Use check box and add specifics and details as applicable (next to the callouts)

	SAFETY & HEALTH
☐	Site-Specific Safety, Health and Environmental Plans
☐	Competent/Qualified Person Documentation
☐	SH&E Audits/Inspections
☐	Subcontractor Responsibilities
☐	Site Orientation Requirements
☐	Pre-Field Work SH&E Meeting/Date
☐	Crane Inspection Certification
☐	Personal Protective Equipment (PPE) (Work activities or work site requires hearing protection/using respirators/special protective clothing/other)
☐	Exposure to General Public (Work activities or location requires special precautions to protect the public)
	FIELD WORK SAFETY ISSUES
☐	Excavations/Trenching
☐	Powered Industrial Trucks, Fork Lifts
☐	Crane Work/Heavy Lifts, Rigging
☐	Work involving Hazardous Materials
☐	Electrical Tie-ins/Lockout – Tagout
☐	Aerial Lift Work – Scissor Lifts, Extendable Boom, etc.
☐	Underground, Caissons, Cofferdams
☐	Scaffold Erection/Work
☐	Demolition
☐	Marine Work/Live Boating

PARSONS

Pre-Field Work SH&E Meeting Form
Site-Specific SH&E Review Checklist
(Sheet 2 of 3)

	FIELD WORK SAFETY ISSUES (Contd.)
☐	Heavy Hauling
☐	Concrete
☐	Diving
☐	Work Adjacent to Production Areas
☐	Site Security/Visitor Control/Public Areas
☐	Permits (Excavations, Scaffolding, Demolition, Traffic, Confined Space, Hot Work, Line Breaking, etc.)
☐	Confined Space (Confined space entry is required)
☐	Welding and cutting (Acetylene/gas cutting, arc welding, soldering and brazing)
☐	Ladders (Portable ladder use is required)
☐	Traffic Control (Work is on or near highways, roads, or mass transit)
	MEDICAL
☐	Substance Abuse Screening
☐	Emergency Procedures
☐	Site Security
☐	Smoking Policy
☐	Medical Services Requirements
☐	Treatment Locations, Addresses, and/or Phone List
	ENVIRONMENTAL
☐	Environmental Hazards
☐	Air Pollution/Emissions and required reporting
☐	Wastewater Discharges
☐	Drinking Water
☐	Management of Hazardous Materials and Hazardous and Solid Wastes
☐	Emergency Response to Spills and Releases Environmental Assessments
☐	Protected Ecological and Cultural Resources
☐	Specific Reports on Toxic or Hazardous Chemicals Usage and Storage (Required by Environmental Regulation)
☐	Materials to be Recycled
☐	Possibility of Buried Items Onsite (cultural artifacts, tanks, wastes, and ordinance) and what to do if encountered
☐	Environmental Regulatory Requirements
☐	Environmental Assets
☐	Resource Conservation/Sustainability

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Pre-Field Work SH&E Meeting Form
Site-Specific SH&E Review Checklist
(Sheet 3 of 3)

Additional Notes/Comments:

ATTENDEES

Name	Title	Company

Attachment 10.1.3

PARSONS

Employee/Subcontractor Training Acknowledgement

Name of Trainer: _____

Training Subject: _____

Training materials used: _____

Name of employee: _____

Date of hire/assignment: _____

I, _____, hereby certify that I have received training as described above in the following areas:

- Names of personnel responsible for site safety and health.
- Safety, health or other hazards at the site.
- The proper use of personal protective equipment.
- The potential occupational hazards in general in the work area and associated with my job assignment.
- Work practices by which a worker can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds on the site.
- Decontamination procedures.
- General safety requirements indicate the safe work conditions, safe work practices and personal protective equipment required for my work.
- The hazards of any chemicals to which I may be exposed and my right to information contained on material safety data sheets for those chemicals, and how to understand this information.
- My right to ask questions, or provide any information to the employer on safety either directly or anonymously without any fear of reprisal.
- Disciplinary procedures the employer will use to enforce compliance with general safety requirements.

I understand this training and agree to comply with general safety requirements for my work area.

_____ _____

Employee Signature Date

Attachment 10.1.4

PARSONS

Risk Mitigation Two-Week Look-Ahead Form

Safety plan for week ending:		Subcontractor:	
Project/ Location:		Meeting date:	
Plan Prepared by:		Dated:	

Next Two Weeks Scope of Work:

Identified Risks/Exposures/Hazards:

Control Measures:

Additional Activity Hazards Analysis Required:

Subcontractors Mobilizing/Demobilizing:

Audit/Inspections Scheduled:

Competent Person Changes:

Planned Orientation/Training :

Recommendations/Comments/Concerns:

Note: This information should be incorporated into the meeting minutes.

Attachment 10.1.5

PARSONS

Notice of Noncompliance with Safety, Health and Environmental Regulations

Under conditions of this enforcement procedure check all items that apply:

☐	1.	You are being notified of this violation and should take corrective action to prevent a reoccurrence. The corrective action shall be documented to the Parsons Construction Management representative immediately.
☐	2.	You must submit a plan for compliance to your Parsons Construction Management representative and the Construction Safety Manager within two days of receipt of this letter. The compliance plan must include the means or methods of compliance and the date that the requirements for compliance will be completed. Once compliance has been achieved, a follow up letter must be sent to the Parsons Construction Management representative and Construction Safety Manager. Failure to comply will result in disciplinary action against your Company.
☐	3.	You are required to review the stated procedures with your Parsons Construction Management representative. Work may not commence on the site until the review is complete and the Subcontractor responds formally that the procedure is understood and will comply.
☐	4.	You are required to review the stated procedures with your Parsons Construction Management representative. Work may not commence on the site until the review is complete and you must confirm formally the disciplinary action to be taken against the supervisor and employees.
☐	5.	All work on the site will stop until the Parsons Construction Management representative reviews all the facts with the Subcontractor and determines if the contract between the parties will be terminated.

Sincerely,

Parsons Representative

cc:
Issuing Construction Manager Representative
Job File
GBU SH&E Director
Project Manager

Attachment 10.1.6

PARSONS

Notice of Subcontractor Violation of Safety and Health Regulations

Date: _____

Contractor Name: _____
Address: _____

_____

_____

_____

Attention: _____

This letter officially notifies you that you have been found to be in violation of the following Safety Regulations:

_____

on (date) _____, by _____.

Confined Space Entry	___	Lockout/Tagout	___	Hot Work	___	Personal Protective Equipment	___
Knowledge of the environment	___	Awareness of warning alarms	___	Evacuation routes	___	Back-up Alarms	___
Assembly locations	___	Fall Protection	___	Scaffolding	___	Environmental/Hazardous Material Storage	___
Trenching	___	Safe Work Practices	___	Security Practices	___		

Other: _____

_____

_____

This/These violations occurred at the following locations: _____

_____

at the following times _____ and dates _____

The name of the employees was/were _____

under the supervision of _____.

Attachment 10.1.7

PARSONS

Weekly SH&E Inspection Checklist (Sheet 1 of 2)

	Week Ending Date:
Project Name:	**Project Number:**
Name of Auditor:	**Signature:**

Check each box during your inspection or indicate N/A. Substandard conditions found must be identified on the back of this checklist

	Electrical: temporary power, circuits marked, GFCI protection, damaged cords, cords protected, correct outlets, and signage.
	Environmental: Air emissions controlled, hazard com program, specific MSDS sheets, fuel signage, spillage dike, dust control, HAZMAT storage, and waste disposal.
	Excavations: Guarded, Soil Condition, Trenching Controls, Blue Stake/Equivalent, Daily Inspections Subcontractor, and Proper Access.
	Fire Safety: Extinguishers; Proper Size, Numbers, Proper Locations, Hose Stations, Hot Work Permit, Fuel Storage.
	Framing Activities: Proper Positions, Monitor, Fall Protection, Housekeeping, Forklift Activity, Training, and Tool Use.
	Guarding: Floors, Walls, Windows, Leading Edge, Roof, Elevator Shafts, Open Holes, Material, Quality, and Handrail
	Housekeeping: Office, Walkways, Waste Material, Lay Down Yard, Grounds, and Subcontractor Areas, Food Debris.
	Ladders: Height, Secured Top/ Bottom, Condition, Employee Position; Three Points of Contact.
	Material Handling: Rigging, Material Condition, Training, Tasks, Proper Lifting, Wheel Barrows, Stacking/Storage.
	Medical: First Aid Kits, Numbers Posted, Address Knowledge, Nearest Emergency Assistance, CPR/First Aid Training.
	Mobile Equipment: Inspections, Condition, Backup Alarms, Leaks, Fuel Storage, Proper Parking, and Training.
	PPE: Hearing, Head, Hand, Eye, Foot, Fall, Seatbelts, Respiratory,
	Sanitary: Drinking Water, Toilets Clean and Adequate, Soap and Water for Washing
	Scaffolds: Component Damage, Footing, Secured, Guardrail, Training, Inspections, Pins & Bracing, Planking, and Ladders.
	Tools: Damage, Cords, Blades, Guards, Hoses, Handles, Switches, Training, Proper Use, Storage, Adequate.
	Training: Forklift, Man Lift, Water Truck, Orientation, Task, Hazards, Power Tools, Scaffolds, and Trenching.
	Welding: Hot Work Permit, PPE, Gas Checks, Confined Space, Tank Storage, Equipment Inspections, and Fire Protection
	Miscellaneous: Any condition or behavior not identified on this checklist.

PARSONS

Weekly SH&E Inspection Checklist (Sheet 2 of 2)

				Week Ending Date:	
Project Name:				**Project Number:**	
Name of Auditor:				**Signature:**	
Hazard Type	1.	Improper or Inadequate Guarding	8.	Substandard Housekeeping	
	2.	Improper Wiring	9.	Hazardous Environmental Conditions	
	3.	Defective Tools, Equipment, Substances	10.	Radiation Exposures	
	4.	Hazardous Arrangements	11.	Congestion or Restricted Movement	
	5.	Inadequate Illumination	12.	Inadequate Warning System	
	6.	Inadequate Ventilation	13.	Fire & Explosive Hazard	
	7.	Improper Personal Protective Equipment	14.	Other:	
Basic Causes	1.	Inadequate Engineering	7.	Inadequate Leadership & Supervision	
	2.	Normal Wear & Tear	8.	Physical Incapacity	
	3.	Inadequate Purchasing	9.	Lack of Knowledge	
	4.	Inadequate Maintenance	10.	Improper Motivation	
	5.	Inadequate Work Standards	11.	Mental Incapacity	
	6.	Abuse	12.	Other:	
Hazard Classification	**Class A: Likelihood of Death** **Class B: Likelihood of Serious Injury** **Class C: Likelihood of Minor Injury**				

Items	**Hazard Type**	**Basic Cause**	**Hazard Class**	**Location**	**Remedial Action(s)**

Comments:

Attachment 10.1.8

PARSONS

Activity Hazards Analysis Training Record

JOB NUMBER_____

AHA NUMBER_____

JOB LOCATION_____

DATE:_____

NAME OF TRAINER:_____

SUBJECTS COVERED:_____

_____

_____

_____

TRAINING AIDS USED:_____

_____

_____

ATTENDEES (PLEASE SIGN NAME LEGIBLY):

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

(Use additional sheets if necessary)

Attachment 10.1.9

PARSONS

Mobilization/Kickoff SH&E Meeting Form

Date:	Project/Location:
Parsons Representative:	Subcontractor Representative:

The following project site safety, health, security, and environmental requirements, procedures, and hazards have been identified and reviewed with the subcontractor:

Mark with "X"	Item	Mark with "X"	Item	Mark with "X"	Item
☐	Air Pollution and Emissions	☐	Fall Protection, Guardrails, and/or Scaffolding	☐	Personal Protective Equipment
☐	Asbestos			☐	Process Safety Management (PSM)
☐	Buried Items	☐	Fire Protection		
☐	Competent / Qualified Person	☐	Hazardous Materials and Wastes	☐	Protected Ecological and Cultural Resources
☐	Confined Spaces (Permit / Non-Permit)	☐	Hot Work, Welding, and/or Cutting	☐	Resource Conservation and Sustainability
☐	Cranes / Hoists / Annual Inspection Certificate(s)	☐	Ladders	☐	Site Security, Visitor Control, and Public Exposure
☐	Demolition	☐	Lead Paint	☐	Specific Reports (Required by Environmental Regulation) on Toxic or Hazardous Chemicals Usage and Storage
☐	Drinking Water	☐	Lockout / Tagout		
☐	Electrical	☐	Management of Hazardous Materials and Hazardous Solid Wastes		
☐	Emergency Response to Spills and Releases			☐	SSHEP, Emergency Planning and Response Plan
☐	Environmental Assessments	☐	Overhead Power Lines	☐	Wastewater Discharges
☐	Excavations and Trenches	☐	Permits (Excavations, Scaffolding, Demolition, Traffic, Confined Spaces, etc.)	☐	Vehicle and Heavy Equipment
				☐	Other:

Protection of the Public:

Additional Project Concerns:

Attendees:

Name	Title	Company

Attachment 10.1.10

PARSONS

Subcontractor Competent Person Form

Definition

A competent person is a person having the ability to recognize existing and predictable hazards and having the authority to correct them.

Responsibility

The designated subcontractor competent person is responsible for recognizing and correcting SH&E risks/hazards. This person has the authority to stop work in a potential SH&E concern on the jobsite. This Subcontractor Manager and competent person are considered the contacts for Parsons projects.

This form must be completed by each subcontractor's manager and the subcontractor's designated competent persons. ***Where a subcontractor is responsible for multiple crafts, it will be necessary to maintain additional designated competent persons and forms.*** Each subcontractor on a Parsons project must submit this completed form to the Parsons Construction Manager before beginning work on the project and must update it any time the designated representative(s) changes.

Acknowledgment

I, _____ representing, _____
Subcontractor Manager (Print) Subcontractor Company Name (Print)

have assigned _____ to be the competent person in the areas indicated below and acknowledge that this individual has been thoroughly trained and is experienced in hazard recognition and has the authority to stop work and correct hazards in the event of a potential hazardous or imminent danger situation.

I, _____ acknowledge that I have been thoroughly trained and have the experience
Competent Person (Print)

to perform the duties as the _____ competent person in the areas marked below and
Subcontractor Company Name (Print)

I understand that I have the responsibility and authority to correct hazards and to stop work in the event of a potential hazardous or imminent danger situation. (Check appropriate items.)

☐	Air Pollution and Emissions	☐	Excavations and Trenches	☐	Protected Ecological and Cultural Resources
☐	Asbestos	☐	Fall Protection	☐	Resource Conservation
☐	Bolting, Riveting, and Fitting	☐	First Aid and CPR	☐	Respiratory Protection
☐	Buried Items	☐	HAZWOPER (initial and annual refresher)	☐	Rigging
☐	Concrete, Forms, and Shoring	☐	HAZWOPER Supervisor	☐	Scaffolding
☐	Cranes and Derricks	☐	Hearing Protection	☐	Surveying
☐	Demolition	☐	Ladders	☐	Traffic Safety (Signage, Flagger)
☐	Drinking Water	☐	Lead	☐	Tunnels and Shafts
☐	Electrical	☐	Marine Work and Diving	☐	Underground Construction
☐	Emergency Response (Spills, etc)	☐	Material and Personnel Hoists	☐	Wastewater
☐	Environmental Assessments	☐	Mechanical Demolition	☐	Welding and Cutting
☐	Other (describe):				
☐	Additional Comments:				

_____ _____ _____
Subcontractor Manager (Signature) Competent Person (Signature) Date

Attachment 10.1.11

Safety Meeting Sign-In Sheet

Site:_____

Safety Meeting Presenter: _____ Date: _____

Current Weather Conditions:

Temperature (^{o}F) = _____ Wind Direction = _____ Wind Speed = _____

Clear - Sunny – Cloudy – Rain - Snow Forecast = _____

Current Site Conditions (circle as appropriate):

Dry - Wet - Muddy - Frozen - Snow Covered - Other (describe) _____

1. Incidents or Injuries to report from Previous Day Activities: No Yes - explain below:

_____

2. Safe and/or At-Risk Observations from Previous Day Activities:_____

_____

_____

3. Activities Taking Place Today: _____

_____

_____

3. Anticipated Hazards: _____

_____

_____

4. Engineering Controls-Work Practices-PPE to Protect Against Hazards: _____

_____

_____

5. Additional Safety Topic or Comments: _____

_____

Safety Meeting Sign-In Sheet

PRINTED NAME	SIGNATURE	COMPANY

Attachment 10.1.12

Competent Person and Activity Hazards Analysis Requirements

Safety and Health Requirement	OSHA Regulation	EM 385-1-1 Regulation	Competent Qualified Person-Supv	Training Required	AHA Required
1. General Safety & Health	1926.20	01.A	*Yes*	*Yes*	*Yes*
2. Safety Training	1926.21	01.B.01	*Yes*	*Yes*	*Yes*
3. Confined Spaces	1910.146; 1926.21	06.01	*Yes; Supv*	*Yes*	*Yes*
4. Confined Space Permit System	1910.146	06.01	*Yes*	*Yes*	*Yes*
5. First Aid and Medical	1926.23, 50	03.A	*Yes*	*Yes*	*Yes*
6. Fire Protection and Prevention	1926.24, 150-155, 352	09.A	*Yes*	*Yes*	*Yes*
7. Housekeeping	1926.25	14.C	*N/A*	*N/A*	*N/A*
8. Illumination	1926.26, 56	07.A	*Recommended*	*N/A*	*N/A*
9. Sanitation	1926.27, 51	02.A	*N/A*	*N/A*	*N/A*
10. Personal Protective Equipment	1926.28, 95-98, 100-107	05.A	*Yes*	*Yes*	*Yes*
11. Acceptable Certifications	1926.29		*Yes*	*Yes*	*Yes*
12. Incorporation by Reference	1926.31	Preamble	*N/A*	*N/A*	*N/A*
13. Emergency Employee Action Plans	1926.35	01.E	*Recommended*	*Yes*	*Yes*
14. Noise Exposure	1910.95; 1926.52	05.C	*Yes*	*Yes*	*Yes*
15. Radiation Protection	1926.53, 54		*Yes*	*Yes*	*Yes*
16. Gases, Vapors, Dusts and Mists	1926.55		*Yes*	*Yes*	*Yes*
17. Ventilation	1926.57, 353		*Recommended*	*Yes*	*Yes*
18. Hazard Communication	1926.59	1.B.06	*Yes*	*Yes*	*Yes*
19. Process Safety Management	1910.119; 1926.64		*Yes*	*Yes*	*Yes*
20. Hazardous Waste Operations and Emergency Response	1910.120; 1926.65	28.A	*Yes* *Supv – 8 hr*	*Yes*	*Yes*
21. Accident prevention signs and tags	1926.200	08.A	*N/A*	*N/A*	*N/A*
22. Signaling	1926.201	08.B	*Recommended*	*N/A*	*Yes*
23. Barricades	1926.202		*N/A*	*N/A*	*N/A*
24. Material Storage	1926.250	14.B	*N/A*	*Yes*	*Yes*

Competent Person and Activity Hazards Analysis Requirements (Cont'd)

Safety and Health Requirement	OSHA Regulation	EM 385-1-1 Regulation	Competent Qualified Person	Training Required	AHA Required
25. Rigging	1926.251	15.A	*Yes*	*Yes*	*Yes*
26. Waste Disposal	1926.252	14.D	*Yes*	*Yes*	*Yes*
27. Tools	1926.300-307	13.A	*N/A*	*N/A*	*Yes*
28. Gas Welding and Cutting	1926.350	10.A	*Recommended*	*Yes*	*Yes*
29. Arc Welding	1926.351	10.E	*Recommended*	*Yes*	*Yes*
30. Electrical	1926.400-415	11.E	*Yes*	*Yes*	*Yes*
31. General Electrical	1926.416	11.A	*Yes*	*Yes*	*Yes*
32. Lockout Tagout	1910.147; 1926.417	12.A	*Yes*	*Yes*	*Yes*
33. Lockout Tagout Permit System	1910.147	12.A	*Yes*	*Yes*	*Yes*
34. Maintenance of Electrical Equipment	1926.431	11A	*Yes*	*Yes*	*Yes*
35. Environmental Deterioration of Electrical Equipment	1926.432		*Yes*	*Yes*	*Yes*
36. Batteries/Battery Charging Equipment	1926.441	11.E	*N/A*	*Yes*	*Yes*
37. Scaffolding	1926.450-454	22.A	*Yes*	*Yes*	*Yes*
38. Aerial Lifts	1926.453	22.J and K	*Yes*	*Yes*	*Yes*
39. Fall Protection	1926.500-503	21.A	*Yes*	*Yes*	*Yes*
40. Cranes, Derricks, Hoists, Elevators and Conveyors	1926.550	16.A	*Yes*	*Yes*	*Yes*
41. Motor Vehicles, Mechanized Equipment	1926.600-603	18.A	*Yes*	*Yes*	*Yes*
42. Powered Industrial Trucks (forklifts)	1910.178		*Yes*	*Yes*	*Yes*
43. Site Clearing	1926.604	31.A	*N/A*	*Yes*	*Yes*
44. Marine Operations and Equipment	1926.606	16.F	*Yes*	*Yes*	*Yes*
45. Excavations	1926.650-652	25.A	*Yes*	*Yes*	*Yes*
46. Excavation Permit	N/A	N/A	*Yes*	*Yes*	*Yes*
47. Concrete and Masonry Construction	1926.700-706	27.A	*Yes*	*Yes*	*Yes*
48. Steel Erection	1926.750-761 and SENRAC		*Yes*	*Yes*	*Yes*
49. Underground Construction	1926.800	26.A	*Yes*	*Yes*	*Yes*
50. Caissons	1926.801	26.H	*Yes*	*Yes*	*Yes*
51. Cofferdams	1926.802		*Yes*	*Yes*	*Yes*
52. Compressed Air	1926.803	26.I	*Yes*	*Yes*	*Yes*
53. Demolition	1926.850-860 inclusive	23.A	*Yes*	*Yes*	*Yes*
54. Power Transmission and Distribution	1926.950-960 inclusive	11.H	*Yes*	*Yes*	*Yes*
55. Rollover Protective Structures; Overhead Protection	1926.1000-1003 inclusive		*N/A*	*N/A*	*Yes*
56. Stairways and Ladders Scope	1926.1050	21.A	*N/A*	*Yes*	*Yes*
57. S/L General Requirements	1926.1051		*Yes*	*Yes*	*Yes*

Competent Person and Activity Hazards Analysis Requirements (Cont'd)

Safety and Health Requirement	OSHA Regulation	EM 385-1-1 Regulation	Competent Qualified Person	Training Required	AHA Required
58. Stairways	1926.1052	21.E	*Recommended*	*Yes*	*N/A*
59. Ladders	1926.1053	21.D	*Yes*	*Yes*	*Yes*
60. Ladder/Stair Training	1926.1060		*Yes*	*Yes*	*Yes*
61. Diving Scope	1926.1071-1072	30.A	*Yes*	*Yes*	*Yes*
62. Dive Team Quals	1926.1076	30.A.08	*Yes*	*Yes*	*Yes*
63. Dive Safe Practices Manual	1926.1080	30.A.16	*Yes*	*Yes*	*Yes*
64. Pre-dive Procedures	1926.1081		*Yes*	*Yes*	*Yes*
65. Procedures During Dive	1926.1082	30.A.15	*Yes*	*Yes*	*Yes*
66. Post Dive Procedures	1926.1083	30.A.22	*Yes*	*Yes*	*Yes*
67. SCUBA Diving	1926.1084	30.B	*Yes*	*Yes*	*Yes*
68. Surface-Supplied Air Diving	1926.1085	30.A.04	*Yes*	*Yes*	*Yes*
69. Mixed-gas Diving	1926.1086	30.D	*Yes*	*Yes*	*Yes*
70. Live boating	1926.1087	30.A.05	*Yes*	*Yes*	*Yes*
71. Diving Equipment	1926.1090	30.E	*Yes*	*Yes*	*Yes*
72. Diving Recordkeeping Requirements	1926.1092	30.A.06	*Yes*	*Yes*	*Yes*
73. Internal Traffic Control	N/A	8.D	*N/A*	*Yes*	*Yes*
74. Traffic Movement Restriction Times	N/A	8.C	*N/A*	*Yes*	*Yes*
75. Line Breaking	1910.119, 1926.54		*Yes*	*Yes*	*Yes*
76. Major Material Movements	N/A	N/A	*N/A*	*Yes*	*Yes*
77. Right-of-way Restrictions	N/A	N/A	*N/A*	*Yes*	*Yes*
78. Bicycles/Golf Carts	N/A	18.D	*N/A*	*Yes*	*N/A*
79. IIPP/SSPP	Cal 3203	Cal 3203	*Yes*	*Yes*	*Yes*

Attachment 10.1.13

100 West Walnut Street • Pasadena, California 91124 • (661) 904-0978 • Fax: (866) 293-0114 • www.parsons.com

_____ _____ of Parsons Corp.
(Employee Name) (Occupation)

is authorized to go to _____ for the following service(s):
(Name of Medical Provider)

Treatment for a Work-Related Injury/Illness for Date of Injury: _____.

In the event the above medical provider determines this injury or condition NOT TO BE WORK RELATED, the employee and Parsons understand that this employee may then be referred by the above medical provider to his/her personal medical doctor.

Employer Information:	Parsons Corporation 100 West Walnut Street Pasadena, CA 91124
Workers' compensation carrier:	**Insurance Information:** TPA/WC Carrier: AIG (Except for the monopolistic states), underwritten by the Insurance Company of the State of Pennsylvania WC policies, effective 1/1/14-1/1/15: All other states: WC 015656170; California: WC 015656169; Florida: WC 015656171; MA/WI: WC 015656172
Adjusting Office and Telephone No.:	

Comments to Provider: Parsons attempts to provide any modified, alternate, light duty recommended._____

_____

_____ _____ _____
Authorized Employer Signature Print Name Date

661-904-0978 866-293-0114
Phone Number Fax Number

Disability slips and return-to-work notifications: Immediately fax to Parsons ***and*** provide copy to employee at conclusion of every evaluation/treatment.

Attention Emergency Department: After acute care, please refer patient back to a _____ for followup treatment.
(Medical provider—to be completed by Parsons—where permitted by law.)

Clinic Protocol Guidelines and WorkCare

- Parsons uses WorkCare as our Corporate Medical Director and Occupational Health Consultant. Parsons is committed to the health and well being of its employees. WorkCare's role is to ensure that Parsons employees receive timely, appropriate, high-quality medical care and that necessary work restrictions are accommodated.

- WorkCare must be contacted when a Parsons employee comes to the clinic, prior to treatment in all non-emergency cases. WorkCare will make every effort to also call the clinic prior to the employee's arrival. If you have not been contacted by WorkCare, please call 1-888-449-7787 and identify what clinic you are from, the nature of your concern, and ask to speak to a WorkCare clinician.

- Please note that Parsons expects WorkCare to assist in the process of developing a course of treatment.

- Please also note that you may receive calls from both Parsons and WorkCare.

- A "Doctor's Work Status Report" form is attached so that you can make recommendations regarding the injured employee's work capacity. The medical provider's role is to identify any activity restrictions that will allow the injured body part to heal. These activity restrictions should be adhered to 24/7. Parsons responsibility is to determine what work can be done safely with these activity restrictions. Parsons is committed to providing temporary modified duty (transitional work) for those employees who are unable to return to work on full duty. **WorkCare requests that Parsons employees return-to-work unless their injury is so severe that they are confined to bed rest with no activity permitted.**

- Parsons is also committed to reducing OSHA recordable injuries. We request that you keep these OSHA recordability guidelines in mind when treating Parsons employees. We are not in any way encouraging under treatment of employees but at the same time, over treatment should be avoided. For example, use of steri-strips instead of sutures is preferred if such treatment is proper for a given laceration. Use of over-the-counter (OTC) medications at OTC dosages is also preferred if deemed adequate for treatment. Provide prescription level medication to employees if it is required for proper medical treatment

- IMMEDIATELY upon conclusion of EVERY medical evaluation (initial and all follow-up evaluations), place phone call and/or email and/or fax to Donna Miller to provide diagnosis and return-to-work restrictions. Also, provide copy to injured worker.

- WorkCare is available 24/7, 365 days a year at: 1-888-449-7787

- Parsons Workers' Compensation Analyst
  Donna P. Miller
  Office Telephone No. and Cell No.: (661) 904-0978
  Fax No.: (866) 293-0114
  100 West Walnut Street
  Pasadena, CA 91124
  Email: donna.miller@parsons.com

PARSONS

Order for Treatment for Work-Related Injury or Illness

100 West Walnut Street
Pasadena, CA 91124

Doctor's Work Status Report

◆ **Please Fax to Donna Miller (866) 293-0114 and Provide Copy to Employee** ◆

Note: Job duties assigned to this employee will match the capabilities you define.

Employee Name:	**Claim Number:**	
Diagnosis:	**Date of Injury:**	____/____/____ **(mm / dd /yyyy)**

RETURN TO WORK STATUS

☐ May return to regular work (Date): / /
☐ Released to full duty with intention given not to aggravate injury (Date): / /
☐ May return to modified work (Date): / /
☐ May not return to work until (Estimated Date): / /
Estimated Duration of Modified Work:

PHYSICAL LIMITATIONS: I certify the employee can perform duties within the capabilities defined as follows:

☐ **Without any restrictions.**

OTE: In terms of an 8 hour workday, Occas. (Occasionally) equals 1–33%; Freq. (Frequently) equals 34–66%; Contin. (Continuously) equals 67–100%

Capabilities	Never	Occas.	Freq.	Contin.	Lifting\Carrying	Never	Occas.	Freq.	Contin.
Bend	☐	☐	☐	☐	0–5 lbs	☐	☐	☐	☐
Squat	☐	☐	☐	☐	6–10 lbs	☐	☐	☐	☐
Crawl	☐	☐	☐	☐	11–20 lbs	☐	☐	☐	☐
Reach above shoulders	☐	☐	☐	☐	21–25 lbs	☐	☐	☐	☐
Kneel	☐	☐	☐	☐	26–50 lbs	☐	☐	☐	☐
Stoop	☐	☐	☐	☐	51–100 lbs	☐	☐	☐	☐
Climb stairs, steps and step stools	☐	☐	☐	☐	Repeated push/pull	☐	☐	☐	☐
Climb ladders	☐	☐	☐	☐	Repeated simple grasp	☐	☐	☐	☐
Walk on uneven ground	☐	☐	☐	☐	Repeated fine manipulation	☐	☐	☐	☐
Other (Specify): ☐	☐	☐	☐	☐	Other (Specify):	☐	☐	☐	☐

Restrictions of Activities	None	Mild	Moderate	Total	Comments
Unprotected heights	☐	☐	☐	☐	
Be around moving machinery	☐	☐	☐	☐	
Exposure to changes in temperature and humidity	☐	☐	☐	☐	
Driving automotive equipment	☐	☐	☐	☐	
Exposure to dust, fumes, and gases	☐	☐	☐	☐	

In an 8 hour workday, Worker can: (CHECK full capacity for each activity)

Total at One Time (Hours)											Total During Entire 8-Hour Day (Hours)										
Hours	**0**	**1/2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Hours**	**0**	**1/2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Sit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Sit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Stand	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Stand	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Walk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	Walk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

☐ Job duties were explained to me by (Name/Title): On (Date): / /

☐ I have received a written list of job tasks.

☐ I have **NOT** received a written list of job tasks, **BUT I AGREE THAT DUTIES MAY BE ASSIGNED AND/OR CHANGED, SO LONG AS THEY MATCH THE LIMITS DEFINED BY ME ABOVE**. ☐ No ☐ Yes

PROGNOSIS

Permanent Restrictions Likely? ☐ No ☐ Yes ☐ Unknown at this time

Medically Stationary? ☐ No ☐ Yes Date: / /

Physician Name (PRINT):	**Telephone No.:**
Signature:	**Date: / /**

Attachment 10.1.14

On-Line Safety Reporting System

Policy Requirements

- Initial incident reports for all incidents, including near misses, shall be reported within 2 hours.
- Detail incident reports are required within 24 hours.
- Reporting is done via on-line (PWeb) incident report form.
- Injuries with Days Away from Work - immediate supervisor and PM must teleconference with GBU President within 4 hours.
- Projects enter hours via on-line form by FIRST Friday of new period.

Reporting Incidents

Corporate policy requires that all employees report safety incidents to their supervisor immediately. Supervisors must report all incidents to the appropriate Project Manager (Department Manager if the incident is not related to a project), who must officially report the incident to the GBU within four hours. This official reporting is done via the PWeb, unless PWeb is unavailable, in which case the incident can be reported by email, fax or telephone.

"Incidents" include work related injuries, work related illness, accidents with property damage only and near misses. "Near misses" are any unplanned event that had the potential to (but did not) result in injury or property damage.

Incident reports should reflect the best available information at the time. Where exact information is not known (recordability, days away from work, etc.) the PM's best judgment should be used when completing the initial incident report. This information can be subsequently revised when the detail incident report is submitted.

When in doubt, submit an initial report or contact the GBU Safety Manager.

On-line Reporting System

The on-line reporting system can be found on the PARCOMM Safety Page on PWeb. To locate the system, follow these steps:

1. From the Corporate PWeb Homepage, select PARCOMM from the Org Units menu
2. Locate and select "Safety" from the header
3. Select the "Online Safety Reporting" link

To create and submit a new incident report, select the orange "Add" button from the main page of the reporting system. To update and existing incident report or complete the Detail Incident page, locate and select the appropriate incident from the list.

Creating or Updating Incidents

The Initial Incident page of the report must be completed within four hours of the incident occurring. This page includes basic information needed for the first notification to our insurance carriers. If possible, all of the fields should be completed in the initial report. A list is provided at the end of this document describing all fields contained on the initial incident page.

Incident Detail Reports

Within 24 hours of the incident occurring, the Incident Detail page of the on-line report must be completed. This page includes detailed information about the injured party, the nature and extent of injuries, medical treatment provided, corrective actions taken, and witness statements. In the event of property damage, this page also includes descriptive information on the property owner. Finally, the page includes a section to include electronic attachments. These might include photographs, signed witness statements, etc.

Monthly Reporting of Hours

Hours must be entered into the on-line reporting system no later than the first Friday of the new period. If an accurate accounting of hours is not available, estimated hours are submitted into the system. The estimated hours can be revised later in the month, or the following month, when accurate data is available.

From the "Hours" page, select "PAR" from the GBU drop down menu and the period (month and year) that is being reported. The system only allows hours to be entered for the period selected. MTD and PTD figures are calculated totals based on the sum of all monthly entries. To enter or correct a prior period entry, simply select that month from the drop-down box and correct the figures for that month. If the name of your "Project" is not alphabetically listed on any of the multiple pages, then select "Field Administration/Other – Industrial".

Be sure to select the correct month and year when entering hours.

Hours must be entered for each (as applicable) of six different labor categories. The categories are as follows:

- Contractor (Field/Craft)
- Contractor (Office/Admin)
- JV Partner (Field/Craft)
- JV Partner (Office/Admin)
- Parsons Employee (Field/Craft)
- Parsons Employee (Office/Admin)

Monthly Statistics Summary Reports

The on-line reporting system automatically calculates incident rates based on incidents and hours entered into the system. To view the statistics, select the "Reports" page from the on-line system. Select "Parsons Safety Statistics Summary", the appropriate GBU, and the appropriate period. (NOTE: The system does not yet provide reports at the Division and Sector level. That enhancement is pending.) Use the checkboxes to select the labor categories desired.

Contact Brad Barber or Greg Beck for Assistance

Initial Incident Report Fields

1. GBU – Select the GBU from the drop down box. Incidents are reported primarily by project, and the GBU should reflect the unit responsible for the project. This may be different from the GBU that employees the person injured.
2. Field Project Name, Office Location or Other – if the injury occurred in the field, then select the appropriate name from the alphabetical listing in the "Field Project" drop down box. If an appropriate name does not exist, select "Field Administration/Other-Industrial". If the incident occurred in a Parsons office, select the office name from the "Office Location" drop down box. ONLY select Field Project or Office Location, not both (or Other). If the appropriate Office Location is not provided, manually enter it into the "Other" box.
3. Job and WBS Numbers – These fields should reflect the charge number responsible for the incident. In general, that will be the number that the employee was charging at the time of the incident. Projects are responsible for visitors, regardless of what charge number they use while visiting the job. For example, if the Division Manager is injured while visiting Project X, the project number is entered, not the division overhead account.
4. Near Miss – Check this box if the report is for a near miss only (no injury or property damage occurred).
5. Emergency Response Notified – Check this box if fire, police or ambulance was called as a result of the incident.
6. Three or More Employees Hospitalized – Check this box if three or more employees were injured as the result of a single incident. In this case, the GBU or Corporate Safety Manager must also be immediately notified by telephone.
7. Extent of Injury – Select the appropriate radio button. First aid cases are as defined by OSHA 1904 criteria. All other injuries are considered recordable.
8. Restricted Duty (# of days) – If the injured person was limited (by a physician) to less than normal work duration or duties, enter the number of days. Estimate the days if unknown, and correct the number later. NOTE: this is the number of CALENDAR days (not scheduled work days), and it does NOT include the day of the injury.
9. Days Away From Work (# of days) – If the injured person was ordered by a physician not to return to work, enter the number of days missed. Estimate the days if unknown, and correct the number later. NOTE: this is the number of CALENDAR days (not scheduled work days), and it does NOT include the day of the injury. Injuries with Days Away From Work require a phone call to the GBU President within 4 hours.
10. Fatality (Date of Death) – In the event of a work related fatality, enter the date of death here. NOTE: Fatalities require immediate phone notification of the Division Manager, GBU President, GBU Safety Manager, and Corporate Safety Manager.
11. Property Damage – Check the appropriate boxes if applicable.
12. Place – Describe the exact location that incident occurred. For example, "in the north stairwell of building 21, between the second and third floor."
13. Date – This field reflects the date the incident occurred, not necessarily the date it was reported. If the exact date is not known, an estimate should be used.
14. Time – This field reflects the time of day that the incident occurred. If the exact time is not known, an estimate should be used.
15. Incident Description – Provide a detailed description of the incident. This is a memo field and text will scroll down the window as it is entered. Use as much space as needed to accurately describe the incident and the resulting injuries.
16. Reported by – This field defaults to the employee login ID that was used to access PWeb. However, the field can be over-written if needed.

17. Name – First and last name of the injured party.
18. Status – Select the most appropriate category from the drop box (Employee - Field, Subcontractor - Field, Partner - Field, Employee - Office, Subcontractor - Office, Partner - Office or 3rd Party).
19. Trade/Function – Select the most appropriate category from the drop box.

Parsons Project Incident/Accident Report Form

PLEASE PRINT

Attach all supplemental documentation, including photos, diagrams, witness statements and field reports

Project Information	Project Title		Location	
	Subcontractor			
	Address			
	City, State, Zip			
	Contact Name		Phone Number	

Incident Type	☐ **Worker's Compensation**	☐ **General Liability**	☐ **Builder's Risk**
	☐ Emergency Response Notified (Police, Fire, Medic, etc.)	☐ Bodily Injury/Illness	☐ Equipment
		☐ Real Property Damage	☐ Supplies
	☐ First-Aid Only	☐ Personal Property Damage	☐ Machinery
	☐ Recordable Injury	☐ Utility Property Damage	☐ Work

Incident Location	Date of Loss		Time of Loss	
	Place (exact location)			

Incident Description	Detailed Description of Accident

Worker's Comp Or Personal Injury (circle one)	Injured Name			
	Address			
	City, State, Zip			
	Home Phone		Date of Birth	
	Nature of Injury			
	Medical Facility		Work Status	
	Treatment Received			

Property Damage Or Builder's Risk (circle one)	Owner's Name			
	Address			
	City, State, Zip			
	Home Phone		Work Phone	
	Damage Type		Estimated Cost	
	Utility Type		Marked or Unmarked	
	Description of Damage			

Witness Information	Name			
	Address			
	City, State, Zip			
	Home Phone		Work Phone	
	Where to contact		Time to contact	

Contractor Subcontractor Action	Describe actions taken

Signature _____ Employer _____

Print Name _____ Date _____

Phone No. _____ Fax Number _____

PARSONS	NEAR MISS REPORT FORM

EMPLOYER

1. Name: _____
2. Mail Address: _____
   (No. and Street) (City or Town) (State and Zip)
3. Location :_____
   (if different from mail address)

NEAR MISS DESCRIPTION

4. Location of near miss:_____
   (No. and Street) (City or Town) (State and Zip)
5. Project: _____
6. Was place of near miss on employer's premises? Yes ( ) No ( )
7. Time of near miss: _____
8. Date of near miss: _____
9. How did the near miss occur? _____
   (Describe fully the events that resulted in the near miss.)

   _____

   Tell what happened and how. Name objects and substances involved. Give details on all factors that led to

   _____

   near miss. Use separate sheet for additional space).
10. What was employee doing when near miss occurred?_____
    (be specific-was employee using tools or equipment

    _____

    or handling material?)

    _____

WITNESS TO MISS

_____ _____
(Name) (Affiliation) (Phone No.)

_____ _____
(Name) (Affiliation) (Phone No.)

RECOMMENDATIONS TO PREVENT NEAR MISS FROM RECURRING

_____

_____

PARSONS PARCOMM®

Field/Project Monthly Report Form

Instructions: Enter the total number of labor hours spent in the field by all Parsons employees and subcontractors during the reporting period. Cost Type (CT) "04" used for WebTime labor entries should represent these hours for Parsons employees. Labor hours spent in the office are classified as CT "01" in WebTime. Incidents/near-miss incidents, air monitoring completed and the type of PPE worn by personnel (i.e. Parsons employees and contractors) must also be reported. Submit by the 3rd working day of the following month (an estimation of the monthly field hours based on number of people working on the project each day is acceptable).

Definitions and Reporting Criteria

Field Hours - time spent by the employee working at a job site or field project, even if performing office/administrative work (i.e. in a modular trailer). Working in another Parsons office or at a client's corporate/main office is not considered field hours for the purposes of this reporting.

Incident - any unplanned or unexpected event, including near-misses, first aid cases, personal injuries requiring medical treatment, vehicle or equipment damage or an environmental release.

Near-miss Incident (NI) - an unplanned or unexpected event that has the potential to result in a personal injury, vehicle or equipment damage, or environmental release, but does not occur (i.e. almost happened).

PPE - Personal Protective Equipment above Level D (work clothes) or Modified Level D (Tyvek or fire retardant coveralls). This includes Level C (chemical resistant suit and/or air-purifying respirator), Level B (chemical resistant suit and/or supplied air) or Level A (full encapsulation suit with SCBA).

Subcontractor - contractors hired by Parsons or a Parsons contractor, to perform activities in the field. Contractor company names should be listed and tracked separately in the Table below, followed by the hiring company in parentheses (i.e. Parsons or subcontractor).

Project Name:		Client:			
Project Location:		Client Contact:			
Parsons Contact:		Project #:		Month:	

Parsons and/or Contractor	Hours	Type of Activities	Incident or NI
Parsons			Yes No
			Yes No
			Yes No
			Yes No

Air Monitoring

Was there any air monitoring that took place during the month? No Yes - If "Yes", indicate below the potential hazards/chemicals monitored (i.e. O2, LEL, dust, VOCs), the monitoring equipment used (i.e. PID, FID, Draeger tubes, 4-gas, DataRAM, cassettes), whether the air monitoring results exceeded an Action Level (AL) or Permissible Exposure Limit (PEL), the level of PPE worn above Level D (C, B or A) and the number of days working in the specific PPE.

Chemical Monitored	Equipment Used	Exceed AL– Exceed PEL	PPE	Days in PPE
		Yes No - Yes		
		Yes No - Yes		
		Yes No - Yes		
		Yes No - Yes		

NOTE: If an AL/PEL is exceeded or PPE above Level D is worn, a Supplemental Information Form (available in the Industrial Division Safety Folder on ParShare) must be completed. All incidents must be reported on the PWeb (PARCOMM Online Safety Reporting System).

Attachment 10.1.15

PARSONS

Site-Specific Risk Review Checklist

Date:_____ Project or Location:_____

Risk/Hazard	Detail	Present
Employee Exposure	Hazardous chemicals	_____
	Lead	_____
	Asbestos	_____
	UXO	_____
	PCB	_____
	Airborne contaminants (dust, mists, fumes)	_____
	Other (specify)	_____
	_____	_____
Hazardous Waste	Handling, removal or storage of hazardous is required	_____
	_____	_____
Crane Work	Mobile cranes	_____
	Tandem lifts	_____
	Bridge cranes	_____
	Derricks	_____
	_____	_____
Powered Industrial Trucks	Forklift training is required	_____
Aerial Lifts	Hydraulic booms	_____
	Scissor lifts	_____
	Mobile scaffolding	_____
	_____	_____
Drilling		
Soil Sampling	Geoprobe	_____
	Split Spoon Sampling	_____
Electrical	Staging area	_____

Risk/Hazard	Detail	Present
Personal Protective Equipment	Work activities or work site requires hearing protection	_____
	Work activities or location requires using respirators	_____
	Work activities or location requires special protective clothing	_____
	_____	_____
Public Exposure	Work activities or location requires special precautions to protect the public	
	_____	_____
Permits	required	_____
	Hot permit	_____
Other Exposures	Other exposure or high-risk activities (list)	
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____

Attachment 10.1.16

HEAT STRESS AND HEAT STRESS MONITORING

Physiological and behavioral monitoring of personnel wearing clothing that differs from the ACGIH standard ensemble of permeable clothing (i.e. cotton or synthetic work clothes) in insulation value and/or wind and vapor permeability should commence when the temperature in the work area is above 70°F (21°C). **Table 10.1.15** presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Heat stress monitoring should be performed by a qualified individual, who shall be able to recognize symptoms related to heat stress.
To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

- **Prickly Heat** (Heat rash)
  - Painful, itchy red rash. Occurs during sweating, on skin covered by clothing.
- **Heat Cramps**
  - Painful spasm of arm, leg or abdominal muscles, during or after work.
- **Heat Exhaustion**
  - Headache, nausea, dizziness. Cool, clammy, moist skin. Heavy sweating. Weak, fast pulse. Shallow respiration, normal temperature.
- **Heat Fatigue**
  - Weariness, irritability, loss of skill for fine or precision work. Decreased ability to concentrate. No loss of temperature control.
- **Heat Syncope** (Heat Collapse)
  - Fainting while standing in a hot environment.
- **Heat Stroke**
  - Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. **This is a life threatening condition.**

Do <u>not</u> permit a worker to wear a respirator, a semi-permeable or impermeable garment when they are showing signs or symptoms of a heat-related illness. An individual may be at greater risk if profuse sweating is sustained over hours. Thus, discontinue exposure to heat stress.

If a worker appears to be disoriented or confused, or suffers inexplicable irritability, malaise, or flu-like symptoms, the worker should be removed for rest in a cool location with rapidly circulating air and kept under skilled observation. If sweating stops and the skin becomes hot and dry, immediate care with hospitalization is essential.

To monitor the worker, measure their heart rate and oral temperature:

- **Heart rate**. Count the radial pulse during a 30-second period as early as possible in the rest period and multiply by 2.
  - If the heart rate exceeds 110 beats per minute (bpm) at the beginning of the rest period, then shorten the next work cycle by one-third and keep the rest period the same.
  - If the heart rate still exceeds 110 beats per minute (bpm) at the beginning of the next rest period, then shorten the following work cycle by another one-third.

  NOTE: A worker cannot return to work after a rest period if their heart rate is greater than 180 beats per minute minus age in years (for individuals with normal cardiac performance); if recovery heart rate at 1 minute after a peak work effort is greater than 110 bpm; or if they have symptoms of sudden and severe fatigue, nausea, dizziness or lightheadedness.

- **Oral temperature**. Use a digital oral thermometer to measure the temperature at the end of the work period (but before drinking).
  - If the oral temperature exceeds 99.6^{o}F (37.6^{o}C), then shorten the next work cycle by one-third without changing the rest period.
  - If the oral temperature still exceeds 99.6^{o}F (37.6^{o}C) at the beginning of the next rest period, then shorten the following cycle by another one-third.

  NOTE: A worker cannot return to work after a rest period if their body core temperature (i.e. ear thermometer) exceeds 101.3^{o}F (38.5^{o}C) for acclimatized personnel or 100.4^{o}F (38.0^{o}C) for unacclimatized personnel. Do not permit a worker to wear a semi-permeable or impermeable garment when their oral temperature exceeds 100.6^{o}F (38.1^{o}C).

Prevention of Heat Stress - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.
  - Mandate work slowdowns as needed.
  - Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, id., eight fluid ounces (0.23 liters) of water

must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:

- Maintain water temperature 50° to 60°F (10° to 16.6°C).
- Provide small disposal cups that hold about four ounces (0.1 liter).
- Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.

Table 10.1.15
Suggested Frequency of Physiological Monitoring
For Fit and Acclimated Workers(A)

Adjusted Temperature(B)	*Normal Work Ensemble(C)*	*Impermeable Ensemble*
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

A. For work levels of 250 kilocalories/hour.

B. Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

C. A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants. Impermeable ensemble includes wearing polycoated Tyvek suits, cloth (woven material) overalls, and half or full facepiece respirators.

Attachment 10.1.17

PARSONS COMMERCIAL TECHNOLOGY GROUP
MANDATORY SUBSURFACE SOIL DISTURBANCE PROTOCOL

1. INTRODUCTION

Intrusive investigation or excavation of the subsurface in areas developed for commercial, industrial or residential use exposes Parsons to the risk of causing damage to underground utilities and structures on a daily basis.

The potential consequences of causing damage to an underground utility or structure include, but are not limited to the following:

- Injury or loss of life
- Financial responsibility for repair, lost time, and/or loss of service
- Loss of client
- Federal investigation of job site work practices
- Litigation (third party lawsuits)

The mandatory protocol and checklists provided herein are intended as tools to aid in the management of risk, and ensure that a responsible standard is consistently applied at project sites where intrusion of the subsurface will occur.

2. PURPOSE

The purpose of this mandatory protocol is the prevention of potential injury and/or loss of life; and damage to subsurface utilities and structures. Parsons' staff will identify and evaluate the hazards associated with underground utilities and other structures prior to conducting any intrusive subsurface operation including but not limited to drilling/boring, test pitting, excavation and other subsurface intrusive activities.

3. SCOPE

Parsons' staff will employ sound investigative and work practices, and will use appropriate measures to avoid damage to subsurface utilities and structures. Furthermore, Parsons requires that these procedures be implemented by all of Parsons' employees and subcontractors, as appropriate. Subcontractors will have a copy of the procedures set forth in Section 6 of this document as an appendix to their contracts.

4. POLICY

Parsons' policy requires that the project manager follow all local, state, and federal laws applying to intrusive subsurface work (i.e. obtain permits, inform agencies, obtain utility clearances, etc). The project manager shall review, as available, all current and historical site drawings and plans from the client, facility owner or tenant, utility providers, municipal government offices (i.e. city engineer or building department) and third parties as appropriate.

The attached Pre-Drilling/Subsurface Checklist for Intrusive Fieldwork **(Attachment A)** shall be completed prior to initiating fieldwork. Note: *The checklist includes a site visit as a requisite to meet with knowledgeable staff as appropriate (current or former site/owner personnel, utility representatives, municipal representatives, etc.), and review site conditions and features relative to the proposed locations for intrusive work. The checklist should be turned in to the Parsons Project Manager and a copy placed in the project file.*

The procedure described under Section 6 of this document is mandatory at all sites where any intrusive subsurface activities will take place, including but not limited to drilling, augering, boring, excavating, test pitting, trenching or direct push (Geoprobe) technology.

Variance from the Subsurface Activity Protocol is allowed only with the written approval of the Client and the appropriate Parsons' Program Manager or Sector Leader and the completion of the Utility Variance Request Checklist (Attachment B). GBU, Division or Project Safety personnel should be consulted as needed. Failure to obtain a variance in writing is grounds for disciplinary action. Copies of all variances will be maintained in the project files.

The Project Manager is encouraged to find locations that are acceptable to the project team to perform intrusive subsurface work that are not within right-of-ways, streets, highways, or near municipal or third party-owned utility corridors. When it is necessary to conduct work within these areas, the Project Manager should obtain approval from either the Program Manager or Sector Leader and submit the existing work plan to the GBU or Division Safety Manager for review.

5. RESPONSIBILITY

It is the responsibility of the Project Manager to ensure that the Subsurface Activity Protocol Intrusive Subsurface and Variance checklists are followed. If a variance is sought, it is the responsibility of the Project manager to gain written approval of the Client and the appropriate Parsons' Program Manager or Sector Leader.

6. PROCEDURE: SUBSURFACE SOIL DISTURBANCE PROTOCOL

The Parsons' Project Manager will be responsible for fulfilling the objectives of this protocol by ensuring that the procedures are carried out by Parsons' employees, subcontractors, and any other person acting on behalf of Parsons. The Parsons' Project Manager will ensure that all individuals working on drilling and other subsurface exploration projects are adequately trained and supervised. Parsons will practice sound investigation and work practices and employ

all necessary measures to avoid damage to subsurface systems and structures. The Parsons' Program/Project Manager, Sector Leader, and the Client will be contacted and advised in advance of beginning field work in the event that a variance to this protocol is requested by the Parsons' Project Manager or designee. The following tasks/subtasks will be completed at every site and documented on the checklist.

6.1 PRE-INVESTIGATION TASKS

The objective of these tasks is to gather all relevant information about the site to assist in identifying exploration locations and obtaining necessary permits. Please note that in some instances the following information will be obtained or gathered by a subcontractor, which meets this objective.

6.1.1 Obtain Site Plans

Obtain as-built drawings and/or existing site plans as available. NOTE: As-built drawings may not accurately depict the locations of improvements and subsurface features and should therefore not be solely relied upon to determine acceptable locations for intrusive subsurface activities.

6.1.2 Obtain Permits

The project staff will observe all local, state, and federal laws, obtain all necessary permits and utility clearances, and secure site access permission. NOTE: Some permits/clearances require this step to be completed after the exploration locations have been identified and marked in the field. If this is required, proceed with Items 6.2 and 6.3 prior to obtaining permits.

6.1.3 Utility Mark-outs

Parsons' project staff will request a utility mark-out through the local utility locating one-call system for the work site, and document a reasonable degree of effort to locate all main electrical, gas, telephone and all other subsurface utilities. The Parsons' Project Manager must be notified of the status of locating underground utilities before field work progresses. If locating utilities becomes problematic, the Parsons' Project Manager should update the client and discuss potential alternative methods for locating or reducing risk of damage to underground utilities/structures for consideration (i.e. subcontract a private locating service, re-evaluate risk/reward of specific locations or utilize intrusive non-destructive methods as described in Section 6.5.6). Site plans will be updated as appropriate to include utility mark-out information. On third party sites, close coordination with the site owner's representatives for mark-outs, review of as-builts, and other information reviews should be conducted prior to work. NOTE: Some utilities require the exploration locations to be identified and marked in the field prior to performing mark-outs. If this is required proceed with Items 6.2 and 6.3 prior to obtaining permits.

6.2 SITE VISIT

A site visit is required to compare the site plan to actual conditions, document all findings, and update the site plan. Parsons will obtain information needed to prepare a vicinity map of the area that may include significant neighboring addresses, land use, surface water bodies, and other natural as well as manmade features of note, as appropriate. The site visit should be scheduled concurrent with, or soon after the utility mark-out. The inspection should include the following activities at a minimum.

6.2.1 Utilities

Note the location of all utility mark-outs and aboveground utilities:

- Area lights
- Phones
- Drain lines
- Overhead lines
- Fire hydrants
- Fiber optic cable signage
- Catch basins
- Manholes
- Junction boxes
- Natural gas
- Other utilities
- Observe paving scars such as areas of new pavement or saw cuts

6.2.2 Plant/Property Systems

If possible, speak with someone having historical site knowledge to gain information about the site (locations of former tanks, lines, etc.). For UST systems:

- Inspect for the presence of a dispenser pan and, if possible, determine whether product piping is rigid or flexible.
- Visually inspect the location of the tank field, observation wells (if present), dispensers and vent stack(s).

- Note the orientation, arrangement, location, sizes, etc. of the tanks and manholes. Estimate the burial depth of the tank field.

- Observe paving scars (i.e. fresh asphalt/concrete patches, scored asphalt/concrete). Note that this may not indicate location of product piping.

6.2.3 Existing Remediation Systems

Visually inspect the location of aboveground components. Note the locations of well manholes, sparge points, etc.

6.2.4 Safety

For UST systems, note the location of the emergency shut off switch and become familiar with its use.

6.3 SELECTION OF DRILLING/TEST PIT LOCATIONS

6.3.1 Critical Zones

Establish pre-drilling critical zones appropriate to the project site. These are zones where no drilling (if possible and if client concurs) will be conducted. As an example, the following critical zones could be applied at a UST site:

- 10ft (3m) distance from the furthest edge of any operating tank

- 10ft (3m) distance surrounding operating dispenser islands

- At active service station sites, the entire area between the tank field and the dispenser islands.

- The zone between 0 and 5-feet of utility markings

6.3.2 Select Drilling Locations

The information collected to this point will be utilized in combination with regulatory requirements and investigation objectives to select drilling locations. It is recommended that alternate drilling locations be selected in case additional explorations are required or obstructions are encountered. The effort to investigate a specific proposed drilling location should be to clear a minimum five-foot radius circle around the location.

6.3.3 Review Selected Locations with the Client

At a minimum, offer to review the selected and alternate drilling locations with the client's project manager or designated representative. When completing Geoprobe^{tm} (or similar) investigations in which some boring locations are not selected in advance, but partially

determined in the field based on field screening results, the client should approve the areas in which work will be performed. Do not proceed with the investigation until the plan has been discussed with the client, and approval to proceed has been granted. If relocation of a boring outside approved limits is necessary at any time and for any reason, contact the client prior to proceeding. CLIENT APPROVAL MUST BE DOCUMENTED. Verbal approval is acceptable if followed with written approval. Documentation may include a notation in the field book, email or written correspondence.

6.4. REQUIRED NOTIFICATIONS

Affected parties must be notified at least 48-hours (longer if possible) in advance of planned intrusive fieldwork. An exception would be in the event of an emergency response situation. Parsons' staff will avoid scheduling conflicts with facility activities at the site. The Parsons' Project Manager or designee will notify the following persons as applicable:

- The oversight regulatory agency (includes local fire, police and municipal contacts as appropriate).
- Property owner for private properties. This should include neighboring third party property owners if a potential exists for causing inconvenience as a result of the scheduled fieldwork.
- Client specific notifications as appropriate (i.e. facility maintenance, retail and/or real estate managers as appropriate)

6.5. ON-SITE SUBSURFACE ACTIVITIES

6.5.1 Safety

A Project Safety Plan (PSP) must be available on site at all times and all Parsons' staff, contractors and subcontractors must be familiar with it. Parsons' employees are to acknowledge their review of the PSP by signing the signature form contained within the PSP. The Parsons' field team leader is tasked with conducting a tailgate meeting at the start of each day to review project specific health and safety items with staff and subcontractors. Subcontractors, however, are responsible for their own health and safety. All work areas shall be secured with safety cones, safety tape, construction fence, barricades, or signs as appropriate.

A copy of this entire subsurface activity protocol and completed checklist must be appended to the health and safety plan.

6.5.2 Supervision

A Parsons' on-site representative will be responsible for overseeing subsurface activities. This representative will ensure that the work is performed with due caution and will be alert for warning signs that could indicate the presence of underground tanks, lines, or other subsurface structures.

6.5.3 Warning Signs

The following warning signs may indicate the presence of a subsurface structure such as tanks or lines:

- Pea Gravel/Sand/Non-indigenous Material.
- The absence of soil recovery in the hand auger. This could indicate pea gravel that has spilled out of the auger.
- Any unexpected departure from the native soil or groundwater conditions as established in other on-site digging.
- Obstructions encountered

If any of the above warning signs or a suspicious condition is encountered, intrusive subsurface activities in this area should immediately cease and the Parsons' Project Manager shall be contacted.

6.5.4 Drill Boring Sequence

If possible, the boring sequence should be planned such that the boring furthest from any suspected underground improvements is carried out first. This is done to determine the natural subsurface conditions and to allow the field geologist/scientist to recognize native versus fill conditions. Also, least impacted locations should be done first if possible to prevent possible cross contamination.

6.5.5 Surface Removal for Paved Areas

Sufficient paving or surface improvement should be removed to allow clear visibility of the subsurface conditions during hand augering/digging, and allow excavation with hand tools. Drilling in an area of high risk may warrant a larger pavement opening.

- Monitoring Well Installations: 2-ft x 2-ft (60cm x 60cm) minimum removal is suggested (assumes for example: 6.25-inch hollow stem auger (HSA) or smaller).
- Soil Borings: 8-inch (20cm) diameter minimum removal is suggested (assumes for example: 3.25-inch HAS or smaller).
- Direct Push Samplers: 4 to 6 inch (10 to 15 cm) diameter minimum removal is suggested (assumes for example: 2-inch diameter sample tube).

The technique used should not pose a threat to subsurface structures. Final completion for holes in pavement shall be neatly saw-cut or cored unless otherwise directed by the client.

6.5.6 Clearing the Subsurface for Utilities and Other Structures

Parsons' staff must ensure that no subsurface utilities, structures, or improvements exist where intrusive subsurface activities will occur. Locations will be cleared using results of historical data research and with geophysical methods (see below for details) at a zone 5 feet in radius around the proposed location. Staff (or personnel supervised by Parsons) will also utilize intrusive, non-destructive procedures such as hand digging to a depth of 5 feet and a diameter or width equivalent to the outside dimensions of the auger to investigate the boring location.

The method used to delineate the subsurface should be compatible with the inherent risk associated with the type of facility/property and the location of the drilling. Proactive investigative methods to clear specific drilling locations will include the following non-invasive and invasive non-destructive methods:

Non-Invasive Geophysical Remote Sensing: Multiple appropriate instruments (ground penetrating radar, electromagnetic detector, magnetometer, metal detector) can be used for this work. Survey an area around the location to a distance of 5 feet using geophysical methods to identify potential subsurface utilities or facilities. Move the borehole location, if necessary, within the cleared circle to avoid an object identified by the geophysical instrument. Examples of geophysical methods are provided below:

- Electromagnetic and radio frequency;
- Ferrous metal or magnetic locators;
- Ground probing radar (GPR).

Important note: A combination of two or more non-invasive instruments may be required to properly clear a subsurface area. For example, a ferrous metal detector may not detect metals pipes embedded in concrete duct banks, PVC pipes, FRP pipes, or other non-ferrous materials.

Intrusive Non-Destructive Procedures: Delineate the subsurface at the borehole location by probing or digging. Several acceptable methods are discussed below. In some cases, these intrusive procedures may not be practical due to the subsurface conditions or requirements of the explorations.

- Vacuum/Air Knife Digging: Vacuum digging has proven to be a very effective and safe means of digging and is recommended instead of probing and digging with hand tools.
- Probing: The probe should have a blunt or rounded tip and should be advanced by hand in a triangular pattern around the bore location without excessive force.
- Hand Digging: Should be performed with a small hand garden spade.

- Hand Augering: The auger is to be turned slowly and not forced through the soil. It is recommended that an auger without sharp points (some augers have rounded edges) be used.

- Post Hole Digging: Can be used for soil removal only in soil that has been probed and cannot be used to advance the hole beyond the depth or width of probing.

The area to be cleared for underground utilities or structures for augering shall exceed the diameter of the largest tool (hand auger, drill auger, sampling tube, etc.) to be advanced and sufficiently large to allow for visual inspection of any obstructions encountered. The first 1 - 2ft (0.3 - 0.6m) can be cleared by hand digging to remove the soil. Slowly and carefully probe (i.e. triangular pattern), vacuum, or hand auger throughout the area to be cleared to ensure that no obstructions exist anywhere near the potential path of the drill auger or push type sampler. The soil in the area to be cleared shall be fully removed during this step. If probing is utilized, then alternate probing with soil removal as necessary, until the first 5-ft (1.5m) has been delineated.

6.5.7 Refusal

Where natural subsurface conditions (e.g. cobbles/rocks, fill material, and/or bedrock) may prevent adequate probing and augering, a practical and sensible evaluation by the Parsons' Project Manager will be the basis for determining if continuation of probing and augering is feasible. In all cases Parsons must employ all means necessary to prevent damaging subsurface utilities, product lines, tanks, or other structures. **When conventional means of probing and augering cannot be utilized, the Parsons' field representative believes that additional probing/augering is not feasible, or if the probing/augering poses additional hazard to personnel because of the physical demands of performing the task, work in that specific area will cease**. The Parsons' Project Manager will contact the client's project manager or designee to discuss alternatives. If Parsons' staff suspects, based on past information or boring logs, that hand augering is infeasible, then alternatives such as vacuum clearing or non-invasive procedures should be evaluated in advance.

6.5.8 Event Notification

If any portion of a tank, pipe, utility or other subsurface structure is encountered, or if there is any doubt it has been encountered, the work is to cease in that area and the Parsons' Project Manager notified immediately. If there is reason to believe that the structure has been damaged, if applicable, the emergency shut-off switch should be activated (if applicable) and the appropriate municipality and client notified immediately. The Parsons' Project Manager and/or client will decide if additional uncovering by hand is required. If it is confirmed that a UST system has been encountered, a tightness test(s) should be considered. Under no circumstances is the area to be backfilled without notifying the Parsons' Project Manager, unless risk of personal injury or damage warrants a temporary backfilling.

In case of refusal or if an unknown subsurface object is encountered during intrusive subsurface activities, then the following specified resolution process must take place.

- Additional and deliberately careful excavation by hand will be conducted in an attempt to define the cause of refusal or identify the subsurface object.

    a. If the cause CAN be readily and correctly defined as not destructive or hazardous, the field task manager should call the PM to discuss the situation.

    b. If the cause CAN be readily and correctly defined as potentially destructive or hazardous, the field task manager should call the PM to discuss the situation. The specific location must be re-evaluated.

    c. If the cause CANNOT be readily and correctly defined, the field task manager should call the PM to discuss the situation. The specific location must be re-evaluated.

- In case "a," drilling may proceed ONLY after consultation with the PM.

- In cases "b" and "c," drilling MUST STOP so that location re-evaluation can take place. The client, the utility owner (if applicable) and if required, the appropriate regulatory agency, must be advised of the situation and consulted to determine if (1) the location is necessary, which may require additional effort to clear a new location, or (2) the location is not necessary, and can be deleted from the program.

6.5.9 Scheduling

Since clearing locations for augering, drilling, excavation and similar intrusive field work can be time consuming, it may be appropriate to perform the surface removal subsurface delineation prior to the arrival of subcontractors and their equipment on site. If these activities are conducted prior to the actual day of intrusive field work, then the cleared locations must be adequately covered with plates and/or backfilled, or barricaded to protect pedestrians and other surface traffic. Care must be taken to prevent settlement of the material used to cover the holes.

Attachment 10.1.18

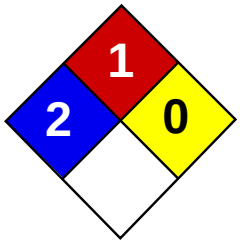
(Reserved)

Attachment 10.1.19

(Reserved)

ATTACHMENT 10.1.20

MATERIAL SAFETY DATA SHEETS



Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Acenaphthene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Acenaphthene

Catalog Codes: SLA2332

CAS#: 83-32-9

RTECS: AB1000000

TSCA: TSCA 8(b) inventory: Acenaphthene

CI#: Not applicable.

Synonym: Ethylenenaphthalene

Chemical Name: 1,8-Dehydroacenaphthalene

Chemical Formula: C10H6(CH2)2

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Acenaphthene	83-32-9	100

Toxicological Data on Ingredients: Acenaphthene LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

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

Skin Contact:

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

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

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

Serious Inhalation: Not available.

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Combustible.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

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

Section 8: Exposure Controls/Personal Protection

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

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

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

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid needles.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 154.21 g/mole

Color: White.

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

Boiling Point: 277.5°C (531.5°F)

Melting Point: 93.6 (200.5°F)

Critical Temperature: Not available.

Specific Gravity: 1.02 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol.

Solubility:
Partially soluble in methanol. Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Material is irritating to mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

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

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: Acenaphthene Massachusetts RTK: Acenaphthene New Jersey: Acenaphthene TSCA 8(b) inventory: Acenaphthene CERCLA: Hazardous substances.: Acenaphthene

Other Regulations: Not available.

Other Classifications:

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

DSCL (EEC): R36/38- Irritating to eyes and skin.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

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

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II.

Other Special Considerations: Not available.

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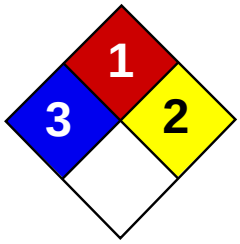
Last Updated: 05/21/2013 12:00 PM



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

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

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

Serious Skin Contact: Not available.

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

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

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

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

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

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

Section 8: Exposure Controls/Personal Protection

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

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

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

Exposure Limits:
TWA: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

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

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

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

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

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

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

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

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

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

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

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

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

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

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

Created: 10/09/2005 04:16 PM

Last Updated: 05/21/2013 12:00 PM

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name CETCO® COARSE CHIPS

Version # 06

Revision date 31-March-2010

Chemical name Bentonite

Chemical description Smectite Clay

Company

CETCO
Drilling Products Group
2870 Forbs Avenue
Hoffman Estates, IL 60192 US
safetydata@amcol.com
http://www.cetco.com/
General Information (800) 527-9948
CHEMTREC® (800) 424-9300

2. Hazards Identification

Emergency overview Material can be slippery when wet

Potential health effects

Routes of exposure Inhalation. Eye contact.

Eyes Dust or powder may irritate eye tissue.

Skin Non-irritating to the skin.

Inhalation Repeated or prolonged inhalation may cause toxic effects. For additional information on inhalation hazards, see Section 11 of this safety data sheet.

Ingestion No significant adverse effects are expected upon ingestion of the product.

Target organs Lungs.

Chronic effects This product has the potential for generation of respirable dust during handling and use. Dust may contain respirable crystalline silica. Overexposure to dust may result in pneumocononiosis, a respiratory disease caused by inhalation of mineral dust, which can lead to fibrotic changes to the lung tissue, or silicosis, a respiratory disease caused by inhalation of silica dust, which can lead to inflammation and fibrosis of the lung tissue. Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled.

3. Composition / Information on Ingredients

The manufacturer lists no ingredients as hazardous according to OSHA 29 CFR 1910.1200.

Composition comments Bentonite contains naturally occurring crystalline silica (not listed in Annex I of Directive 67/548/EEC) in quantities less than 6%. Occupational Exposure Limits for impurities are listed in Section 8.

4. First Aid Measures

First aid procedures

Eye contact Flush eyes immediately with large amounts of water. Get medical attention if irritation develops or persists.

Skin contact No special measures required. Get medical attention if irritation develops or persists.

Inhalation If symptoms are experienced, remove source of contamination or move victim to fresh air. If the affected person is not breathing, apply artificial respiration. If breathing is difficult, give oxygen. Call a physician if symptoms develop or persist.

Ingestion No special measures required. If ingestion of a large amount does occur, seek medical attention.

Notes to physician Provide general supportive measures and treat symptomatically.

5. Fire Fighting Measures

Flammable properties None known.

Extinguishing media

Suitable extinguishing media Use any media suitable for the surrounding fires. Dry chemical, CO2, water spray or regular foam.

Protection of firefighters

Protective equipment and precautions for firefighters	Material can be slippery when wet
Hazardous combustion products	None known.

6. Accidental Release Measures

Personal precautions	Material can be slippery when wet. Wear a dust mask if dust is generated above exposure limits.
Environmental precautions	No special environmental precautions required.
Methods for containment	None necessary.
Methods for cleaning up	Avoid the generation of dusts during clean-up. Collect dust or particulates using a vacuum cleaner with a HEPA filter. Reduce airborne dust and prevent scattering by moistening with water.

7. Handling and Storage

Handling	Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed. In case of insufficient ventilation, wear suitable respiratory equipment.
Storage	Guard against dust accumulation of this material. No special storage conditions required. No special restrictions on storage with other products.

8. Exposure Controls / Personal Protection

Occupational exposure limits

ACGIH

Constituents	Type	Value	Form
INERT OR NUISANCE DUST (SEQ250)	TWA	10 mg/m3	Inhalable particles.
		3 mg/m3	Respirable particles.
QUARTZ (14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

U.S. - OSHA

Constituents	Type	Value	Form
INERT OR NUISANCE DUST (SEQ250)	PEL	15 mg/m3	Total dust.
		5 mg/m3	Respirable fraction.
	TWA	5 mg/m3	Respirable fraction.
		50 mppcf	Total dust.
		15 mppcf	Respirable fraction.
		15 mg/m3	Total dust.
QUARTZ (14808-60-7)	TWA	2.4 mppcf	Respirable.
		0.3 mg/m3	Total dust.
		0.1 mg/m3	Respirable.
		0.1 mg/m3	Respirable dust.

Exposure guidelines	Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled.
Engineering controls	If material is ground, cut, or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits. If engineering measures are not sufficient to maintain concentrations of dust particulates below the OEL, suitable respiratory protection must be worn.

Personal protective equipment

Eye / face protection	Wear dust goggles.
Skin protection	No special protective equipment required.
Respiratory protection	Use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit.
General hygiene considerations	Eye wash fountain is recommended. Use good industrial hygiene practices in handling this material.

9. Physical & Chemical Properties

Appearance	Not available.
Color	Various.
Odor	None.

Odor threshold	Not available.
Physical state	Solid.
Form	Pellets. Chips. Tablet.
pH	7 - 9
Melting point	Not available.
Freezing point	Not available.
Boiling point	Not available.
Flash point	Non-flammable
Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	Non-explosive
Flammability limits in air, lower, % by volume	Non-explosive
Vapor pressure	Not available.
Vapor density	Not available.
Specific gravity	2.5503 estimated
Relative density	Not available.
Solubility (water)	Negligible
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
VOC	0 % estimated
Percent volatile	0 % estimated

10. Chemical Stability & Reactivity Information

Chemical stability	Stable at normal conditions.
Conditions to avoid	None known.
Incompatible materials	None known.
Hazardous decomposition products	None known.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Chronic effects

In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However in making the overall evaluation, IARC noted that "carcinogenicity was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.)

In June 2003, SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk..." (SCOEL SUM Doc 94-final, June 2003)

According to the current state of the art, worker protection against silicosis can be consistently assured by respecting the existing regulatory occupational exposure limits. Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled.

Carcinogenicity

IARC Monographs: Overall evaluation

QUARTZ (14808-60-7) 1 Carcinogenic to humans.

Carcinogenicity

US ACGIH Threshold Limit Values: A2 carcinogen

QUARTZ (14808-60-7)	A2 Suspected human carcinogen.

US NTP Report on Carcinogens: Known carcinogen

QUARTZ (14808-60-7)	Known carcinogen.

12. Ecological Information

Ecotoxicological data

Product	Test Results
CETCO® COARSE CHIPS	LC50 Fish: 19000 mg/l 96.00 Hours estimated

* Estimates for product may be based on additional component data not shown.

Ecotoxicity This material is not expected to be harmful to aquatic life.

Environmental effects Based on the physical properties of this product, significant environmental persistence and bioaccumulation would not be expected.

Persistence and degradability Not available.

13. Disposal Considerations

Disposal instructions Dispose in accordance with all applicable regulations. Material should be recycled if possible.

14. Transport Information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations OSHA Process Safety Standard: This material is not known to be hazardous by the OSHA Highly Hazardous Process Safety Standard, 29 CFR 1910.119.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - No
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

Section 302 extremely hazardous substance No

Section 311 hazardous chemical Yes

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of New and Existing Chemicals (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations WARNING: This product contains a chemical known to the State of California to cause cancer.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

QUARTZ (14808-60-7) Listed.

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

QUARTZ (14808-60-7) Listed: October 1, 1988 Carcinogenic.

US - Pennsylvania RTK - Hazardous Substances: Listed substance

QUARTZ (14808-60-7) Listed.

16. Other Information

Further information

This safety datasheet only contains information relating to safety and does not replace any product information or product specification.

Recommended restrictions

Workers (and your customers or users in the case of resale) should be informed of the potential presence of respirable dust and respirable crystalline silica as well as their potential hazards. Appropriate training in the proper use and handling of this material should be provided as required under applicable regulations.

HMIS ratings

NFPA ratings

Health: 1
Flammability: 0
Instability: 0

Disclaimer

The information provided in 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 guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The manufacturer expressly does not make any representations, warranties, or guarantees as to its accuracy, reliability or completeness nor assumes any liability, for its use. It is the user's responsibility to verify the suitability and completeness of such information for each particular use.

Third party materials: Insofar as materials not manufactured or supplied by this manufacturer are used in conjunction with, or instead of this product, it is the responsibility of the customer to obtain, from the manufacturer or supplier, all technical data and other properties relating to these and other materials and to obtain all necessary information relating to them. No liability can be accepted in respect of the use of this product in conjunction with materials from another supplier. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Issue date

31-March-2010

Other information

CETCO is an AMCOL International company.

SAFETY DATA SHEET

Version 5.3
Revision Date 05/02/2014
Print Date 05/12/2014

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Benz[*a*]anthracene
Product Number	:	B2209
Brand	:	Aldrich
Index-No.	:	601-033-00-9
REACH No.	:	A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.	:	56-55-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 1B), H350
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word — Danger

Hazard statement(s)

H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.

P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	1,2-Benzanthracene Tetraphene
Formula	:	$C_{18}H_{12}$
Molecular Weight	:	228.29 g/mol
CAS-No.	:	56-55-3
EC-No.	:	200-280-6
Index-No.	:	601-033-00-9

Hazardous components

Component	Classification	Concentration
Benz[a]anthracene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Nature of decomposition products not known.

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min

Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	Melting point/range: 157 - 159 °C (315 - 318 °F)
f)	Initial boiling point and boiling range	437.6 °C (819.7 °F)
g)	Flash point	no data available
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	no data available
l)	Vapour density	no data available
m)	Relative density	no data available
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	no data available
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
no data available

Inhalation: no data available

Dermal: no data available

LD50 Intravenous - rat - > 200 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)
NTP:	Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
no data available

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[a]anthracene)
Marine pollutant: Marine pollutant

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[a]anthracene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	56-55-3	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

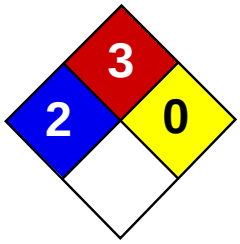
Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.3 Revision Date: 05/02/2014 Print Date: 05/12/2014



Material Safety Data Sheet
Benzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Benzene

Catalog Codes: SLB1564, SLB3055, SLB2881

CAS#: 71-43-2

RTECS: CY1400000

TSCA: TSCA 8(b) inventory: Benzene

CI#: Not available.

Synonym: Benzol; Benzine

Chemical Name: Benzene

Chemical Formula: C6-H6

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Benzene	71-43-2	100

Toxicological Data on Ingredients: Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. The substance is toxic to blood, bone marrow, central nervous system (CNS). The substance may be toxic to liver, Urinary System. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

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

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

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

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

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 497.78°C (928°F)

Flash Points: CLOSED CUP: -11.1°C (12°F). (Setaflash)

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Explosive in presence of oxidizing materials, of acids.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Extremely flammable liquid and vapor. Vapor may cause flash fire. Reacts on contact with iodine heptafluoride gas. Dioxygenyl tetrafluoroborate is as very powferful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition. Contact with sodium peroxide with benzene causes ignition. Benzene ignites in contact with powdered chromic anhydride. Virgorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

Special Remarks on Explosion Hazards:
Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction

of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Section 6: Accidental Release Measures

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

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

Section 7: Handling and Storage

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

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

Section 8: Exposure Controls/Personal Protection

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

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

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

Exposure Limits:
TWA: 0.5 STEL: 2.5 (ppm) from ACGIH (TLV) [United States] TWA: 1.6 STEL: 8 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.1 STEL: 1 from NIOSH TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States] TWA: 10 (ppm) from OSHA (PEL) [United States] TWA: 3 (ppm) [United Kingdom (UK)] TWA: 1.6 (mg/m3) [United Kingdom (UK)] TWA: 1 (ppm) [Canada] TWA: 3.2 (mg/m3) [Canada] TWA: 0.5 (ppm) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:
Aromatic. Gasoline-like, rather pleasant. (Strong.)

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

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

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powferful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 930 mg/kg [Rat]. Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. Causes damage to the following organs: blood, bone marrow, central nervous system (CNS). May cause damage to the following organs: liver, Urinary System.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects. May affect genetic material (mutagenic). May cause cancer (tumorigenic, leukemia)) Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism,and urinary system. Eyes: Causes eye irritation. Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value) California prop. 65: This product contains the following ingredients

for which the State of California has found to cause cancer which would require a warning under the statute: Benzene Connecticut carcinogen reporting list.: Benzene Connecticut hazardous material survey.: Benzene Illinois toxic substances disclosure to employee act: Benzene Illinois chemical safety act: Benzene New York release reporting list: Benzene Rhode Island RTK hazardous substances: Benzene Pennsylvania RTK: Benzene Minnesota: Benzene Michigan critical material: Benzene Massachusetts RTK: Benzene Massachusetts spill list: Benzene New Jersey: Benzene New Jersey spill list: Benzene Louisiana spill reporting: Benzene California Director's list of Hazardous Substances: Benzene TSCA 8(b) inventory: Benzene SARA 313 toxic chemical notification and release reporting: Benzene CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

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

Other Classifications:

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

DSCL (EEC):
R11- Highly flammable. R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer. R62- Possible risk of impaired fertility. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S46- If swallowed, seek medical advice immediately and show this container or label. S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:35 PM

Last Updated: 05/21/2013 12:00 PM

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SAFETY DATA SHEET

Version 5.1
Revision Date 06/30/2014
Print Date 09/18/2014

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benzo[*a*]pyrene

Product Number : B1760
Brand : Sigma
Index-No. : 601-032-00-3

CAS-No. : 50-32-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin sensitisation (Category 1), H317
Germ cell mutagenicity (Category 1B), H340
Carcinogenicity (Category 1B), H350
Reproductive toxicity (Category 1B), H360
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H317 May cause an allergic skin reaction.
H340 May cause genetic defects.
H350 May cause cancer.
H360 May damage fertility or the unborn child.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and

	understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P321	Specific treatment (see supplemental first aid instructions on this label).
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	3,4-Benzpyrene 3,4-Benzopyrene Benzo[def]chrysene
Formula	:	$C_{20}H_{12}$
Molecular Weight	:	252.31 g/mol
CAS-No.	:	50-32-8
EC-No.	:	200-028-5
Index-No.	:	601-032-00-3

Hazardous components

Component	Classification	Concentration
Benzo[a]pyrene		
	Skin Sens. 1; Muta. 1B; Carc. 1B; Repr. 1B; Aquatic Acute 1; Aquatic Chronic 1; H317, H340, H350, H360, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		

Benzo[a]pyrene	50-32-8	TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benzo[a]pyrene	50-32-8	1-Hydroxypyrene (1-HP)		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	Melting point/range: 177 - 180 °C (351 - 356 °F) - lit.
f)	Initial boiling point and boiling range	495 °C (923 °F) - lit.
g)	Flash point	no data available
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	no data available
l)	Vapour density	no data available
m)	Relative density	1.35 g/cm3
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	log Pow: 5.97
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
no data available

Inhalation: no data available

Dermal: no data available

LD50 Subcutaneous - rat - 50 mg/kg

Skin corrosion/irritation
Skin - mouse
Result: Mild skin irritation

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
Chronic exposure may cause dermatitis.

Germ cell mutagenicity
May alter genetic material.
In vivo tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	1 - Group 1: Carcinogenic to humans (Benzo[a]pyrene)
NTP:	Reasonably anticipated to be a human carcinogen (Benzo[a]pyrene)
OSHA:	OSHA specifically regulated carcinogen (Benzo[a]pyrene)

Reproductive toxicity
May cause congenital malformation in the fetus.
Presumed human reproductive toxicant

May cause reproductive disorders.

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: DJ3675000

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.25 mg/l - 48 h
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 0.02 mg/l - 72 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
Bioaccumulation: Lepomis macrochirus (Bluegill) - 48 h - 0.0005 mg/l

Bioconcentration factor (BCF): 3,208

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[a]pyrene)
Reportable Quantity (RQ): 1 lbs
Marine pollutant:
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzo[a]pyrene)
Marine pollutant: No

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[a]pyrene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	1990-01-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H317	May cause an allergic skin reaction.
H340	May cause genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Muta.	Germ cell mutagenicity

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling

or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.1 Revision Date: 06/30/2014 Print Date: 09/18/2014

SAFETY DATA SHEET

Version 5.2
Revision Date 04/02/2014
Print Date 05/12/2014

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Chrysene
Product Number	:	BCR269
Brand	:	Fluka
Index-No.	:	601-048-00-0
REACH No.	:	A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.
CAS-No.	:	218-01-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H341	Suspected of causing genetic defects.
H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.

P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	$C_{18}H_{12}$
Molecular Weight	:	228.29 g/mol
CAS-No.	:	218-01-9
EC-No.	:	205-923-4
Index-No.	:	601-048-00-0

Hazardous components

Component	Classification	Concentration
Chrysene		
	Muta. 2; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H341, H350, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature: 2 - 8 °C

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Confirmed animal carcinogen with unknown relevance to humans		
Chrysene	218-01-9	TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis

Chrysene	218-01-9	1-Hydroxypyrene (1-HP)		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	Melting point/range: 252 - 254 °C (486 - 489 °F)

f)	Initial boiling point and boiling range	448 °C (838 °F)
g)	Flash point	no data available
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	no data available
l)	Vapour density	no data available
m)	Relative density	no data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 5.73
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
no data available

Inhalation: no data available

Dermal: no data available

LD50 Intraperitoneal - mouse - > 320 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Chrysene)
NTP:	Known to be human carcinogen (Chrysene)
	Reasonably anticipated to be a human carcinogen (Chrysene)
NTP:	Known to be human carcinogen (Chrysene)
	Reasonably anticipated to be a human carcinogen (Chrysene)
OSHA:	OSHA specifically regulated carcinogen (Chrysene)

Reproductive toxicity
no data available

no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1.90 mg/l - 2 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

no data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

Not dangerous goods

IMDG

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chrysene)
Marine pollutant: Marine pollutant

IATA

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chrysene)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

SARA 311/312 Hazards

Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Chrysene	218-01-9	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	0
Reactivity Hazard:	0

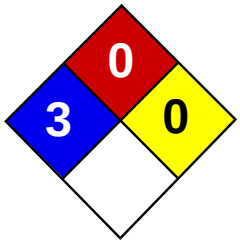
Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.2 Revision Date: 04/02/2014 Print Date: 05/12/2014



Material Safety Data Sheet
Sodium Cyanide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium Cyanide

Catalog Codes: SLS2314, SLS3736

CAS#: 143-33-9

RTECS: VZ7525000

TSCA: TSCA 8(b) inventory: Sodium Cyanide

CI#: Not available.

Synonym:

Chemical Name: Sodium Cyanide

Chemical Formula: NaCN

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium Cyanide	143-33-9	100

Toxicological Data on Ingredients: Sodium Cyanide: ORAL (LD50): Acute: 6.44 mg/kg [Rat]. DERMAL (LD50): Acute: 10.4 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator). Corrosive to eyes and skin. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to skin, eyes, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

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

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

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Slightly flammable to flammable in presence of acids, of moisture.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Dangerous on contact with acids, acid fumes, water or stream. It will produce toxic and flammable vapors of CN-H and sodium oxide. Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas. When heated to decomposition it emits toxic fumes hydgrogen cyanide and oxides of nitrogen

Special Remarks on Explosion Hazards: Fusion mixtures of metal cyanides with metal chlorates, perchlorated or nitrates causes a violent explosion

Section 6: Accidental Release Measures

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

Large Spill:
Corrosive solid. Poisonous solid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F).

Section 8: Exposure Controls/Personal Protection

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

Personal Protection:
Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

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

Exposure Limits:
STEL: 5 (mg/m3) from ACGIH (TLV) [United States] SKIN CEIL: 4.7 from NIOSH CEIL: 5 (mg/m3) from NIOSHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Granular solid. Flakes solid.)

Odor:
Faint almond-like odor. Odorless when perfectly dry. Emits odor of hydrogen cyanide when damp.

Taste: Not available.

Molecular Weight: 49.01 g/mole

Color: White.

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

Boiling Point: 1496°C (2724.8°F)

Melting Point: 563°C (1045.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.595 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Vapor Density of Hydrogen Cyanide gas: 0.941

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:
Soluble in cold water. Slightly soluble in Ethanol

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, moisture, incompatibles.

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

Corrosivity:
Corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Violent reaction with fluorine gas, magnesium, nitrates, nitric acid. Dangerous on contact with acids, acid fumes, water or stream. It wil produce toxic and flammable vapors of CN-H and sodium oxide. Cyanide may react with CO2 in ordinary air to form toxic hydrogen cyanide gas. Strong oxidizers such as acids, acid salts, chlorates, and nitrates. Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas.

Special Remarks on Corrosivity: Corrosive to aluminum

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:
Acute oral toxicity (LD50): 6.44 mg/kg [Rat]. Acute dermal toxicity (LD50): 10.4 mg/kg [Rabbit].

Chronic Effects on Humans: May cause damage to the following organs: skin, eyes, central nervous system (CNS).

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May cause adverse reproductive effects (maternal and paternal fertility) based on animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health effects: Skin: May cause itching and irritation. May be fatal if absorbed through injured skin with symtpoms similar to those noted for inhalation and ingestion. Eyes: May cause eye irritation and eye damage. Inhalation: May cause respiratory tract irritation. May be fatal if inhaled. The substance inhibits cellular respiration causing metabolic asphyxiation. May cause headache, weakness, dizziness, labored breathing, nausea, vomiting. May be followed by cardiovascular effects, unconciousness, convulsions, coma, and death Ingestion: May be fatal if swallowed. May cause

gastrointestinal tract irritation with nausea, vomiting. May affect behavior and nervous systems(seizures, convulsions, change in motor activity, headache, dizziness, confusion, weakness stupor, aniexity, agitation, tremors), cardiovascular system, respiration (hyperventilation, pulmonary edema, breathing difficulty, respiratory failure), cardiovascular system (palpitations, rapid heart beat, hypertension, hypotension). Massive doses by produce sudden loss of conciousness and prompt death from respiratory arrest. Smaller but still lethal doses on the breath or vomitus. Chronic Potential Health Effects: Central Nervous system effects (headaches, vertigo, insomnia, memory loss, tremors, fatigue), fatigue, metabolic effects (poor appetite), cardiovascular effects (chest discomfort, palpitations), nerve damage to the eyes, or dermatitis, respiratory tract irritation, eye irritation, or death can occur. may prolong the illness for 1 or more hours. A bitter almond odor may be noted

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

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

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Sodium cyanide UNNA: 1689 PG: I

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut carcinogen reporting list.: Sodium Cyanide Illinois chemical safety act: Sodium Cyanide New York release reporting list: Sodium Cyanide Rhode Island RTK hazardous substances: Sodium Cyanide Pennsylvania RTK: Sodium Cyanide Minnesota: Sodium Cyanide Massachusetts RTK: Sodium Cyanide Massachusetts spill list: Sodium Cyanide New Jersey: Sodium Cyanide New Jersey spill list: Sodium Cyanide Louisiana RTK reporting list: Sodium Cyanide Louisiana spill reporting: Sodium Cyanide California Director's List of Hazardous Substances: Sodium Cyanide TSCA 8(b) inventory: Sodium Cyanide TSCA 4(a) final test rules: Sodium Cyanide TSCA 8(a) PAIR: Sodium Cyanide TSCA 8(d) H and S data reporting: Sodium Cyanide TSCA 12(b) one time export: Sodium Cyanide SARA 302/304/311/312 extremely hazardous substances: Sodium Cyanide CERCLA: Hazardous substances.: Sodium Cyanide: 10 lbs. (4.536 kg)

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

Other Classifications:

WHMIS (Canada):
CLASS B-6: Reactive and very flammable material. CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive solid.

DSCL (EEC):
R27/28- Very toxic in contact with skin and if swallowed. R41- Risk of serious damage to eyes. S1/2- Keep locked up and out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S28- After contact with skin, wash immediately with plenty of water S36/37- Wear suitable protective clothing and gloves. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

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

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

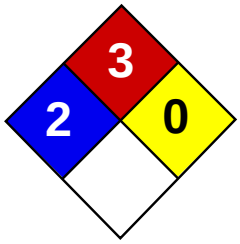
References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 01:58 PM

Last Updated: 05/21/2013 12:00 PM

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



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C8H10

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (irritant, sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

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

Serious Skin Contact: Not available.

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:
CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

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

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

Section 7: Handling and Storage

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

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

Section 8: Exposure Controls/Personal Protection

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

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

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

Exposure Limits:
TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m3) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

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

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in diethyl ether. Very slightly soluble in cold water or practically insoluble in water. Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene. Insoluble in Ammonia. Slightly soluble in Chloroform. Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

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

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central nervous system (CNS).

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

Special Remarks on Toxicity to Animals:
Lethal Dose/Conc 50% Kill: LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg Lowest Published Lethal Dose/Conc: LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate. May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Can cause mild skin irritation. It can be absorbed through intact skin. Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm , it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS) Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include

headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and conciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987). Ingestion: Do not drink, pipet or siphon by mouth. May cause gastroinestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Ethylbenzene Illinois toxic substances disclosure to employee act: Ethylbenzene Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene Rhode Island RTK hazardous substances: Ethylbenzene Pennsylvania RTK: Ethylbenzene Minnesota: Ethylbenzene Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene New Jersey: Ethylbenzene New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene California Director's List of Hazardous Substances: Ethylbenzene TSCA 8(b) inventory: Ethylbenzene TSCA 4(a) proposed test rules: Ethylbenzene TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97 SARA 313 toxic chemical notification and release reporting: Ethylbenzene

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

Other Classifications:

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

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S24/25- Avoid contact with skin and eyes. S29- Do not empty into drains.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

SAFETY DATA SHEET

Version 5.4
Revision Date 06/27/2014
Print Date 09/18/2014

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Fluoranthene

Product Number : 48535
Brand : Supelco

CAS-No. : 206-44-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H302 Harmful if swallowed.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P301 + P312 IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
P330 Rinse mouth.
P391 Collect spillage.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : Benzo[j,k]fluorene

Formula : $C_{16}H_{10}$
Molecular Weight : 202.25 g/mol
CAS-No. : 206-44-0
EC-No. : 205-912-4

Hazardous components

Component	Classification	Concentration
Fluoranthene		
	Acute Tox. 4; Aquatic Acute 1; Aquatic Chronic 1; H302, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator.For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	no data available
c)	Odour Threshold	no data available
d)	pH	no data available
e)	Melting point/freezing point	Melting point/range: 105 - 110 °C (221 - 230 °F) - lit.
f)	Initial boiling point and boiling range	384 °C (723 °F) - lit.
g)	Flash point	198.0 °C (388.4 °F) - closed cup
h)	Evapouration rate	no data available
i)	Flammability (solid, gas)	no data available
j)	Upper/lower flammability or explosive limits	no data available
k)	Vapour pressure	no data available
l)	Vapour density	no data available
m)	Relative density	no data available
n)	Water solubility	no data available
o)	Partition coefficient: n-octanol/water	no data available
p)	Auto-ignition temperature	no data available
q)	Decomposition temperature	no data available
r)	Viscosity	no data available
s)	Explosive properties	no data available
t)	Oxidizing properties	no data available

9.2 Other safety information
no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid
no data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
no data available

LD50 Oral - rat - 2,000 mg/kg

Inhalation: no data available

Inhalation: no data available

Dermal: no data available

LD50 Dermal - rabbit - 3,180 mg/kg

no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Fluoranthene)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	Reasonably anticipated to be a human carcinogen (Fluoranthene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: LL4025000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.0077 mg/l - 96 h
	NOEC - Cyprinodon variegatus (sheepshead minnow) - 560 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - > 0.005 - < 0.01 mg/l - 3 d
	Immobilization EC50 - Daphnia magna (Water flea) - 0.78 mg/l - 20 h
	NOEC - Daphnia magna (Water flea) - 0.085 mg/l - 48 h

12.2 Persistence and degradability
no data available

12.3 Bioaccumulative potential
no data available

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

no data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Fluoranthene)
Reportable Quantity (RQ): 100 lbs
Marine pollutant:
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Fluoranthene)
Marine pollutant: No

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Fluoranthene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H302	Harmful if swallowed.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	1
Fire Hazard:	1
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the

product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.4 Revision Date: 06/27/2014 Print Date: 09/18/2014

Material Safety Data Sheet

Nonflammable Gas Mixture: Hydrogen Cyanide 0.1- 2.79% / Nitrogen 97.21-99%

Section 1. Chemical product and company identification

Product name : Nonflammable Gas Mixture: Hydrogen Cyanide 0.1- 2.79% / Nitrogen 97.21-99%

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry.

MSDS # : 002271

Date of Preparation/Revision : **3/1/2012.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas.

Emergency overview : DANGER!

MAY BE FATAL IF INHALED.
CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Do not puncture or incinerate container. Do not breathe gas. Contains material that may cause target organ damage, based on animal data. Use only with adequate ventilation. Keep container closed.

Contact with rapidly expanding gases can cause frostbite.

Target organs : Contains material which may cause damage to the following organs: blood, kidneys, lungs, liver, mucous membranes, heart, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS), thyroid.

Routes of entry : Inhalation Dermal Eyes

Potential acute health effects

Eyes : Slightly irritating to the eyes. Contact with rapidly expanding gas may cause burns or frostbite.

Skin : Slightly irritating to the skin. Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Very toxic by inhalation. Slightly irritating to the respiratory system.

Ingestion : Ingestion is not a normal route of exposure for gases

Potential chronic health effects

Chronic effects : Contains material that may cause target organ damage, based on animal data.

Target organs : Contains material which may cause damage to the following organs: blood, kidneys, lungs, liver, mucous membranes, heart, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS), thyroid.

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

Nonflammable Gas Mixture: Hydrogen Cyanide 0.1- 2.79% / Nitrogen 97.21-99%

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Nitrogen	7727-37-9	97.21 - 99	Oxygen Depletion [Asphyxiant]
Hydrogen Cyanide	74-90-8	0.1 - 2.79	**ACGIH TLV (United States, 2/2010). Absorbed through skin. Notes: Measured as CN** C: 5 mg/m³, (measured as CN) C: 4.7 ppm, (measured as CN) **NIOSH REL (United States, 6/2009). Absorbed through skin.** CEIL: 5 mg/m³ 10 minute(s). CEIL: 4.7 ppm 10 minute(s). **OSHA PEL (United States, 6/2010). Absorbed through skin.** TWA: 11 mg/m³ 8 hour(s). TWA: 10 ppm 8 hour(s). **OSHA PEL 1989 (United States, 3/1989). Absorbed through skin.** STEL: 5 mg/m³ 15 minute(s). STEL: 4.7 ppm 15 minute(s).

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Inhalation : Call medical doctor or poison control center immediately. Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product : Non-flammable.

Products of combustion : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides

Fire-fighting media and instructions : Use an extinguishing agent suitable for the surrounding fire.

Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : Immediately contact emergency personnel. Stop leak if without risk. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

Handling : Use only with adequate ventilation. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Storage : Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Full chemical-resistant suit and self-contained breathing apparatus should be worn only by trained and authorized persons.

Product name

nitrogen	Oxygen Depletion [Asphyxiant]
Hydrogen cyanide	**ACGIH TLV (United States, 2/2010). Absorbed through skin. Notes: Measured as CN** C: 5 mg/m³, (measured as CN) C: 4.7 ppm, (measured as CN) **NIOSH REL (United States, 6/2009). Absorbed through skin.** CEIL: 5 mg/m³ 10 minute(s). CEIL: 4.7 ppm 10 minute(s). **OSHA PEL (United States, 6/2010). Absorbed through skin.** TWA: 11 mg/m³ 8 hour(s). TWA: 10 ppm 8 hour(s). **OSHA PEL 1989 (United States, 3/1989). Absorbed through skin.** STEL: 5 mg/m³ 15 minute(s). STEL: 4.7 ppm 15 minute(s).

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Melting/freezing point : -210.01°C (-346°F) This is based on data for the following ingredient: nitrogen.

Critical temperature : Lowest known value: -146.9°C (-232.4°F) (nitrogen).

Vapor density : Highest known value: 0.967 (Air = 1) (nitrogen).

Gas Density (lb/ft ^{3}) : Weighted average: 0.07

Section 10. Stability and reactivity

Stability and reactivity : The product is stable.

Incompatibility with various substances : Not considered to be reactive according to our database.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
Hydrogen cyanide	LD50 Intravenous	Rat	810 ug/kg	-
	LC50 Inhalation Gas.	Rat	150 ppm	30 minutes
	LC50 Inhalation Gas.	Rat	140 ppm	1 hours

Chronic effects on humans : Contains material which may cause damage to the following organs: blood, kidneys, lungs, liver, mucous membranes, heart, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS), thyroid.

Other toxic effects on humans : No specific information is available in our database regarding the other toxic effects of this material to humans.

Specific effects

Carcinogenic effects : No known significant effects or critical hazards.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
Hydrogen cyanide	-	Acute LC50 0.068 to 0.072 mg/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
	-	Acute LC50 0.042 to 0.046 mg/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
	-	Acute LC50 0.028 to 0.035 mg/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss - Juvenile	96 hours

		(Fledgling, Hatchling, Weanling)	
-	Acute LC50 152 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas - Juvenile (Fledgling, Hatchling, Weanling) - 13 weeks - 30.8 mm - 0.289 g	96 hours
-	Acute LC50 133 to 140 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas - Juvenile (Fledgling, Hatchling, Weanling) - 13 weeks - 30.8 mm - 0.289 g	96 hours
-	Acute LC50 124 to 144 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas - Juvenile (Fledgling, Hatchling, Weanling) - 13 weeks - 30.8 mm - 0.289 g	96 hours
-	Acute LC50 117 to 135 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas - Juvenile (Fledgling, Hatchling, Weanling) - 13 weeks - 30.8 mm - 0.289 g	96 hours
-	Acute LC50 68 to 72 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
-	Acute LC50 42 to 46 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
-	Acute LC50 28 to 35 ug/L Fresh water	Fish - Rainbow trout,donaldson trout -	96 hours

		Oncorhynchus mykiss - Juvenile (Fledgling, Hatchling, Weanling)

Products of degradation : Products of degradation: carbon oxides (CO, CO_2) and water, nitrogen oxides (NO, NO_2 etc.).

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1956	COMPRESSED GAS, N.O.S.	2.2	Not applicable (gas).		-
TDG Classification	UN1956	COMPRESSED GAS, N.O.S.	2.2	Not applicable (gas).		**Explosive Limit and Limited Quantity Index** 0.125 **Passenger Carrying Road or Rail Index** 75
Mexico Classification	UN1956	COMPRESSED GAS, N.O.S.	2.2	Not applicable (gas).		-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 15. Regulatory information

United States

U.S. Federal regulations :

TSCA 8(a) IUR: Not determined
United States inventory (TSCA 8b): All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: Hydrogen cyanide
SARA 302/304 emergency planning and notification: Hydrogen cyanide
SARA 302/304/311/312 hazardous chemicals: nitrogen; Hydrogen cyanide
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: nitrogen: Sudden release of pressure; Hydrogen cyanide: Fire hazard, reactive, Immediate (acute) health hazard

Clean Water Act (CWA) 307: Hydrogen cyanide

Clean Water Act (CWA) 311: Hydrogen cyanide

Clean Air Act (CAA) 112 accidental release prevention - Toxic Substances:
Hydrogen Cyanide

Clean Air Act (CAA) 112 regulated toxic substances: Hydrogen cyanide

SARA 313

		Product name	CAS number	Concentration
Form R - Reporting requirements	:	Hydrogen Cyanide	74-90-8	0.1 - 2.79
Supplier notification	:	Hydrogen Cyanide	74-90-8	0.1 - 2.79

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations :

Connecticut Carcinogen Reporting: None of the components are listed.
Connecticut Hazardous Material Survey: None of the components are listed.
Florida substances: None of the components are listed.
Illinois Chemical Safety Act: None of the components are listed.
Illinois Toxic Substances Disclosure to Employee Act: None of the components are listed.
Louisiana Reporting: None of the components are listed.
Louisiana Spill: None of the components are listed.
Massachusetts Spill: None of the components are listed.
Massachusetts Substances: The following components are listed: NITROGEN; HYDROGEN CYANIDE
Michigan Critical Material: None of the components are listed.
Minnesota Hazardous Substances: None of the components are listed.
New Jersey Hazardous Substances: The following components are listed: NITROGEN; HYDROGEN CYANIDE; HYDROCYANIC ACID
New Jersey Spill: None of the components are listed.
New Jersey Toxic Catastrophe Prevention Act: The following components are listed: hydrogen cyanide
New York Acutely Hazardous Substances: The following components are listed: Hydrocyanic acid
New York Toxic Chemical Release Reporting: None of the components are listed.
Pennsylvania RTK Hazardous Substances: The following components are listed: NITROGEN; HYDROCYANIC ACID
Rhode Island Hazardous Substances: None of the components are listed.

Canada

WHMIS (Canada) :

Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).

CEPA Toxic substances: None of the components are listed.
Canadian ARET: None of the components are listed.
Canadian NPRI: The following components are listed: Hydrogen cyanide
Alberta Designated Substances: None of the components are listed.
Ontario Designated Substances: None of the components are listed.
Quebec Designated Substances: None of the components are listed.

Section 16. Other information

United States

Label requirements :

MAY BE FATAL IF INHALED.
CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Canada

Label requirements :

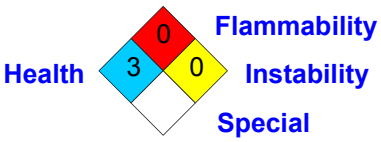
Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).

Nonflammable Gas Mixture: Hydrogen Cyanide 0.1- 2.79% / Nitrogen 97.21-99%

Hazardous Material Information System (U.S.A.) :

Health	*	3
Flammability		0
Physical hazards		0

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



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

Hydrogen Sulfide

Section 1. Chemical product and company identification

Product name : Hydrogen Sulfide

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry.

Synonym : Dihydrogen monosulfide; Dihydrogen sulfide; Hydrosulfuric acid; Stink damp; Sulfur hydride; Sulfureted hydrogen; H2S; Sulfuretted hydrogen; Hydrogen-sulphide-; Hydrogen sulfide (H2S); Acide sulfhydrique; Hydrogene sulfure; Idrogeno solforato; Rcra waste number U135; Schwefelwasserstoff; Siarkowodor; UN 1053; Zwavelwaterstof; Hepatic gas; Hepatic acid; Hydrogen monosulfide; Sewer gas; Sour gas; Sulfur hydroxide

MSDS # : 001029

Date of Preparation/Revision : **5/7/2013.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas. [COLORLESS LIQUEFIED COMPRESSED GAS WITH A ROTTEN EGG ODOR, BUT ODORLESS AT POISONOUS CONCENTRATIONS. [NOTE: SENSE OF SMELL BECOMES RAPIDLY FATIGUED AND CAN NOT BE RELIED UPON TO WARN OF THE CONTINUOUS PRESENCE OF H2S.]]

Emergency overview : DANGER!

FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
MAY BE FATAL IF INHALED.
MAY CAUSE EYE AND SKIN IRRITATION.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Keep away from heat, sparks and flame. Do not puncture or incinerate container. Do not breathe gas. Avoid contact with eyes, skin and clothing. May cause target organ damage, based on animal data. Use only with adequate ventilation. Wash thoroughly after handling. Keep container closed.

Contact with rapidly expanding gases can cause frostbite.

Target organs : May cause damage to the following organs: lungs, upper respiratory tract, eyes, central nervous system (CNS).

Routes of entry : Inhalation Dermal Eyes

Potential acute health effects

Eyes : Moderately irritating to eyes. Contact with rapidly expanding gas may cause burns or frostbite.

Skin : Moderately irritating to the skin. Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Very toxic by inhalation.

Ingestion : Ingestion is not a normal route of exposure for gases

Potential chronic health effects

Chronic effects : Can cause target organ damage.

Target organs : May cause damage to the following organs: lungs, upper respiratory tract, eyes, central nervous system (CNS).

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Hydrogen Sulfide	7783-06-4	100	**ACGIH TLV (United States, 3/2012).** STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s). **NIOSH REL (United States, 1/2013).** CEIL: 15 mg/m³ 10 minute(s). CEIL: 10 ppm 10 minute(s). **OSHA PEL 1989 (United States, 3/1989).** STEL: 21 mg/m³ 15 minute(s). STEL: 15 ppm 15 minute(s). TWA: 14 mg/m³ 8 hour(s). TWA: 10 ppm 8 hour(s). **OSHA PEL Z2 (United States, 11/2006).** AMP: 50 ppm 10 minute(s). CEIL: 20 ppm

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Inhalation : Call medical doctor or poison control center immediately. Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product : Flammable.

Auto-ignition temperature : 259.85°C (499.7°F)

Flammable limits : Lower: 4% Upper: 44%

Products of combustion : Decomposition products may include the following materials:
sulfur oxides

Fire-fighting media and instructions : In case of fire, use water spray (fog), foam or dry chemical.

In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

Handling : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Avoid contact with skin and clothing. Avoid contact with eyes. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Storage : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Full chemical-resistant suit and self-contained breathing apparatus should be worn only by trained and authorized persons.

Product name

hydrogen sulphide

ACGIH TLV (United States, 3/2012).
STEL: 5 ppm 15 minute(s).
TWA: 1 ppm 8 hour(s).
NIOSH REL (United States, 1/2013).
CEIL: 15 mg/m³ 10 minute(s).
CEIL: 10 ppm 10 minute(s).
OSHA PEL 1989 (United States, 3/1989).
STEL: 21 mg/m³ 15 minute(s).
STEL: 15 ppm 15 minute(s).

TWA: 14 mg/m³ 8 hour(s).
TWA: 10 ppm 8 hour(s).

OSHA PEL Z2 (United States, 11/2006).
AMP: 50 ppm 10 minute(s).
CEIL: 20 ppm

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight : 34.08 g/mole

Molecular formula : H2-S

Boiling/condensation point : -60°C (-76°F)

Melting/freezing point : -82.8°C (-117°F)

Critical temperature : 100.5°C (212.9°F)

Vapor pressure : 252 (psig)

Vapor density : 1.19 (Air = 1)

Specific Volume (ft ^{3}/lb) : 11.236

Gas Density (lb/ft ^{3}) : 0.089

Section 10. Stability and reactivity

Stability and reactivity : The product is stable.

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
hydrogen sulphide	LD50 Intraperitoneal	Rat	2300 ug/kg	-
	LD50 Intravenous	Rat	270 ug/kg	-
	LC50 Inhalation Vapor	Rat	820 mg/m3	3 hours
	LC50 Inhalation Vapor	Rat	700 mg/m3	4 hours
	LC50 Inhalation Vapor	Rat	470 mg/m3	6 hours
	LC50 Inhalation Gas.	Rat	712 ppm	1 hours
	LC50 Inhalation Gas.	Mouse	634 ppm	1 hours
	LC50 Inhalation Gas.	Rat	444 ppm	4 hours

IDLH : 100 ppm

Chronic effects on humans : May cause damage to the following organs: lungs, upper respiratory tract, eyes, central nervous system (CNS).

Other toxic effects on humans : No specific information is available in our database regarding the other toxic effects of this material to humans.

Specific effects

Carcinogenic effects : No known significant effects or critical hazards.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
hydrogen sulphide	-	Acute EC50 770 ug/L Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis ssp. lauren - 10 mm	48 hours
	-	Acute EC50 540 ug/L Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis ssp. lauren - 10 mm	48 hours
	-	Acute EC50 95 ug/L Fresh water	Crustaceans - Scud - Gammarus pseudolimnaeus - 11 mm	2 days
	-	Acute EC50 71 ug/L Fresh water	Crustaceans - Scud - Gammarus pseudolimnaeus - 11 mm	2 days
	-	Acute EC50 62 ug/L Fresh water	Crustaceans - Scud - Gammarus pseudolimnaeus - 11 mm	2 days
	-	Acute LC50 4 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
	-	Acute LC50 3.2 ug/L Fresh water	Fish - Asian redtail catfish - Hemibagrus nemurus	96 hours
	-	Acute LC50 3 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
	-	Acute LC50 2 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
	-	Acute LC50 <2 ug/L Fresh water	Fish - Yellow perch - Perca flavescens - Yolk-sac fry	96 hours

Products of degradation :

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1053	HYDROGEN SULFIDE	2.3	Not applicable (gas).		**Reportable quantity** 100 lbs. (45.4 kg) **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: Forbidden. **Special provisions** 2, B9, B14
TDG Classification	UN1053	HYDROGEN SULFIDE; OR HYDROGEN SULPHIDE	2.3	Not applicable (gas).		**Explosive Limit and Limited Quantity Index** 0 **ERAP Index** 0 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden

Hydrogen Sulfide						
Mexico Classification	UN1053	HYDROGEN SULFIDE	2.3	Not applicable (gas).		-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 15. Regulatory information

United States

U.S. Federal regulations : **United States inventory (TSCA 8b):** This material is listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: hydrogen sulphide
SARA 302/304 emergency planning and notification: hydrogen sulphide
SARA 302/304/311/312 hazardous chemicals: hydrogen sulphide
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: hydrogen sulphide: Fire hazard, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.

Clean Air Act (CAA) 112 regulated toxic substances: hydrogen sulphide

SARA 313

		Product name	CAS number	Concentration
Form R - Reporting requirements	:	Hydrogen Sulfide	7783-06-4	100
Supplier notification	:	Hydrogen Sulfide	7783-06-4	100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is listed.
New York Acutely Hazardous Substances: This material is listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

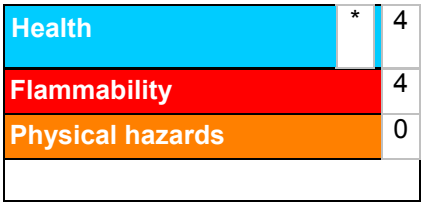
United States

Label requirements : FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
MAY BE FATAL IF INHALED.
MAY CAUSE EYE AND SKIN IRRITATION.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Canada

Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

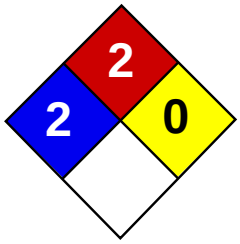
Hazardous Material Information System (U.S.A.) :



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

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



Health	2
Fire	2
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Naphthalene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Naphthalene

Catalog Codes: SLN1789, SLN2401

CAS#: 91-20-3

RTECS: QJ0525000

TSCA: TSCA 8(b) inventory: Naphthalene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C10H8

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Naphthalene	91-20-3	100

Toxicological Data on Ingredients: Naphthalene: ORAL (LD50): Acute: 490 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit]. VAPOR (LC50): Acute: 170 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

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

Serious Skin Contact: Not available.

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 567°C (1052.6°F)

Flash Points: CLOSED CUP: 88°C (190.4°F). OPEN CUP: 79°C (174.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

Large Spill:
Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

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

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

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

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

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

Exposure Limits:
Israel: TWA: 10 (ppm) TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [1995] TWA: 52 STEL: 79 (mg/m3) from ACGIH [1995] Australia: STEL: 15 (ppm) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid.)

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

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

Boiling Point: 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties:
Partially dispersed in hot water, methanol, n-octanol. Very slightly dispersed in cold water. See solubility in methanol, n-octanol.

Solubility:
Partially soluble in methanol, n-octanol. Very slightly soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: May attack some forms of rubber and plastic

Polymerization: No.

Section 11: Toxicological Information

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

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 490 mg/kg [Rat]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

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

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: Naphthalene Pennsylvania RTK: Naphthalene Florida: Naphthalene Minnesota: Naphthalene Massachusetts RTK: Naphthalene TSCA 8(b) inventory: Naphthalene TSCA 8(a) PAIR: Naphthalene TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87 SARA 313 toxic chemical notification and release reporting: Naphthalene: 1% CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

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

Other Classifications:

WHMIS (Canada):
CLASS B-4: Flammable solid. CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R36- Irritating to eyes. R40- Possible risks of irreversible effects. R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed. R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation. R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

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

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 01:30 PM

Last Updated: 05/21/2013 12:00 PM

MATERIAL SAFETY DATA SHEET

ERA A Waters Company

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER:	**ERA**	**BUSINESS PHONE:**	**303-431-8454**
ADDRESS:	**16341 Table Mountain Parkway**	**FAX: 303-421-0159**	**EMAIL: info@eraqc.com**
	Golden, CO, 80403 U.S.A.	**CHEMICAL EMERGENCY PHONE:**	**352-535-5053 (INFOTRAC)**

Product Name(s): **PCBs in Oil, PriorityPollutnT™, PCBs in Oil**

Catalog / Part Number(s): **729, 729S, 820, 821, 822, 823, 824, 825, 826, 827, 828, 835, 835S, 835SAL1-4, 186004327, 186004328, 186004329, 186004330, 186004331, 186004332, 18600433, 186004334, 186004397**

MSDS Creation Date: **November 28, 2006** **MSDS Reference Number:** **820-828**

Revision Date: **July 19, 2012**

SECTION 2: HAZARDS IDENTIFICATION

Warning. Repeated exposure may cause skin dryness or cracking. If swallowed, may be aspirated and cause lung damage. May cause cancer. The matrix of the standard is a petroleum based oil mixture which is classified as dangerous by Directive 199/45/EC. Use only as directed and in accordance with good laboratory practices.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

				EXPOSURE LIMITS		EU LABEL
CHEMICAL INGREDIENT NAME	CAS NUMBER	EC NUMBER	% BY WT.	OSHA	ACGIH	HAZARD LABEL
Distillate (petroleum), hydrogen treated light naphthenic	64742-53-6	256-156-6	≤99.9	5 mg/m3 (mist)	5 mg/m3; 10 mg/m3 STEL (mist)	

Notes: This standard is a mixture of PCB Aroclors (randomly selected) 1242, 1248, 1254 or 1260 which are present at levels <0.05% in a matrix of distillate (petroleum), hydrogen treated light naphthenic (hydrocarbons C15-C30) packaged in 2-10 ml flame sealed amber ampoule. Only one arochlor will be present in each standard. Exposure Limits are 8-Hour TWA (Time Weighted Average) unless designated C (Ceiling) or STEL (Short Term Exposure Limit). Other components considered Non-Hazardous under OSHA 1910.1200 (HazCom) as they are not present in concentrations exceeding 1% (or 0.1% if considered a known or potential carcinogen).
Material Use: Analytical reagent or certified reference material used in laboratories. Uses also include research and development.

SECTION 4: FIRST-AID MEASURES

Inhalation: Remove to fresh air. Skin Contact: Flush with water.
Eye Contact: Immediately flush with water for a minimum of 15 minutes.
Ingestion: Methanol may be fatal or cause blindness. Seek immediate medical attention.
Note to Physician: Effects may be delayed. Ethanol may inhibit methanol metabolism.
After following first aid measures, seek medical attention.

SECTION 5: FIRE-FIGHTING MEASURES

Flammable Properties: Not flammable
Extinguishing Media: Dry chemical, carbon dioxide or appropriate foam.
Unique Aspects Contributing To a Fire: None.
Special Fire Fighting Procedures: None.
Note: As in any fire, wear self-contained breathing apparatus, and full protective gear.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Due to small quantities involved, spills or leaks should not pose a significant problem. Absorb with spill pillow or other absorbent and place in closed container for later disposal. Wear appropriate personal protective equipment.

SECTION 7: HANDLING AND STORAGE

Handle in accordance with good laboratory practices. Store in a dark, dry well-ventilated place. This product is intended for use only by people trained in the safety and handling of chemicals and laboratory preparations.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Handle in accordance with good laboratory practices.
Respiratory Protection: Not normally needed. If exposure limits are exceeded, use approved/certified respirator.
Eye Protection: Splash goggles.
Skin Protection: Neoprene or other chemical resistant gloves. Disposable nitrile are acceptable for light intermittent exposure.
Engineering Controls: Work in a fume hood or use general or other local exhaust ventilation to meet Exposure Limits.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

DATA FOR MATRIX (Data is for Distillate (petroleum), hydrogen treated light naphthenic):

Appearance:	**Yellow color**	**Specific Gravity:**	**~0.88**	**Melting Point:**	**NA**
Physical State:	**Liquid**	**Flash Point:**	**ASTM D-92 >145°C (293°F)**	**Vapor Pressure:**	**<0.013 kPa at 20°C**
Odor:	**Slight**	**Explosion Limits:**	**LEL NA% UEL NA%**	**Vapor Density (air=1):**	**>5**
pH:	**NA**	**Boiling Point:**	**260-371°C**	**Solubility in Water:**	**Soluble**

SECTION 10: STABILITY AND REACTIVITY

Hazardous Polymerization Will Not Occur __X__ May Occur____ Stability: Stable __X__ Unstable ____

Hazardous Decomposition/Combustion Products: Aldehydes, oxides of carbon, sulfur oxides. Does not decompose at ambient temperatures.
Conditions and Materials to Avoid: Excessive heat; high energy sources of ignition.

SECTION 11: TOXICOLOGICAL INFORMATION

Primary Route(s) of Exposure Under Normal Use: Inhalation, eye contact, absorbed through skin.

Target Organ(s): Skin.

Acute Effects: If swallowed, may be aspirated and cause lung damage. May cause cancer. Reproductivity system male/female. May be irritating to the eyes, nose, throat, and lungs. May defat and dry the skin.

Carcinogenic Cat. 2 - *Carcinogenic Classifications are per European Union-EINECS*
Distillate (petroleum), hydrogen treated light naphthenic: Oral, rat: LD50=>2000 mg/kg; Inhalation, rat: LC50 =>5000 mg/m3; Dermal, rabbit: LD50=>20000 mg/kg

Chronic Effects: Dermatitis.

California Prop-65: This standard is or contains chemicals known to the state of California to cause cancer. Components in this standard are listed as RTK in Massachusetts, Pennsylvania & New Jersey.

SECTION 12: ECOLOGICAL INFORMATION

No information available on this preparation or mixture. By complying with sections 6 & 7 there will be no release into the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

To determine proper disposal, consult applicable federal, state and local environmental control regulations.

SECTION 14: TRANSPORT INFORMATION

Shipment Name/Type: Non-hazardous for transport.
UN Number: NA Shipping/Hazardous Class: NA Packing Group: NA

Shipping regulations are based on combinations of criteria such as quantity, class and packaging according to DOT, IATA and (49) CFR.

SECTION 15: REGULATORY INFORMATION

EU Symbol of Danger: Toxic (T)
EU Risk Phrases: May cause cancer [R45]

U.S. TSCA: Constitutes listed
Canada: This product has been classified according to the hazard criteria of the CPR and this MSDS contains all the information required by the CPR.

SECTION 16: OTHER INFORMATION

United States EPA Regulatory Information:		**NFPA Rating:**	**Health: 1**	**Flammability: 1**	**Reactivity: 0**	
SARA 313:	**NA**					
CERCLA RQ:	**NA**	**HMIS Rating:**	**Health: 1**	**Flammability: 1**	**Physical Hazard:**	**0**

NOTE: NA = Data not available, not established, determined or not pertinent.

MATERIAL SAFETY DATA SHEET
ERA A Waters Company

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER: ERA
ADDRESS: 16341 Table Mountain Parkway
Golden, CO, 80403 U.S.A.

BUSINESS PHONE: 303-431-8454
FAX: 303-421-0159 **EMAIL:** info@eraqc.com
CHEMICAL EMERGENCY PHONE: 352-535-5053 (INFOTRAC)

Product Name(s): **PCBs in Soil, PriorityPollutnT™, PCBs in Soil**

Catalog / Part Number(s): **490, 491, 492, 493, 494, 495, 496, 497, 498, 624, 624AL1-4, 726, 186004307, 186004308, 186004309, 186004310, 186004311, 186004312, 186004313, 186004314, 186004321**

MSDS Creation Date: November 22, 2005
Revision Date: July 19, 2012

MSDS Reference Number: 490-498

SECTION 2: HAZARDS IDENTIFICATION

Not hazardous according to Directive 199/45/EC. Use only as directed an in accordance with good laboratory practices.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

				EXPOSURE LIMITS		EU LABEL
CHEMICAL INGREDIENT NAME	CAS NUMBER	EC NUMBER	% BY WT.	OSHA	ACGIH	HAZARD LABEL
No Hazardous Ingredients	NA	NA	NA	NA	NA	NA

Notes: Each product is 20-50 grams of an internal standard containing a mixture of organic chemicals & PCB arochlors with levels <0.05 % dried in inert clean topsoil/sand. The soil may contain silica, crystalline – quartz. The sample is solid, loose dirt and does not contain liquid. Considered Non-Hazardous under OSHA 1910.1200 (HazCom) as product contains no known or potential carcinogens in excess of 0.1% of the composition nor any other hazardous chemical in excess of 1% of the composition.
Material Use: Analytical reagent or certified reference material used in laboratories. Uses also include research and development.

SECTION 4: FIRST-AID MEASURES

Inhalation: Remove to fresh air.
Skin Contact: Flush with water.
Eye Contact: Immediately flush with water for a minimum of 15 minutes.
Ingestion: Get medical attention.
After following first aid measures, seek medical attention.

SECTION 5: FIRE-FIGHTING MEASURES

Flammable Properties: Not flammable.
Extinguishing Media: Dry chemical, carbon dioxide or appropriate foam.
Unique Aspects Contributing To a Fire: None.
Special Fire Fighting Procedures: None.
Note: As in any fire, wear self-contained breathing apparatus, and full protective gear.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Sweep up dirt and avoid creating dust. Place wastes into closed containers for proper disposal.

SECTION 7: HANDLING AND STORAGE

Keep container tightly closed. Store is a cool dry place. Handle in accordance with good laboratory practices. This product is intended for use only by people trained in the safety and handling of chemicals and laboratory preparations.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Handle in accordance with good laboratory practices.
Respiratory Protection: Not normally needed. May use HEPA or nuisance dust mask to reduce inhalation of dust.
Eye Protection: Safety glasses with side shields.
Skin Protection: Neoprene or other chemical resistant gloves. Disposable nitrile gloves are acceptable for light intermittent exposure.
Engineering Controls: Work in a fume hood or use general or other local exhaust ventilation to meet Exposure Limits.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

DATA FOR MIX/MATRIX:

Appearance:	**brown soil or blond sand**	**Specific Gravity:**	**NA**	**Melting Point:**	**NA**
Physical State:	**Solid**	**Flash Point:**	**NA**	**Vapor Pressure:**	**NA**
Odor:	**NA**	**Explosion Limits:**	**NA**	**Vapor Density (air=1):**	**NA**
pH:	**NA**	**Boiling Point:**	**NA**	**Solubility in Water:**	**NA**

SECTION 10: STABILITY AND REACTIVITY

Hazardous Polymerization Will Not Occur __X__ May Occur____ Stability: Stable __X__ Unstable ____
Hazardous Decomposition/Combustion Products: NA
Conditions and Materials to Avoid: NA

SECTION 11: TOXICOLOGICAL INFORMATION

Primary Route(s) of Exposure Under Normal Use: NA

Target Organ(s): NA

Acute Effects: NA

Chronic Effects: NA

Other Information: Chemical Ingredient(s) not classified as carcinogen(s) by OSHA, IARC, NTP, ACGIH, or California.

SECTION 12: ECOLOGICAL INFORMATION

No information available on this preparation or mixture. By complying with sections 6 & 7 there will be no release into the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

To determine proper disposal, consult applicable federal, state and local environmental control regulations.

SECTION 14: TRANSPORT INFORMATION

Shipment Name/Type: Non-hazardous for transport.
UN Number: NA Shipping/Hazardous Class: NA Packing Group: NA
Shipping regulations are based on combinations of criteria such as quantity, class and packaging according to DOT, IATA and (49) CFR.

SECTION 15: REGULATORY INFORMATION

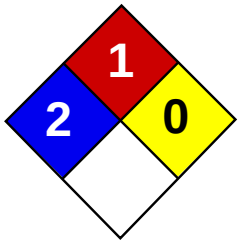
EU Symbol of Danger: NA
EU Risk Phrases: NA

U.S. TSCA: NA
Canada: This product has been classified according to the hazard criteria of the CPR and this MSDS contains all the information required by the CPR.

SECTION 16: OTHER INFORMATION

United States EPA Regulatory Information:		**NFPA Rating:**	**Health: NA**	**Flammability: NA**	**Reactivity: NA**	
SARA 313:	**NA**					
CERCLA RQ:	**NA**	**HMIS Rating:**	**Health: NA**	**Flammability: NA**	**Physical Hazard:**	**NA**

NOTE: NA = Data not available, not established, determined or not pertinent.



Health	2
Fire	1
Reactivity	0
Personal Protection	C

Material Safety Data Sheet
Pyrene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Pyrene

Catalog Codes: SLP3868

CAS#: 129-00-00

RTECS: UR2450000

TSCA: TSCA 8(b) inventory: Pyrene

CI#: Not available.

Synonym: Benzo(D,E,F)phenanthrene

Chemical Name: Pyrene

Chemical Formula: C16-H10

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Pyrene	129-00-00	100

Toxicological Data on Ingredients: Pyrene: ORAL (LD50): Acute: 2700 mg/kg [Rat]. 800 mg/kg [Mouse].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

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

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

Serious Skin Contact: Not available.

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

Serious Inhalation: Not available.

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of heat, of combustible materials. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of heat. Non-explosive in presence of open flames and sparks.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested,

seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F). Preferably refrigerate.

Section 8: Exposure Controls/Personal Protection

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

Personal Protection: Safety glasses. Synthetic apron. Gloves (impervious).

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid. Powdered solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 202.26 g/mole

Color: Yellow.

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

Boiling Point: 404°C (759.2°F)

Melting Point: 151.2°C (304.2°F)

Critical Temperature: Not available.

Specific Gravity: 1.271 @ 23 C (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 4.9

Ionicity (in Water): Not available.

Dispersion Properties:
Is not dispersed in cold water, hot water. See solubility in diethyl ether.

Solubility:
Soluble in diethyl ether. Insoluble in cold water, hot water. Pyrene is fairly soluble in organic solvents. It is soluble in alcohol, benzene, carbon disulfide, ether, petroleum ether, and toluene

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 800 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May affect genetic material (mutagenic). May cause cancer (tumorigenic) according to animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation. May be absorbed through skin. Eyes: May cause eye irritation. Conjunctival irritation may be noted. Inhalation: May cause respiratory tract irritaiton. Ingestion: May cause gastrointestinal tract irritation. May affect behavior/Central Nervous System (excitation and muscel spasicity), liver and urinary system, and immune system, and blood.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 1.8 mg/l 48 hours [Water flea].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

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

Section 14: Transport Information

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

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut carcinogen reporting list.: Pyrene Illinois chemical safety act: Pyrene New York release reporting list: Pyrene Pennsylvania RTK: Pyrene Massachusetts RTK: Pyrene Massachusetts spill list: Pyrene New Jersey: Pyrene New Jersey spill list: Pyrene Louisiana RTK reporting list: Pyrene Louisiana spill reporting: Pyrene California Director's list of Hazardous Substances: Pyrene TSCA 8(b) inventory: Pyrene TSCA 8(a) CAIR: Pyrene TSCA 8(d) H and S data reporting: Pyrene: June 1, 1987-June1, 1997 SARA 302/304/311/312 extremely hazardous substances: Pyrene CERCLA: Hazardous substances.: Pyrene: 5000 lbs. (2268 kg)

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

Other Classifications:

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

DSCL (EEC):
R20/21/22- Harmful by inhalation, in contact with skin and if swallowed. S2- Keep out of the reach of children. S36/37- Wear suitable protective clothing and gloves. S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: C

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

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves (impervious). Synthetic apron. Not applicable. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 06:14 PM

Last Updated: 05/21/2013 12:00 PM

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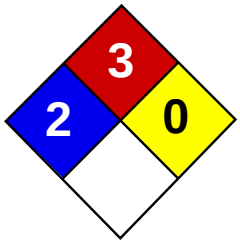

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

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

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

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

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

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

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

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

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N2O4; AgClO4; BrF3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

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

Large Spill:
Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

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

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

Section 8: Exposure Controls/Personal Protection

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

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

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

Exposure Limits:
TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

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

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

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

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Cauess mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophostatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

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

Other Classifications:

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

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:30 PM

Last Updated: 05/21/2013 12:00 PM

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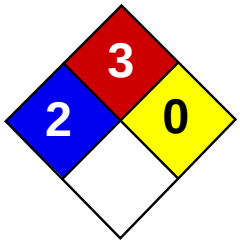

Material Safety Data Sheet
Xylenes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Xylenes

Catalog Codes: SLX1075, SLX1129, SLX1042, SLX1096

CAS#: 1330-20-7

RTECS: ZE2100000

TSCA: TSCA 8(b) inventory: Xylenes

CI#: Not available.

Synonym: Xylenes; Dimethylbenzene; xylol; methyltoluene

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

Chemical Formula: C6H4(CH3)2

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

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

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

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

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

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

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

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

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

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

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

Flammable Limits: LOWER: 1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

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

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

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

Special Remarks on Explosion Hazards:
Vapors may form explosive mixtures with air. Containers may explode when heated. May polymerize explosively when heated. An attempt to chlorinate xylene with 1,3-Dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin) caused a violent explosion

Section 6: Accidental Release Measures

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

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined

areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

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

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

Section 8: Exposure Controls/Personal Protection

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

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

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

Exposure Limits:
TWA: 100 (ppm) [Canada] TWA: 435 (mg/m3) [Canada] TWA: 434 STEL: 651 (mg/m3) from ACGIH (TLV) [United States] TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless. Clear

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

Boiling Point: 138.5°C (281.3°F)

Melting Point: -47.4°C (-53.3°F)

Critical Temperature: Not available.

Specific Gravity: 0.864 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 1 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Miscible with absolute alcohol, ether, and many other organic liquids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles

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

Corrosivity: Non-corrosive in presence of glass.

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

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2119 mg/kg [Mouse]. Acute dermal toxicity (LD50): >1700 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5000 4 hours [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

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

Special Remarks on Toxicity to Animals:
Lowest Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Man] - Route: Oral; Dose: 10000 ppm/6H

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in animal. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects (male and femael fertility (spontaneous abortion and fetotoxicity)) and birth defects based animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. Can be absorbed through skin. Eyes: Causes eye irritation. Inhalation: Vapor causes respiratory tract and mucous membrane irritation. May affect central nervous system and behavior (General anesthetic/CNS depressant with effects including headache, weakness, memory loss, irritability, dizziness, giddiness, loss of coordination and judgement, respiratory depression/arrest or difficulty breathing, loss of appetite, nausea, vomiting, shivering, and possible coma and death). May also affects blood, sense organs, liver, and peripheral nerves. Ingestion: May cause gastrointestinal irritation including abdominal pain, vomiting, and nausea. May also affect liver and urinary system/ kidneys. May cause effects similar to those of acute inhalation. Chronic Potential Health Effects: Chronic inhalation may affect the urinary system (kidneys) blood (anemia), bone marrow (hyperplasia of bone marrow) brain/behavior/Central Nervous system. Chronic inhalation may alsocause mucosal bleeding. Chronic ingestion may affect the liver and metabolism (loss of appetite) and may affect urinary system (kidney damage)

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Xylenes UNNA: 1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

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

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

Other Classifications:

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

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

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Close this window MSDS

Common Name: GREEN PATCH ASPHALT

Manufacturer: COLD MIX

MSDS Revision Date: 4/18/2013

MSDS Format: No Format Specified

Grainger Item Number(s): 39F846, 39F847

Manufacturer Model Number(s):

MSDS Table of Contents

Click the desired link below to jump directly to that section in the MSDS.

CMM
COLD MIX MANUFACTURING

GREEN PATCH(R*)
PAVING THE WAY TO GO GREEN

GREENPATCH 50 POUND BAG - ITEM #39F846
GREENPATCH 40 POUND PAIL - ITEM #39F847

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

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PRODUCT NAME(S): GREEN PATCH COLD MIX ASPHALT

SYNONYMS: COLD MIX/POTHOLE PATCHING MATERIAL

PRODUCT CODE NUMBER:

PRODUCT USES:
GREEN PATCH COLD MIX ASPHALT IS A VOC-FREE HIGH PERFORMANCE COLD PATCH FOR USE IN REPAIRING ASPHALT PAVEMENT, PARKING LOTS, AND DRIVEWAYS.

MANUFACTURING INFORMATION:
COLD MIX MANUFACTURING
120-30 26TH AVENUE
FLUSHING, NY 11354

CONTACT: MIKE MILANO

GENERAL INFORMATION TELEPHONE NUMBER: 718-463-1444
WEBSITE: WWW.GREENPATCH.COM

EMERGENCY TELEPHONE NUMBERS:
718-463-1444 (8 A.M. - 5 P.M. EST)
718-463-6292 FAX
845-216-1926 AFTER HOURS

SECTION 2. COMPOSITION INFORMATION ON INGREDIENTS

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INGREDIENT	CAS NUMBER	PERCENT BY WEIGHT
AGGREGATE (DOLOMITE)	7000-29-5	40 - 60
RECLAIMED ASPHALT PAVEMENT (RAP)	VARIOUS	40 - 60
ASPHALT (AS FUME)	8052-42-4	<10
CRYSTALLINE SILICA (AS QUARTZ) (NATURALLY IN AGGREGATE & RAP	14808-60-7	>1
FATTY ACID ALKYL ESTERS	VARIOUS	<4

SECTION 3. HAZARD INFORMATION

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EXCLAMATION MARK

WARNING:

TOXIC - HARMFUL BY INHALATION. (CONTAINS CRYSTALLINE SILICA)

IRRITANT: CAUSES EYE, SKIN AND INHALATION IRRITATION.

USE PROPER ENGINEERING CONTROLS, WORK PRACTICES, AND PERSONAL PROTECTIVE EQUIPMENT.

READ MSDS FOR DETAILS.

EYE PROTECTION

GLOVES

EMERGENCY OVERVIEW:
GREEN PATCH IS A BLEND OF AGGREGATES COATED WITH AN ASPHALT MIXTURE DESIGNED FOR USE AND APPLICATION AT AMBIENT TEMPERATURES. THE PRODUCT SHOULD NOT BE HEATED. IF THE PRODUCT IS HEATED, THE RELEASE OF TOXIC HYDROGEN SULFIDE (H2S) MAY OCCUR. CONTENT WITH HEATED COATED AGGREGATE MAY RESULT IN THERMAL BURNS.

PRIMARY ROUTES OF ENTRY: SKIN AND/OR EYE CONTACT.

EYE CONTACT:
AIRBORNE PARTICULATES MAY CAUSE IMMEDIATE OR DELAYED IRRITATION OR INFLAMMATION. EYES MAY BECOME RED OR ITCHY. EYE CONTACT REQUIRES IMMEDIATE FIRST AID.

SKIN CONTACT:
MAY CAUSE SKIN IRRITATION AND DERMATITIS UPON PROLONGED CONTACT.

INGESTION (NOT A PROBABLE ROUTE OF EXPOSURE):
IF INGESTION OCCURS, DO NOT INDUCE VOMITING. INGESTION MAY CAUSE STOMACH DISTRESS, NAUSEA, OR VOMITING. IF CONSCIOUS, DRINK WATER. SEEK MEDICAL ATTENTION OR CONTACT POISON CONTROL CENTER IMMEDIATELY.

INHALATION (NOT A PROBABLE ROUTE OF EXPOSURE):
MOVE TO FRESH AIR. SEEK MEDICAL ATTENTION.

CHRONIC CARCINOGENICITY EFFECTS:
THIS PRODUCT OR ONE OF ITS INGREDIENTS PRESENT AT 0.1% OR MORE, ARE LISTED AS A CARCINOGEN BY NTP, ARC, OR OSHA.

SEE SECTION 11 (TOXICOLOGICAL INFORMATION) FOR DETAILS.

SECTION 4. FIRST AID MEASURES

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EYES:
IN CASE OF CONTACT, HOLD EYELIDS OPEN AND IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION IMMEDIATELY IF IRRITATION DEVELOPS AND PERSISTS.

SKIN:
REMOVE CONTAMINATED CLOTHING AND SHOES. WASH AFFECTED AREAS WITH SOAP AND WATER, OR A MILD DETERGENT. GET MEDICAL ATTENTION IF SYMPTOMS DEVELOP.

INHALATION:
REMOVE PERSON FROM THE CONTAMINATED AREA TO FRESH AIR. IF BREATHING IS DIFFICULT, GIVE OXYGEN. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. GET MEDICAL ATTENTION IMMEDIATELY. SEEK MEDICAL ATTENTION FOR DISCOMFORT OR IF COUGHING OR OTHER SYMPTOMS DO NOT SUBSIDE.

INGESTION:
GET MEDICAL ATTENTION IMMEDIATELY. DO NOT INDUCE VOMITING. IF CONSCIOUS, HAVE PERSON DRINK PLENTY OF WATER.

SECTION 5. FIRE FIGHTING MEASURES

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FLASH POINT: NOT APPLICABLE (N/A)

AUTO IGNITION TEMPERATURES: N/A

LOWER EXPLOSIVE LIMIT: N/A
UPPER EXPLOSIVE LIMIT: N/A

GENERAL HAZARD:
A GRANULATED SOLID WITH A PARTIALLY COMBUSTIBLE COATING, AVOID BREATHING FUMES.

FIRE AND EXPLOSION HAZARDS:
DURING A FIRE, CARBON MONOXIDE, CARBON DIOXIDE, OXIDES OF NITROGEN AND SULFUR, HYDROGEN SULFIDE AND IRRITATING AND/OR TOXIC GASES MAY BE GENERATED.

EXTINGUISHING MEDIAN:
CARBON DIOXIDE, WATER SPRAY (WITH CAUTION) OR DRY CHEMICAL.

FIRE FIGHTING INSTRUCTIONS:
A SCBA AND FULL PROTECTION GEAR IS RECOMMENDED TO LIMIT EXPOSURE TO COMBUSTION PRODUCTS WHEN FIGHTING ANY FIRE.

SECTION 6. ACCIDENT RELEASE MEASURES

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COLLECT AND DISPOSE IN ACCORDANCE WITH APPLICABLE REGULATIONS.

AVOID RELEASE TO WATERWAYS AND SEWERS.

GENERAL:
USE A SHOVEL TO SCOOP UP AND PLACE IN SUITABLE STURDY CONTAINER FOR RECOVERY OR DISPOSAL. WEAR APPROPRIATE PROTECTION EQUIPMENT DESCRIBED IN SECTION 8.

SECTION 7. HANDLING AND STORAGE

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GENERAL:
KEEP CONTAINERS/BAGS TIGHTLY CLOSED. STORE IN COOL, DRY, WELL-VENTILATED AREAS. DO NOT EXPOSE TO HEAT, OPEN FLAMES, STRONG OXIDIZERS OR SOURCES OF IGNITION.

USAGE:
USE ONLY WITH ADEQUATE VENTILATION.

AVOID CONTACT WITH SKIN, EYES AND CLOTHING. THOROUGHLY WASH HANDS AND EXPOSED SKIN IF EXPOSED.

CLOTHING: REMOVE AND LAUNDER CLOTHING THAT IS SOILED.

SECTION 8. EXPOSURE CONTROL AND PERSONAL PROTECTION

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ENGINEERING CONTROLS: USE WITH ADEQUATE AND LOCAL EXHAUST VENTILATION.

PERSONAL PROTECTION EQUIPMENT (PPE):
EYE AND FIRE PROTECTION; ANSI APPROVED GLASSES, SAFETY GOGGLES OR FIRE SHIELD RECOMMENDED.

SKIN PROTECTION: USE PROTECTIVE GLOVES AND APRON TO PREVENT SKIN CONTACT.

FOOT PROTECTION: WEAR ANSI APPROVED SAFETY FOOTWEAR.

RESPIRATORY PROTECTION:
NONE NORMALLY REQUIRED. RESPIRATORY PROTECTION EQUIPMENT USE MAY BE REQUIRED FOR SECONDARY OPERATION, SUCH CUTTING OR OPERATIONS CAUSING DUST OR FUMES. THE LEVEL OF RESPIRATORY PROTECTION REQUIRED SHOULD BE BASED ON THE EVALUATION OF CHEMICAL EXPOSURE BY A HEALTH OR SAFETY PROFESSIONAL.

OCCUPATIONAL EXPOSURE LIMITS FOR INDIVIDUAL INGREDIENTS (IF APPLICABLE):

INGREDIENT	OSHA PEL - TWA	ACGIH TLV-TWA
ASPHALT (FUME)	5 MG/M3	0.5 MG/M3 BENZENE SOLUBLE AEROSOL
SILICA (QUARTZ)	10 MG/M3/%SiO2+2 RESPIRABLE DUST	0.25 MG/M3

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

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APPEARANCE: BLACK, GRANULATED SOLID

EVAPORATION RATE: N/A

ODOR: SLIGHT PETROLEUM ODOR

PH: N/A

PHYSICAL STATE: GRANULATED SOLID

BOILING POINT: N/A

VAPOR PRESSURE: N/A

FREEZING POINT: N/A

VAPOR DENSITY: N/A

SOLUBILITY: NOT SOLUBLE

SPECIFIC GRAVITY: >2.3

VOLATILE POINT: <0.2%

SECTION 10. STABILITY AND REACTIVITY

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STABILITY:
STABLE. AVOID CONTACT WITH HEAT, SOURCES OF IGNITION AND OPEN FLAME.

INCOMPATIBILITY:
MAY BE INCOMPATIBLE WITH STRONG ACIDS, BASES AND OXIDIZING AGENTS.

HAZARDOUS POLYMERIZATION: NOT EXPECTED TO OCCUR.

HAZARDOUS DECOMPOSITION:
NOT EXPECTED TO OCCUR IF HANDLED AND STORED PROPERLY.

CONDITION TO AVOID:
SOURCES OF IGNITION, OPEN FLAME AND STRONG OXIDIZING AGENTS.

SECTION 11. TOXICOLOGICAL INFORMATION

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CHRONIC/CARCINOGENICITY:

IARC CLASSIFIES THE BELOW LISTED INGREDIENTS AS CARCINOGENIC TO HUMANS

SILICA, QUARTZ (GROUP 1)

ASPHALT AS FUME (GROUP 3A)

ACGIH (A2) NTP (GROUP 2) HAVE DESIGNATED SILICA, QUARTZ AS SUSPECTED HUMAN CARCINOGENS

MISCELLANEOUS TOXICOLOGICAL INFORMATION:
TESTING HAS NOT BEEN CONDUCTED ON THIS PRODUCT. AVAILABLE DATA FOR

INDIVIDUAL INGREDIENTS ARE NOTED BELOW.

COMPONENT	OSHA-PEL-TWA (MG/M2)	ACGIH TLV-TWA (MG/M2)	LD50 (RAT, ORAL)	LC50
ASPHALT (FUME)	N/A	0.5	N/A	N/A
CRYSTALLINE SILICA (QUARTZ)	[(10) / (% SiO2+2)] (R); [(30) / (%SiO+2)] (T)	0.025 (R)	N/A	N/A
FATTY ACID ALKYL ESTER	N/A	N/A	17.G/KG	N/A

SECTION 12. ECOLOGICAL INFORMATION

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THE ENVIRONMENTAL IMPACT (ECO-TOXICITY) OF THIS PRODUCT HAS NOT BEEN INVESTIGATED.

THE FATTY ACID ALKYL ESTER IS BIODEGRADABLE.

SECTION 13. DISPOSAL CONSIDERATIONS

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WASH DISPOSAL METHOD:

COMPONENT WASTE NUMBERS:
EPA WASTE NUMBERS ARE NOT AVAILABLE FOR THIS PRODUCT OR ITS COMPONENTS.

INSTRUCTIONS:
DISPOSE IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.

REFER TO SECTION 7 FOR HANDLING PROCEDURES AND SECTION 8 FOR PPE RECOMMENDATIONS.

CONTAMINATED PACKAGING: DISPOSE IN ACCORDANCE WITH LOCAL REGULATIONS.

SECTION 14. TRANSPORTATION INFORMATION

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US DOT: NOT REGULATED

IMDG: NOT REGULATED

IATA: NOT REGULATED

TDG: NOT REGULATED

SECTION 15. REGULATORY INFORMATION

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U.S. REGULATORY INFORMATION:

OSHA/MSHA HAZARD COMMUNICATION:
THIS PRODUCT IS CONSIDERED BY OSHA/MSHA TO BE A HAZARDOUS CHEMICAL AND SHOULD BE IN THE EMPLOYEES' HAZARD COMMUNICATION PACKAGE.

CERCLA/SUPERFUND:
NEITHER THIS PRODUCT NOR ITS COMPONENTS ARE LISTED AS A CERCLA HAZARDOUS SUBSTANCE.

EPCRA SARA TITLE III:

COMPONENT	SARA 311/312	SARA 313 TITLE III
AGGREGATE (SILICA)	ACUTE HEALTH HAZARD (IRRITATION)	
ASPHALT	DELAYED (CHRONIC) HEALTH EFFECTS	

RCRA:
IF DISCARDED AS PURCHASED, THIS PRODUCT IS NOT HAZARDOUS WASTE EITHER BY LISTING OR CHARACTERISTIC.

TSCA:
COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TOXIC SUBSTANCES CONTROL ACT (TSCA) INVENTORY.

INGREDIENTS/COMPONENTS STATE REGULATED:

COMPONENT	STATE					
	CA(1)	MA	MN	NJ	PA	RI
SILICA, QUARTZ	YES	YES	NK	YES	YES	NK
ASPHALT	YES	YES	YES	YES	YES	YES

(1) CONTAINS SUBSTANCES CRYSTALLINE SILICA AND ASPHALT; KNOWN BY STATE OF CALIFORNIA TO CAUSE CANCER. CALIFORNIA'S PROPOSITION 65.

CANADIAN REGULATORY INFORMATION:
CLASSIFICATION OF THIS PRODUCT BY HAZARDOUS CRITERIA OF CPA COMPONENT CRYSTALLINE SILICA AS D2A - VERY TOXIC AND IS SUBJECT TO WHMIS REQUIREMENTS.

WHMIS - CANADA PICTOGRAMS): D2 - MATERIALS CAUSING OTHER TOXIC EFFECTS

NFPA:
1
0
0

HMIS:
HEALTH 1
FLAMMABILITY 0
REACTIVITY 0
PERSONAL PROTECTION

SECTION 16. OTHER INFORMATION

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ABBREVIATIONS:

>: GREATER THAN

<: LESS THAN

ACGIH: AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS

ANSI: AMERICAN NATIONAL STANDARDS INSTITUTE

ARC: AMERICAN RED CROSS

CAS NO.: CHEMICAL ABSTRACT SERVICE NUMBER

CERCLA:
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT

CPA: CONSUMER PROTECTION AGENCY

DOT: U.S. DEPARTMENT OF TRANSPORTATION

EPA: ENVIRONMENTAL PROTECTION AGENCY

EPCRA: EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT

EST: EASTERN STANDARD TIME

HMIS: HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

IARC: INTERNATIONAL AGENCY FOR RESEARCH ON CANCER

IATA: INTERNATIONAL AIR TRANSPORT ASSOCIATION.

IMDG: INTERNATIONAL MARITIME DANGEROUS GOODS CODE

LC50: LETHAL CONCENTRATION

LD50: LETHAL DOSE

MG/M3: MILLIGRAMS PER CUBIC METER

MSHA: MINE SAFETY AND HEALTH ADMINISTRATION

N/A: NOT APPLICABLE

NFPA: NATIONAL FIRE PROTECTION ASSOCIATION

NTP: NATIONAL TOXICOLOGY PROGRAM

OSHA: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

PEL: PERMISSIBLE EXPOSURE LIMIT

PH: NEGATIVE LOG OF HYDROGEN ION

PPE: PERSONAL PROTECTIVE EQUIPMENT

R: RESPIRABLE PARTICULATE

RCRA: RESOURCE CONSERVATION AND RECOVERY ACT

SARA: SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT

SCBA: SELF-CONTAINED BREATHING APPARATUS

T: TOTAL PURCHASE

TDG: TRANSPORTATION OF DANGEROUS GOODS

TLV: THRESHOLD LIMIT VALUE

TSCA: TOXIC SUBSTANCES CONTROL ACT

TWA: TOTAL WEIGHTED AVERAGE (8 HOUR)

VOC: VOLATILE ORGANIC COMPOUND

WHMIS: WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM

THIS MSDA WAS REVISED ON APRIL 18, 2013 BY PRI ASPHALT TECHNOLOGIES, INC.; TAMPA, FL 33610.

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U.S. SILICA COMPANY

Material Safety Data Sheet

Product Name: Silica Sand and Ground Silica
Product Description: Crystalline Silica

1. Identification of the substance/preparation and of the company/undertaking

1.1. Identification of the substance or preparation

Product Name/Trade Names:
Sand and Ground Silica Sand (sold under various names: ASTM TESTING SANDS • GLASS SAND • FILPRO® · FLINT SILICA • DM-SERIES • F-SERIES • FOUNDRY SANDS • FJ-SERIES H-SERIES • L-SERIES • N-SERIES • NJ SERIES • OK-SERIES • P-SERIES • T-SERIES • hydraulic fracturing sand, all sizes • frac sand, all sizes • MIN-U-SIL® Fine Ground Silica • MYSTIC WHITE® • #1 DRY • #1 SPECIAL • PENN SAND® • PRO WHITE® · SILURIAN® · Q-ROK® • SIL-CO-SIL® Ground Silica • MICROSIL® • SUPERSIL® • MASON SAND • GS SERIES • PER-SPEC • proppant, all sizes • SHALE FRAC® - SERIES • KOSSE WHITE® • OTTAWA WHITE® • OPTIJUMP®.

Chemical Name or Synonym:
Crystalline Silica (Quartz), Sand, Silica Sand, Flint, Ground Silica, Silica Flour.
White or tan sand or ground silica with no odor.

1.2. Use of the Substance/Preparation

Main Applications (non-exhaustive list): brick, ceramics, foundry castings, glass, grout, hydraulic fracturing sand, frac sand, proppant, mortar, paint and coatings, silicate chemistry, silicone rubber, thermoset plastics.

DO NOT USE U.S. SILICA COMPANY SAND OR GROUND SILICA FOR SAND BLASTING.

1.3. Company / Producer

U.S. Silica Company
8490 Progress Drive, Suite 300
Frederick, MD 21701
U.S.A.

Phone: 800-243-7500
Emergency Phone: 301-682-0600
Fax: 301-682-0690

2. Hazards Identification

2.1. EMERGENCY OVERVIEW:

The material is white or tan sand, or ground sand; the ground sand looks like white powder. It has no odor and is not flammable, combustible or explosive. It does not cause burns or severe skin or eye irritation. A single exposure will not result in serious adverse health effects. Crystalline silica is not known to be an environmental hazard.

Personal protective equipment – respirator -- is not required unless the concentration of respirable silica dust exceeds applicable occupational exposure levels.

Crystalline silica (quartz) is incompatible with hydrofluoric acid, fluorine, chlorine trifluoride or oxygen difluoride.

2.2. OSHA REGULATORY STATUS
This material is considered hazardous under the OSHA Hazard Communications Standard (29 CFR 1910.1200).

2.3. POTENTIAL HEALTH EFFECTS: The potential health effects are CHRONIC; the route of exposure is INHALATION; the hazards described are associated with respirable crystalline silica dust – respirable dust particles are less than 10 microns in aerodynamic diameter.
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2.3.1. Inhalation:
a. Silicosis: The prolonged repeated inhalation of respirable crystalline silica can cause silicosis, a fibrosis (scarring) of the lungs.

Silicosis may be progressive; it may lead to disability and death.

b. Lung Cancer: Crystalline silica is classified as carcinogenic to humans.

c. Tuberculosis: Silicosis increases the risk of tuberculosis.

d. Autoimmune and Chronic Kidney Diseases: Some studies show excess numbers of cases of scleroderma, connective tissue disorders, lupus, rheumatoid arthritis, chronic kidney diseases and end-stage kidney disease in workers exposed to respirable crystalline silica.

e. Non-Malignant Respiratory Diseases (other than silicosis): Some studies show an increased incidence in chronic bronchitis and emphysema in workers exposed to respirable crystalline silica.

2.3.2. Eye Contact:
Crystalline silica (sand or ground silica) may cause abrasion of the cornea.

2.3.3. Skin Contact:
Not applicable.

2.3.4. Ingestion:
Not applicable.

2.3.5. Chronic Effects:
The adverse health effects -- silicosis, lung cancer, autoimmune and chronic kidney diseases, tuberculosis, and non-malignant respiratory diseases -- are chronic effects.

2.3.6. Signs and Symptoms of Exposure:
Generally, there are no signs or symptoms of exposure to crystalline silica; silicosis may result in shortness of breath, especially upon exertion. See Section 11 for additional information.

2.3.7. Medical Conditions Generally Aggravated by Exposure:
The condition of individuals with lung disease (e.g., bronchitis, emphysema, chronic obstructive pulmonary disease) can be aggravated by exposure.

2.3.8 **Potential Environmental Effects**
None known.

See Section 11, Toxicological Information, for additional detail on potential adverse health effects.

3. Composition / Information on Ingredients

Component / CAS #		%	Hazardous under OSHA Haz Comm Standard?
Crystalline Silica (quartz)	14808-60-7	99.0 – 99.9	Yes
Aluminum Oxide	1344-28-1	<1.0	No
Iron Oxide	1309-37-1	<0.1	No
Titanium Oxide	13463-67-7	<0.1	No

4. First Aid Measures

4.1. Eye Exposure:
Wash immediately with plenty of water. If irritation persists, seek medical attention.

4.2. Skin Exposure:
Not applicable

4.3. Inhalation:
No specific first-aid is necessary since the adverse health effects associated with inhalation of respirable crystalline silica result from chronic exposures. If there is a gross inhalation of crystalline silica, remove the person immediately to fresh air, give artificial respiration as needed, seek medical attention as needed.

4.4. Ingestion:
Not applicable

5. Fire Fighting Measures

5.1. Fire Hazard Data:

Auto ignition: Not Applicable

Flash Point: Not Applicable

Flammability Limits (vol/vol%): **Lower:** Not Applicable **Upper:** Not Applicable

Extinguishing Media:
Product is not flammable, combustible or explosive. Use extinguishing media appropriate for surrounding fire.

Special Fire Fighting Procedures:
Not applicable.

Unusual Fire and Explosion Hazards:
None

6. Accidental Release Measures

6.1. Personal precautions:

Avoid generating dust. If the concentration of respirable silica dust exceeds the OSHA PEL or other applicable limit (if lower than the PEL), wear respirator specified in Section 8 of this Safety Data Sheet.

Environmental precautions: No specific precautions. Discard any product, residue, disposable container or liner in compliance with regulatory requirements.

Methods for cleaning up: Avoid dry sweeping. Do not use compressed air to clean spilled sand or ground silica. Use water spraying/flushing or ventilated or HEPA filtered vacuum cleaning system. Dispose of in closed containers.

7. Handling and Storage

7.1. Handling:

Avoid generating dust. Do not breathe dust. Do not rely on your sight to determine if dust is in the air. Respirable crystalline silica dust may be in the air without a visible dust cloud.

Use adequate exhaust ventilation and dust collection. Maintain and test ventilation and dust collection equipment. Use all available work practices to control dust exposures, such as water sprays. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Keep airborne dust concentrations below permissible exposure limits.

Where necessary to reduce exposures below the PEL or other applicable limit (if lower than the PEL), wear a respirator approved for silica containing dust when using, handling, storing or disposing of this product or bag. See Section 8, for further information on respirators.. Do not alter the respirator. Do not wear a tight-fitting respirator with facial hair such as a beard or mustache that prevents a good face to face piece seal between the respirator and face. Maintain, clean, and fit test respirators in accordance with applicable standards. Wash or vacuum clothing that has become dusty.

Participate in training, exposure monitoring, and health surveillance programs to monitor any potential adverse health effects that may be caused by breathing respirable crystalline silica.

The OSHA Hazard Communication Standard, 29 CFR Sections 1910.1200, 1915.1200, 1917.28, 1918.90, 1926.59 and 1928.21, and state and local worker or community "right-to-know" laws and regulations should be strictly followed.

DO NOT USE U.S. SILICA COMPANY SAND OR GROUND SILICA FOR SAND BLASTING.

7.2. Storage

Use dust collection to trap dust produced during loading and unloading. Keep containers closed and store bags to avoid accidental tearing, breaking, or bursting.

7.3. Specific uses

Apply safe handling recommendations in Section 7.1.

8. Exposure Controls / Personal Protection

8.1. Local Exhaust Ventilation:
Use sufficient local exhaust ventilation to reduce the level of respirable crystalline silica to below the OSHA PEL or other applicable limit (if lower than PEL). See ACGIH "Industrial Ventilation, A Manual of Recommended Practice" (latest edition).

8.2. Respiratory Protection:
If it is not possible to reduce airborne exposure levels to below the OSHA PEL or other applicable limit with ventilation, use the table below to assist you in selecting respirators that will reduce personal exposures to below the OSHA PEL. This table is part of the NIOSH Respirator Selection Logic, 2004, Chapter III, Table 1, "Particulate Respirators". The full document can be found at www.cdc.gov/niosh/npptl/topics/respirators; the user of this MSDS is directed to that site for information concerning respirator selection and use. The assigned protection factor (APF) is the minimum anticipated level of protection provided by each type of respirator worn in accordance with an adequate respiratory protection program. For example, an APF of 10 means that the respirator should reduce the airborne concentration of a particulate by a factor of 10, so that if the workplace concentration of a particulate was 150 ug/m^3, then a respirator with an APF of 10 should reduce the concentration of particulate to 15 ug/m^3.

Assigned protection factor [1]	Type of Respirator (Use only NIOSH-certified respirators)
10	Any air-purifying elastomeric half-mask respirator equipped with appropriate type of particulate filter. [2] Appropriate filtering facepiece respirator. [2,3] Any air-purifying full facepiece respirator equipped with appropriate type of particulate filter. [2] Any negative pressure (demand) supplied-air respirator equipped with a half-mask.
25	Any powered air-purifying respirator equipped with a hood or helmet and a high efficiency (HEPA) filter. Any continuous flow supplied-air respirator equipped with a hood or helmet.
50	Any air-purifying full facepiece respirator equipped with N-100, R-100, or P-100 filter(s). Any powered air-purifying respirator equipped with a tight-fitting facepiece (half or full facepiece) and a high-efficiency filter. Any negative pressure (demand) supplied-air respirator equipped with a full facepiece. Any continuous flow supplied-air respirator equipped with a tight-fitting facepiece (half or full facepiece). Any negative pressure (demand) self-contained respirator equipped with a full facepiece.
1,000	Any pressure-demand supplied-air respirator equipped with a half-mask.

1. The protection offered by a given respirator is contingent upon (1) the respirator user adhering to complete program requirements (such as the ones required by OSHA in 29CFR1910.134), (2) the use of NIOSH-certified respirators in their approved configuration, and (3) individual fit testing to rule out those respirators that cannot achieve a good fit on individual workers.
2. Appropriate means that the filter medium will provide protection against the particulate in question.
3. An APF of 10 can only be achieved if the respirator is qualitatively or quantitatively fit tested on individual workers.

8.3. Exposure controls

8.3.1. Occupational exposure controls / guidelines

Component	CAS No.	OSHA PEL		ACGHI TLV		NISOSH REL		
		TWA	STEL	TWA	STEL	TWA	STEL	Unit
Crystalline Silica (quartz)	14808-60-7	$\frac{10}{\%\ SiO_2 + 2}$	None	0.025	None	0.05	None	mg / m^3

If crystalline silica (quartz) is heated to more than 870°C, quartz can change to a form of crystalline silica known as tridymite; if crystalline silica (quartz) is heated to more than1470°C, quartz can change to a form of crystalline silica known as cristobalite. It OSHA PEL for crystalline silica as tridymite or cristobalite is one-half of the OSHA PEL for crystalline silica (quartz).

Engineering Controls:
Ventilation must be adequate to maintain the crystalline silica concentrations in the workplace air below the exposure limit(s) outlined in Section 8.3.1 of this Safety Data Sheet.

Respiratory Protection
In case of exposure to dust, and in any case if such exposure is above regulatory limits (see above), wear a personal respirator as outlined in Section 8.2 above.

Eye / Face Protection:
If eye contact while using product may be anticipated, wear appropriate safety glasses with side shields or chemical goggles [as described by European Standard EN 166].

Skin Protection
Maintain good industrial hygiene. Protection recommended for workers suffering from dermatitis or sensitive skin.

8.3.2. Environmental Exposure Controls

No special requirements. There is no reported ecotoxicity for silica, a naturally occurring substance abundantly present in nature.

9. Physical and Chemical Properties

9.1. General Information

Physical State:	White or tan sand: granular, crushed or ground to a powder.
Odor:	None

9.2. Important Health, Safety and Environmental Information

pH:	6 - 8
Specific Gravity:	2.65 g/cc
Melting Point:	3110°F/1710°C
Freezing Point	Not Applicable
Boiling Point:	4046°F/2230°C
Flashpoint:	Not Applicable
Flammability:	Not Applicable
Explosive properties:	Not Applicable
Oxidizing properties:	contact with powerful oxidizing agents such as fluorine, chlorine trifluoride, and oxygen difluoride may cause fires.
Vapor Pressure:	None
Relative Density:	Not Applicable
Solubility*:*	Silica will dissolve in hydrofluoric acid and produce a corrosive gas, silicon tetrafluoride
Water Solubility:	Insoluble
Percent Volatiles by Volume:	Not Applicable
Viscosity:	Not Applicable

Vapor density:	Not Applicable
Molecular Weight:	60.08
Evaporation rate:	Not Applicable

10. Stability and Reactivity

10.1. Chemical Stability:
Stable

10.2. Conditions to Avoid:
Contact with powerful oxidizing agents such as fluorine, chlorine trifluoride, and oxygen difluoride may cause fires.

10.3. Materials / Chemicals to Be Avoided:
Contact with powerful oxidizing agents, such as fluorine, chlorine trifluoride and oxygen difluoride, may cause fires.

10.4. Hazardous Decomposition Products:
Will not occur.

10.5. Hazardous Polymerization:
Will not occur.

11. Toxicological Information

The method of exposure that can lead to the adverse health effects described below is inhalation.

A. SILICOSIS

The major concern is silicosis, caused by the inhalation of respirable crystalline silica dust. Silicosis can exist in several forms, chronic (or ordinary), accelerated, or acute.

Chronic or Ordinary Silicosis is the most common form of silicosis, and can occur after many years (15 to 20 or more) of prolonged repeated inhalation of relatively low levels of airborne respirable crystalline silica dust. It is further defined as either simple or complicated silicosis. Simple silicosis is characterized by lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability. Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF). Complicated silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Although there may be no symptoms associated with complicated silicosis or PMF, the symptoms, if present, are shortness of breath and cough. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease secondary to the lung disease (cor pumonale).

Accelerated Silicosis can occur with prolonged repeated inhalation of high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear within five (5) years of initial exposure. Progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except that lung lesions appear earlier and progression is more rapid.

Acute Silicosis can occur after the repeated inhalation of very high concentrations of respirable crystalline silica over a short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough, weakness and weight loss. Acute silicosis is fatal.

B. CANCER

IARC - The International Agency for Research on Cancer ("IARC") concluded that "crystalline silica in the form of quartz or cristobalite dust is carcinogenic to humans (Group 1)". For further information on the IARC evaluation, see IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 100C,"A Review of Human Carcinogens: Arsenic, Metals, Fibres and Dusts " (2011).

The American College of Occupational and Environmental Medicine ("ACOEM") notes: "In 1996, [IARC] re-classified silica as a Class I human lung carcinogen, based on sufficient animal and human data. Although the degree of increased risk varies (with relative risks ranging from 1.3 to 6.9), the risk appears to be greatest in workers with silicosis who smoke. The cancer risk to silica-exposed workers without silicosis (especially if they are not smokers) is less clear despite continuing research, some of which has yielded disparate results." ACOEM, "Medical Surveillance of Workers Exposed to Crystalline Silica", June 2005.

The EU Scientific Committee for Occupational Exposure Limits (SCOEL) concluded in June 2002 (SCOEL Sum Doc. 94-final): "The main effect in humans of inhalation of respirable silica dust is silicosis. There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore preventing the onset of silicosis will also reduce the cancer risk."

C. AUTOIMMUNE DISEASES

Several studies have reported excess cases of several autoimmune disorders, -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis -- among silica-exposed workers.).

D. TUBERCULOSIS

Individuals with silicosis are at increased risk to develop pulmonary tuberculosis, if exposed to tuberculosis bacteria. Individuals with chronic silicosis have a three-fold higher risk of contracting tuberculosis than similar individuals without silicosis.

E. KIDNEY DISEASE

Several studies have reported excess cases of kidney diseases, including end stage renal disease, among silica-exposed workers. For additional information on the subject, the following may be consulted: "Kidney Disease and Silicosis", Nephron, Volume 85, pp. 14-19 (2000).

F. NON-MALIGNANT RESPIRATORY DISEASES

The reader is referred to Section 3.5 of the NIOSH Special Hazard Review cited below, for information concerning the association between exposure to crystalline silica and chronic bronchitis, emphysema and small airways disease. There are studies that disclose an association between dusts found in various mining occupations and non-malignant respiratory diseases, particularly among smokers. It is unclear whether the observed associations exist only with underlying silicosis, only among smokers, or result from exposure to mineral dusts generally (independent of the presence or absence of crystalline silica, or the level of crystalline silica in the dust).

Sources of information:

The ***NIOSH Hazard Review - Occupational Effects of Occupational Exposure to Respirable Crystalline Silica*** published in April 2002 summarizes and discusses the medical and epidemiological literature on the health risks and diseases associated with occupational exposures to respirable crystalline silica. The *NIOSH Hazard Review* should be consulted for additional information, and citations to published studies on health risks and diseases associated with occupational exposure to respirable crystalline silica. The *NIOSH Hazard Review* is available from NIOSH - Publications Dissemination, 4676 Columbia Parkway, Cincinnati, OH 45226, or through the NIOSH web site, www.cdc.gov/niosh/topics/silica, then click on the link "NIOSH Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica".

For a more recent review of the health effects of respirable crystalline silica, the reader may consult *Fishman's Pulmonary Diseases and Disorders*, Fourth Edition, Chapter 57. "Coal Workers' Lung Diseases and Silicosis".

12. Ecological Information

12.1. Ecotoxicological Information:
Crystalline silica (quartz) is not known to be ecotoxic; i.e., no data suggests that crystalline silica (quartz) is toxic to birds, fish, invertebrates, microorganisms or plants.

13. Disposal Considerations

13.1. Waste Disposal Method:
Discard any product, residue, disposable container or liner in full compliance with national regulations.

13.2. Container Handling and Disposal:
Dispose of container and unused contents in accordance with national regulations.

14. Transportation Information

Shipping Name:

ADR/RID/IMO/ICAO /US DOT	**Proper Shipping Name**	Not Regulated
	Hazard Class	Not Regulated
	ID Number	Not Regulated
	Packaging Group	Not Regulated

Crystalline silica (quartz) is not a hazardous material for purposes of transportation under the U. S. Department of Transportation Table of Hazardous Materials, 49 CFR §172.101.

15. Regulatory Information

Silica sand has no harmonized classification & labeling under Directives 67/548/EEC and 1999/45/EC. Because the respirable fraction is high (10% and more) in ground silica (flour), the preparation is self-classified as Xn (harmful). In such case, the following risk and safety phrases are applicable.

Risk Phrases:
R 48/20: Harmful: danger of serious damage to health by prolonged exposure through inhalation.
Safety Phrases:
S 22: Do not breathe dust.
S 38: In case of insufficient ventilation, wear suitable respiratory equipment.

UNITED STATES (FEDERAL AND STATE)

TSCA No.: Crystalline silica (quartz) appears on the EPA TSCA inventory under the CAS No. 14808-60-7.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

CERCLA: Crystalline silica (quartz) is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 40 CFR §302.

Emergency Planning and Community Right to Know Act (SARA Title III): Crystalline silica (quartz) is not an extremely hazardous substance under Section 302 and is not a toxic chemical subject to the requirements of Section 313.

Clean Air Act: Crystalline silica (quartz) mined and processed by U.S. Silica Company is not processed with or does not contain any Class I or Class II ozone depleting substances.

FDA: Silica is included in the list of substances that may be included in coatings used in food contact surfaces, 21 CFR §175.300(b)(3)(xxvi).

NTP: Silica, crystalline (respirable size) is classified as Known to be a Human Carcinogen.

OSHA Carcinogen: Crystalline silica (quartz) is not listed.

California Proposition 65: Crystalline silica (airborne particles of respirable size) is classified as a substance known to the State of California to be a carcinogen.

California Inhalation Reference Exposure Level (REL): California established a chronic REL of 3 µg for silica (crystalline, respirable). A chronic REL is an airborne level of a substance at or below which no adverse health effects are anticipated in individuals indefinitely exposed to the substance at that level.

Massachusetts Toxic Use Reduction Act: Silica, crystalline (respirable size, <10 microns) is “toxic” for purposes of the Massachusetts Toxic Use Reduction Act.

Pennsylvania Worker and Community Right to Know Act: Quartz is a hazardous substance under the Act, but it is not a special hazardous substance or an environmental hazardous substance.

CANADA

Domestic Substances List: U. S. Silica Company products, as naturally occurring substances, are on the Canadian DSL.

WHMIS Classification: D2A

OTHER

EINECS No.: 238-878-4

EEC Label (Risk/Safety Phrases): R 48/20, S22, S38

CLP Label (Hazard Class/Hazard Statement/Precaution Statements):
STOT RE 1/ H372/ P260, P285, P501

IARC: Crystalline silica (quartz) is classified in IARC Group 1.

Australian Inventory of Chemical Substances (AICS): All of the components of this product are listed on the AICS inventory or exempt from notification requirements.

Japan Ministry of International Trade and Industry (MITI): All of the components of this product are existing chemical substances as defined in the Chemical Substance Control Law Registry Number 1-548.

Korea Existing Chemicals Inventory (KECI) (set up under the Toxic Chemical Control Law): Listed on the ECL with registry number 9212-5667.

Philippines Inventory of Chemicals and Chemical Substances (PICCS): Listed for PICCS.

National, state, provincial or local emergency planning, community right-to-know or other laws, regulations or ordinances may be applicable--consult applicable national, state, provincial or local laws.

16. Other Information

16.1 Hazardous Material Information System (HMIS):

Health	*
Flammability	0
Reactivity	0
Protective Equipment	E

* For further information on health effects, see Sections 2, 8 and 11 of this MSDS.

16.2 National Fire Protection Association (NFPA):

Health	0
Flammability	0
Reactivity	0

16.3 Web Sites with Information about Effects of Crystalline Silica Exposure:

The U. S. Silica Company web site will provide updated links to OSHA and NIOSH web sites addressing crystalline silica issues: www.ussilica.com, click on “Info Center”, then click on “Health & Safety”.

The U.S. National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and Health Administration (OSHA) maintain sites with information about crystalline silica and its potential health effects. For NIOSH, http://www.cdc.gov/niosh/topics/silica; for OSHA, http://www.osha.gov/dsg/topics/silicacrystalline/index.

The IARC Monograph concerning crystalline silica, Volume 100C, can be accessed in PDF form at the IARC web site, http://monographs.iarc.fr/ENG/Monographs/PDFs/index.php.

U. S. Silica Company Disclaimer

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Date: March 2012

MATERIAL SAFETY DATA SHEET

ALCONOX®

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Union REACH Regulations

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	**ALCONOX®**
CHEMICAL FAMILY NAME:	Detergent.
PRODUCT USE:	Critical-cleaning detergent for laboratory, healthcare and industrial applications
U.N. NUMBER:	Not Applicable
U.N. DANGEROUS GOODS CLASS:	Non-Regulated Material
SUPPLIER/MANUFACTURER'S NAME:	Alconox, Inc.
ADDRESS:	30 Glenn St., Suite 309, White Plains, NY 10603. USA
EMERGENCY PHONE:	**TOLL-FREE in USA/Canada** 800-255-3924
	International calls 813-248-0585
BUSINESS PHONE:	914-948-4040
DATE OF PREPARATION:	May 2011
DATE OF LAST REVISION:	February 2008

SECTION 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a white granular powder with little or no odor. Exposure can be irritating to eyes, respiratory system and skin. It is a non-flammable solid. The Environmental effects of this product have not been investigated.

US DOT SYMBOLS

Non-Regulated

CANADA (WHMIS) SYMBOLS

EUROPEAN and (GHS) Hazard Symbols

Signal Word: **Warning!**

EU LABELING AND CLASSIFICATION:

Classification of the substance or mixture according to Regulation (EC) No1272/2008 Annex 1
EC# 205-633-8 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 268-356-1 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 231-838-7 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 231-767-1 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 207-638-8 Index# 011-005-00-2
EC# 205-788-1 This substance is not classified in the Annex I of Directive 67/548/EEC

GHS Hazard Classification(s):

Eye Irritant Category 2A

Hazard Statement(s):

H319: Causes serious eye irritation

Precautionary Statement(s):

P260: Do not breath dust/fume/gas/mist/vapors/spray
P264: Wash hands thoroughly after handling
P271: Use only in well ventilated area.
P280: Wear protective gloves/protective clothing/eye protection/face protection/

Hazard Symbol(s):

[Xi] Irritant

Risk Phrases:
R20: Harmful by inhalation
R36/37/38: Irritating to eyes, respiratory system and skin

Safety Phrases:
S8: Keep container dry
S22: Do not breath dust
S24/25: Avoid contact with skin and eyes

HEALTH HAZARDS OR RISKS FROM EXPOSURE:

ACUTE: Exposure to this product may cause irritation of the eyes, respiratory system and skin. Ingestion may cause gastrointestinal irritation including pain, vomiting or diarrhea.

CHRONIC: This product contains an ingredient which may be corrosive.

TARGET ORGANS: ACUTE: Eye, respiratory System, Skin CHRONIC: None Known

SECTION 3 - COMPOSITION and INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	CAS #	EINECS #	ICSC #	WT %	HAZARD CLASSIFICATION; RISK PHRASES
Sodium Bicarbonate	144-55-8	205-633-8	1044	33 - 43%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	268-356-1	Not Listed	10 – 20%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Tripolyphosphate	7758-29-4	231-838-7	1469	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Tetrasodium Pyrophosphate	7722-88-5	231-767-1	1140	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Carbonate	497-19-8	207-638-8	1135	1 - 10%	HAZARD CLASSIFICATION: [Xi] Irritant RISK PHRASES: R36
Sodium Alcohol Sulfate	151-21-3	205-788-1	0502	1 – 5%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Balance of other ingredients are non-hazardous or less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).					

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard *JIS Z 7250: 2000*.

SECTION 4 - FIRST-AID MEASURES

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with contaminated individual.

EYE CONTACT: If product enters the eyes, open eyes while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.

SKIN CONTACT: Wash skin thoroughly after handling. Seek medical attention if irritation develops and persists. Remove contaminated clothing. Launder before re-use.

INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if breathing dificulty continues.

INGESTION: If product is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice. Take a copy of the label and/or MSDS with the victim to the health professional.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin, or eye problems may be aggravated by prolonged contact.

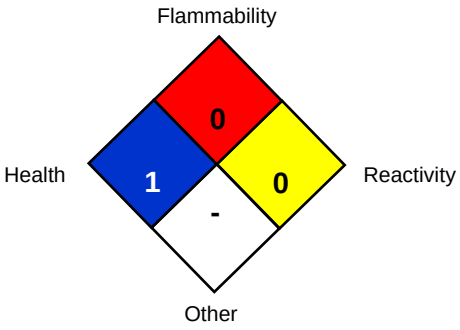
RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

SECTION 5 - FIRE-FIGHTING MEASURES

FLASH POINT: Not Flammable
AUTOIGNITION TEMPERATURE: Not Applicable
FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): NA Upper (UEL): NA
FIRE EXTINGUISHING MATERIALS: As appropriate for surrounding fire. Carbon dioxide, foam, dry chemical, halon, or water spray.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is non-flammable and has no known explosion hazards.
Explosion Sensitivity to Mechanical Impact: Not Sensitive.
Explosion Sensitivity to Static Discharge: Not Sensitive
SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING SYSTEM



HMIS RATING SYSTEM

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD (BLUE)	1
FLAMMABILITY HAZARD (RED)	0
PHYSICAL HAZARD (YELLOW)	0

PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Sect 8		See Sect 8

For Routine Industrial Use and Handling Applications

Hazard Scale: **0** = Minimal **1** = Slight **2** = Moderate **3** = Serious **4** = Severe * = Chronic hazard

SECTION 6 - ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Personnel should be trained for spill response operations.
SPILLS: Contain spill if safe to do so. Prevent entry into drains, sewers, and other waterways. Sweep, shovel or vacuum spilled material and place in an appropriate container for re-use or disposal. Avoid dust generation if possible. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

SECTION 7 - HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing dusts generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Containers of this product must be properly labeled. Store containers in a cool, dry location. Keep container tightly closed when not in use. Store away from strong acids or oxidizers.

SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/GUIDELINES:

Chemical Name	CAS#	ACGIH TWA	OSHA TWA	SWA
Sodium Bicarbonate	144-55-8	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium Tripolyphosphate	7758-29-4	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Tetrasodium Pyrophosphate	7722-88-5	5 mg/m³	5 mg/m³	5 mg/m³
Sodium Carbonate	497-19-8	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium Alcohol Sulfate	151-21-3	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust

Currently, International exposure limits are not established for the components of this product. Please check with competent authority in each country for the most recent limits in place.

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use local exhaust ventilation to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Based on test data, exposure limits should not be exceeded under normal use conditions when using Alconox Detergent. Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Use chemical resistant gloves to prevent skin contact.. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate to prevent contact (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE:	Solid
APPEARANCE & ODOR:	White granular powder with little or no odor.
ODOR THRESHOLD (PPM):	Not Available
VAPOR PRESSURE (mmHg):	Not Applicable
VAPOR DENSITY (AIR=1):	Not Applicable.
BY WEIGHT:	Not Available
EVAPORATION RATE (nBuAc = 1):	Not Applicable.
BOILING POINT (C°):	Not Applicable.
FREEZING POINT (C°):	Not Applicable.
pH:	9.5 (1% aqueous solution)
SPECIFIC GRAVITY 20°C: (WATER =1)	0.85 – 1.1
SOLUBILITY IN WATER (%)	>10% w/w
COEFFICIENT OF WATER/OIL DIST.:	Not Available
VOC:	None
CHEMICAL FAMILY:	Detergent

SECTION 10 - STABILITY and REACTIVITY

STABILITY: Product is stable
DECOMPOSITION PRODUCTS: When heated to decomposition this product produces Oxides of carbon (COx)
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids and strong oxidizing agents.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Contact with incompatible materials and dust generation.

SECTION 11 - TOXICOLOGICAL INFORMATION

TOXICITY DATA: Toxicity data is available for mixture:

CAS# 497-19-8 LD50 Oral (Rat)	4090 mg/kg
CAS# 497-19-8 LD50 Oral (Mouse)	6600 mg/kg
CAS# 497-19-8 LC50 Inhalation (Rat)	2300 mg/m³ 2H
CAS# 497-19-8 LC50 Inhalation (Mouse)	1200 mg/m³ 2H
CAS# 7758-29-4 LD50 Oral (Rat)	3120 mg/kg
CAS# 7758-29-4 LD50 Oral (Mouse)	3100 mg/kg
CAS# 7722-88-5 LD50 Oral (Rat)	4000 mg/kg

SUSPECTED CANCER AGENT: None of the ingredients are found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.
IRRITANCY OF PRODUCT: Contact with this product can be irritating to exposed skin, eyes and respiratory system.
SENSITIZATION OF PRODUCT: This product is not considered a sensitizer.
REPRODUCTIVE TOXICITY INFORMATION: No information concerning the effects of this product and its components on the human reproductive system.

SECTION 12 - ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.
ENVIRONMENTAL STABILITY: No Data available at this time.
EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plants or animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on this product's effects on aquatic life.

SECTION 13 - DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

SECTION 14 - TRANSPORTATION INFORMATION

US DOT; IATA; IMO; ADR:

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.
PROPER SHIPPING NAME: Non-Regulated Material
HAZARD CLASS NUMBER and DESCRIPTION: Not Applicable
UN IDENTIFICATION NUMBER: Not Applicable
PACKING GROUP: Not Applicable.
DOT LABEL(S) REQUIRED: Not Applicable
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): Not Applicable
MARINE POLLUTANT: None of the ingredients are classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B)

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS:
This product is not classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:
This product is not classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):
This product is not classified as Dangerous Goods, by rules of IATA:

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION:
This product is not classified as Dangerous Goods by the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):

This product is not classified by the United Nations Economic Commission for Europe to be dangerous goods.

SECTION 15 - REGULATORY INFORMATION

UNITED STATES REGULATIONS

SARA REPORTING REQUIREMENTS: This product is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows: None

TSCA: All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.

SARA 311/312:

Acute Health: Yes Chronic Health: No Fire: No Reactivity: No

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): None

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): None of the ingredients are on the California Proposition 65 lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: All of the components of this product are on the DSL Inventory

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This product is categorized as a Controlled Product, Hazard Class D2B as per the Controlled Product Regulations

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION:

Classification of the mixture according to Regulation (EC) No1272/2008. See section 2 for details.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: All components of this product are listed on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory if Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftliste List of Toxic Substances:	Listed
U.S. TSCA:	Listed

SECTION 16 - OTHER INFORMATION

PREPARED BY: Paul Eigbrett Global Safety Management, 10006 Cross Creek Blvd. Suite 440, Tampa, FL 33647

Disclaimer: To the best of Alconox, Inc. knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness is not guaranteed and no warranties of any type either express or implied are provided. The information contained herein relates only to this specific product.

ANNEX:

IDENTIFIED USES OF ALCONOX® AND DIRECTIONS FOR USE

Used to clean: Healthcare instruments, laboratory ware, vacuum equipment, tissue culture ware, personal protective equipment, sampling apparatus, catheters, tubing, pipes, radioactive contaminated articles, optical parts, electronic components, pharmaceutical apparatus, cosmetics manufacturing equipment, metal castings, forgings and stampings, industrial parts, tanks and reactors. Authorized by USDA for use in federally inspected meat and poultry plants. Passes inhibitory residue test for water analysis. FDA certified.

Used to remove: Soil, grit, grime, buffing compound, slime, grease, oils, blood, tissue, salts, deposits, particulates, solvents, chemicals, radioisotopes, radioactive contaminations, silicon oils, mold release agents.

Surfaces cleaned: Corrosion inhibited formulation recommended for glass, metal, stainless steel, porcelain, ceramic, plastic, rubber and fiberglass. Can be used on soft metals such as copper, aluminum, zinc and magnesium if rinsed promptly. Corrosion testing may be advisable.

Cleaning method: Soak, brush, sponge, cloth, ultrasonic, flow through clean-inplace. Will foam—not for spray or machine use.

Directions: Make a fresh 1% solution (2 1/2 Tbsp. per gal., 1 1/4 oz. per gal. or 10 grams per liter) in cold, warm, or hot water. If available use warm water. Use cold water for blood stains. For difficult soils, raise water temperature and use more detergent. Clean by soak, circulate, wipe, or ultrasonic method. Not for spray machines, will foam. For nonabrasive scouring, make paste. Use 2% solution to soak frozen stopcocks. To remove silver tarnish, soak in 1% solution in aluminum container. RINSE THOROUGHLY—preferably with running water. For critical cleaning, do final or all rinsing in distilled, deionized, or purified water. For food contact surfaces, rinse with potable water. Used on a wide range of glass, ceramic, plastic, and metal surfaces. Corrosion testing may be advisable.

QUIKRETE®
CEMENT & CONCRETE PRODUCTS™

RAPID SETTING REPAIR MATERIALS

MATERIAL SAFETY DATA SHEET
(Complies with OSHA 29 CFR 1910.1200)

SECTION I: PRODUCT IDENTIFICATION

The QUIKRETE® Companies
One Securities Centre
3490 Piedmont Road, Suite 1300
Atlanta, GA 30329

Emergency Telephone Number
(770) 216-9580

Information Telephone Number
(770) 216-9580

MSDS D4
Revision: May-12

QUIKRETE® Product Name	**Product #**
RAPID ROAD REPAIR	FIBERED 1242-50, UN-FIBERED 1242-52 EXTENDED 1242-80
RAPID HARDENING SAND MIX	1243-50
HYDRAULIC WATER STOP	1126-00
QUICK SETTING CEMENT	1240-00
EXTERIOR USE ANCHORING CEMENT	1245-80, -81
FASTSET™ WATER-STOP CEMENT	1126-00

PRODUCT USE: HYDRAULIC CEMENT-BASED RAPID-SETTING REPAIR MATERIALS

SECTION II - HAZARD IDENTIFICATION

Route(s) of Entry: Inhalation, Skin, Ingestion
Acute Exposure: Product becomes alkaline when exposed to moisture. Exposure can dry the skin, cause alkali burns and affect the mucous membranes. Dust can irritate the eyes and upper respiratory system. Toxic effects noted in animals include, for acute exposures, alveolar damage with pulmonary edema.
Chronic Exposure: Dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the cornea. Hypersensitive individuals may develop an allergic dermatitis.
Carcinogenicity: Since Portland cement and blended cements are manufactured from raw materials mined from the earth (limestone, marl, sand, shale, etc.) and process heat is provided by burning fossil fuels, trace, but detectable, amounts of naturally occurring, and possibly harmful, elements may be found during chemical analysis. Under ASTM standards, Portland cement may contain 0.75 % insoluble residue. A fraction of these residues may be free crystalline silica. Respirable crystalline silica (quartz) can cause silicosis, a fibrosis (scarring) of the lungs and

possibly cancer. There is evidence that exposure to respirable silica or the disease silicosis is associated with an increased incidence of Scleroderma, tuberculosis and kidney disorders.

Carcinogenicity Listings:

NTP:	Known carcinogen
OSHA:	Not listed as a carcinogen
IARC Monographs:	Group 1 Carcinogen
California Proposition 65:	Known carcinogen

NTP: The National Toxicology Program, in its "Ninth Report on Carcinogens" (released May 15, 2000) concluded that "Respirable crystalline silica (RCS), primarily quartz dusts occurring in industrial and occupational settings, is *known to be a human carcinogen*, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to RCS and increased lung cancer rates in workers exposed to crystalline silica dust (reviewed in IAC, 1997; Brown *et al*., 1997; Hind *et al*., 1997)

IARC: The International Agency for Research on Cancer ("IARC") concluded that there was "*sufficient evidence* in humans for the carcinogenicity of crystalline silica in the forms of quartz or cristobalite from occupational sources", and that there is "*sufficient evidence* in experimental animals for the carcinogenicity of quartz or cristobalite." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is *carcinogenic to humans (*Group 1)." The IARC evaluation noted that "carcinogenicity was not detected in all industrial circumstances or studies. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." For further information on the IARC evaluation, see IARC Monographs on the Evaluation of carcinogenic Risks to Humans, Volume 68, "Silica, Some Silicates." (1997)

Signs and Symptoms of Exposure: Symptoms of excessive exposure to the dust include shortness of breath and reduced pulmonary function. Excessive exposure to skin and eyes especially when mixed with water can cause caustic burns as severe as third degree.

Medical Conditions Generally Aggravated by Exposure: Individuals with sensitive skin and with pulmonary and/or respiratory disease, including, but not limited to, asthma and bronchitis, or subject to eye irritation, should be precluded from exposure. Exposure to crystalline silica or the disease silicosis is associated with increased incidence of scleroderma, Tuberculosis and possibly increased incidence of kidney lesions.

Chronic Exposure: Dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the cornea. Hypersensitive individuals may develop an allergic dermatitis. (May contain trace (<0.05 %) amounts of chromium salts or compounds including hexavalent chromium, or other metals found to be hazardous or toxic in some chemical forms. These metals are mostly present as trace substitutions within the principal minerals)

Medical Conditions Generally Aggravated by Exposure: Individuals with sensitive skin and with pulmonary and/or respiratory disease, including, but not limited to, asthma and bronchitis, or subject to eye irritation, should be precluded from exposure.

SECTION III - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components	CAS No.	PEL (OSHA) mg/M^3	TLV (ACGIH) mg/M^3
Silica Sand, crystalline	14808-60-7	$\frac{10}{\%SiO_2+2}$	0.05 (respirable)
Portland Cement	65997-15-1	5	5
May Contain one or more of the following ingredients:			
Amorphous Silica	07631-86-9	$\frac{80\ mg/M^3}{\%\ SiO_2}$	10
Calcium Sulfate	10101-41-4 or 13397-24-5	5	5
Lime	01305-62-0	5	5
Fly Ash	68131-74-8	5	5
Calcium Aluminate Cement	65997-16-2	5	5
Clay	01332-58-7	5	5
Pulverized Limestone	01317-65-3	5	5

Other Limits: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration=0.05 mg/M^3 (respirable free silica) as determined by a full-shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica

SECTION IV – First Aid Measures

Eyes: Immediately flush eye thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.
Skin: Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment if irritation or inflammation develops or persists. Seek immediate medical treatment in the event of burns.
Inhalation: Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical help if coughing and other symptoms do not subside. Inhalations of large amounts of Portland cement require immediate medical attention.
Ingestion: Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

SECTION V - FIRE AND EXPLOSION HAZARD DATA

Flammability: Noncombustible and not explosive.
Auto-ignition Temperature: Not Applicable
Flash Points: Not Applicable

SECTION VI – ACCIDENTAL RELEASE MEASURES

If spilled, use dustless methods (vacuum) and place into covered container for disposal (if not contaminated or wet). Use adequate ventilation to keep exposure to airborne contaminants below the exposure limit.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND STORAGE

Do not allow water to contact the product until time of use. DO NOT BREATHE DUST. In dusty environments, the use of an OSHA, MSHA or NIOSH approved respirator and tight fitting goggles is recommended.

SECTION VIII – EXPOSURE CONTROL MEASURES

Engineering Controls: Local exhaust can be used, if necessary, to control airborne dust levels.

Personal Protection: The use of barrier creams or impervious gloves, boots and clothing to protect the skin from contact is recommended. Following work, workers should shower with soap and water. Precautions must be observed because burns occur with little warning -- little heat is sensed.

WARN EMPLOYEES AND/OR CUSTOMERS OF THE HAZARDS AND REQUIRED OSHA PRECAUTIONS ASSOCIATED WITH THE USE OF THIS PRODUCT.

Exposure Limits: Consult local authorities for acceptable exposure limits

SECTION IX - PHYSICAL/CHEMICAL CHARACTERISTICS

Appearance: Gray to gray-brown colored powder. Some products contain coarse aggregate.

Specific Gravity:	2.6 to 3.15	**Melting Point:**	>2700^{o}F
Boiling Point:	>2700^{o}F	**Vapor Pressure:**	Not Applicable
Vapor Density:	Not Applicable	**Evaporation Rate:**	Not Applicable
Solubility in Water:	Slight	**Odor:**	Not Applicable

SECTION X - REACTIVITY DATA

Stability: Stable.
Incompatibility (Materials to Avoid): Material when mixed with water will react with Aluminum and other alkali and alkaline earth elements liberating hydrogen gas.
Hazardous Decomposition or By-products: None
Hazardous Polymerization: Will Not Occur.
Condition to Avoid: Keep dry until used to preserve product utility.

SECTION XI – TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Ingestion
Toxicity to Animals:
LD50: Not Available
LC50: Not Available
Chronic Effects on Humans: Conditions aggravated by exposure include eye disease, skin disorders and Chronic Respiratory conditions.
Special Remarks on Toxicity: Not Available

SECTION XII – ECOLOGICAL INFORMATION

Ecotoxicity: Not Available
BOD5 and COD: Not Available
Products of Biodegradation: Not available
Toxicity of the Products of Biodegradation: Not available
Special Remarks on the Products of Biodegradation: Not available

SECTION XIII – DISPOSAL CONSIDERATIONS

Waste Disposal Method: The packaging and material may be land filled; however, material should be covered to minimize generation of airborne dust. This product is not classified as a hazardous waste under the authority of the RCRA (40CFR 261) or CERCLA (40CFR 117&302).

SECTION XIV – TRANSPORT INFORMATION

DOT/UN Shipping Name: Non-regulated
DOT Hazard Class: Non-regulated
Shipping Name: Non-regulated
Non-Hazardous under U.S. DOT and TDG Regulations

SECTION XV – OTHER REGULATORY INFORMATION

US OSHA 29CFR 1910.1200: Considered hazardous under this regulation and should be included in the employers hazard communication program
SARA (Title III) Sections 311 & 312: Qualifies as a hazardous substance with delayed health effects
SARA (Title III) Section 313: Not subject to reporting requirements
TSCA (May 1997): All components are on the TSCA inventory list
Federal Hazardous Substances Act: Is a hazardous substance subject to statues promulgated under the subject act
California Regulation: WARNING: This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Canadian Environmental Protection Act: Not listed
WHMIS Classification: Considered to be a hazardous material under the Hazardous Products Act as defined by the Controlled Products Regulations (Class D2A, E- Corrosive Material) and subject to the requirements of Health Canada's Workplace Hazardous Material Information (WHMIS). This product has been classified according to the hazard criteria of the Controlled Products Regulation (CPR). This document complies with the WHMIS requirements of the Hazardous Products Act (HPA) and the CPR.

SECTION XVI – OTHER INFORMATION

HMIS-III:

Health –
0 = No significant health risk
1 = Irritation or minor reversible injury possible
2 = Temporary or minor injury possible
3 = Major injury possible unless prompt action is taken
4 = Life threatening, major or permanent damage possible

Flammability-
0 = Material will not burn
1 = Material must be preheated before ignition will occur
2 = Material must be exposed to high temperatures before ignition
3 = Material capable of ignition under normal temperatures
4 = Flammable gases or very volatile liquids; may ignite spontaneously

Physical Hazard-
0 = Material is normally stable, even under fire conditions
1 = Material normally stable but may become unstable at high temps
2 = Materials that are unstable and may undergo react at room temp
3 = Materials that may form explosive mixtures with water
4 = Materials that are readily capable of explosive water reaction

Abbreviations:

ACGIH	American Conference of Government Industrial Hygienists
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
CFR	Code of Federal Regulations
CPR	Controlled Products Regulations (Canada)
DOT	Department of Transportation
IARC	International Agency for Research
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicity Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TWA	Time-weighted Average
WHMIS	Workplace Hazardous Material Information System

Revision #07-01, supersedes all previous revisions.

QUIKRETE®

CEMENT & CONCRETE PRODUCTS™

Created: 10/25/2006
Last Updated: May 8, 2012

NOTE: The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to silica contained in our products.

QUIKRETE®
CEMENT & CONCRETE PRODUCTS™

Portland Cement Based Concrete Products

MATERIAL SAFETY DATA SHEET
(Complies with OSHA 29 CFR 1910.1200)

SECTION I: PRODUCT IDENTIFICATION

The QUIKRETE® Companies
One Securities Centre
3490 Piedmont Road, Suite 1300
Atlanta, GA 30329

Emergency Telephone Number
(770) 216-9580

Information Telephone Number
(770) 216-9580

MSDS J1
Revision: Aug-13

QUIKRETE® Product Name	Code #
CONCRETE MIX	1101
FENCE POST MIX	1005
FIBER-REINFORCED CONCRETE MIX	1006
CRACK RESISTANT CONCRETE MIX	1006-80
QUIKRETE 5000 CONCRETE MIX	1007
QUIKRETE 6000 CONCRETE MIX	1007
LIGHTWEIGHT CONCRETE MIX	1008
HANDICRETE CONCRETE MIX	1141-59, -60, -80
MAXIMUM YIELD CONCRETE MIX	1100-80
B-CRETE	1101-81
PRO-FINISH QUIKRETE 5000	1007-85
BASIC CONCRETE MIX	1015
RIP RAP	1129
ALL-STAR CONCRETE MIX	1121
ALL-STAR CRACK RESISTANT CONCRETE MIX	1470-03
ALL-STAR 5000 CONCRETE MIX	1470-01
RED-E-CRETE CONCRETE MIX	1101-91, -87; 1141-62, -63, -92, -93
RIP RAP SCRIM	1134-80
FIBER REINFORCED DECK MIX	1251-80, -81
PRO-FINISH CRACK RESISTANT CONCRETE MIX	1006-68
COUNTERTOP MIX	1106-80
RITEMIX CONCRETE	1171-60
GREEN CONCRETE MIX	1101-63, -73
FLOWCRETE 5000 (MIX 801)	8080026/NR80026

Product Use: Portland cement-based, aggregated products for general construction

SECTION II - HAZARD IDENTIFICATION

Route(s) of Entry: Inhalation, Skin, Ingestion

Acute Exposure: Product becomes alkaline when exposed to moisture. Exposure can dry the skin, cause alkali burns and affect the mucous membranes. Dust can irritate the eyes and upper respiratory system. Toxic effects noted in animals include, for acute exposures, alveolar damage with pulmonary edema.

Chronic Exposure: Dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the cornea. Hypersensitive individuals may develop an allergic dermatitis.

Carcinogenicity: Since Portland cement and blended cements are manufactured from raw materials mined from the earth (limestone, marl, sand, shale, etc.) and process heat is provided by burning fossil fuels, trace, but detectable, amounts of naturally occurring, and possibly harmful, elements may be found during chemical analysis. Under ASTM standards, Portland cement may contain 0.75 % insoluble residue. A fraction of these residues may be free crystalline silica. Respirable crystalline silica (quartz) can cause silicosis, a fibrosis (scarring) of the lungs and possibly cancer. There is evidence that exposure to respirable silica or the disease silicosis is associated with an increased incidence of Scleroderma, tuberculosis and kidney disorders.

Carcinogenicity Listings:		
	NTP:	Known carcinogen
	OSHA:	Not listed as a carcinogen
	IARC Monographs:	Group 1 Carcinogen
	California Proposition 65:	Known carcinogen

NTP: The National Toxicology Program, in its "Ninth Report on Carcinogens" (released May 15, 2000) concluded that "Respirable crystalline silica (RCS), primarily quartz dusts occurring in industrial and occupational settings, is *known to be a human carcinogen*, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to RCS and increased lung cancer rates in workers exposed to crystalline silica dust (reviewed in IAC, 1997; Brown *et al*., 1997; Hind *et al*., 1997)

IARC: The International Agency for Research on Cancer ("IARC") concluded that there was "*sufficient evidence* in humans for the carcinogenicity of crystalline silica in the forms of quartz or cristobalite from occupational sources", and that there is "*sufficient evidence* in experimental animals for the carcinogenicity of quartz or cristobalite." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is *carcinogenic to humans (*Group 1)." The IARC evaluation noted that "carcinogenicity was not detected in all industrial circumstances or studies. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." For further information on the IARC evaluation, see IARC Monographs on the Evaluation of carcinogenic Risks to Humans, Volume 68, "Silica, Some Silicates." (1997)

Signs and Symptoms of Exposure: Symptoms of excessive exposure to the dust include shortness of breath and reduced pulmonary function. Excessive exposure to skin and eyes especially when mixed with water can cause caustic burns as severe as third degree.

Medical Conditions Generally Aggravated by Exposure: Individuals with sensitive skin and with pulmonary and/or respiratory disease, including, but not limited to, asthma and bronchitis, or subject to eye irritation, should be precluded from exposure. Exposure to crystalline silica or the disease silicosis is associated with increased incidence of scleroderma, Tuberculosis and possibly increased incidence of kidney lesions.

Chronic Exposure: Dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the cornea. Hypersensitive individuals may develop an allergic dermatitis. (May contain trace (<0.05 %) amounts of chromium salts or compounds including hexavalent chromium, or other metals found to be hazardous or toxic in some chemical forms. These metals are mostly present as trace substitutions within the principal minerals)

Medical Conditions Generally Aggravated by Exposure: Individuals with sensitive skin and with pulmonary and/or respiratory disease, including, but not limited to, asthma and bronchitis, or subject to eye irritation, should be precluded from exposure.

SECTION III - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components	CAS No.	%	PEL (OSHA) mg/M^3	TLV (ACGIH) mg/M^3
Portland Cement	65997-15-1	10-30	5	5
Lime	01305-62-0	0-5	5	5
Silica Sand, crystalline	14808-60-7	70-90	$\frac{10}{\%SiO_2+2}$	0.025 (respirable)
May contain one or more of the following ingredients:				
Amorphous Silica (From fly Ash)	07631-86-9	$\frac{80}{\%SiO_2+2}$	10	
Alumina (From Fly Ash)	01344-28-1	5	5	
Limestone Dust	01317-65-3	5	5	
Calcium Sulfate	10101-41-4 or 13397-24-5	5	5	

Other Limits: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration=0.05 mg/M^3 (respirable free silica) as determined by a full-shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica.

SECTION IV – First Aid Measures

Eyes: Immediately flush eye thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.
Skin: Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment if irritation or inflammation develops or persists. Seek immediate medical treatment in the event of burns.
Inhalation: Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical help if coughing and other symptoms do not subside. Inhalations of large amounts of Portland cement require immediate medical attention.
Ingestion: Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

SECTION V - FIRE AND EXPLOSION HAZARD DATA

Flammability: Noncombustible and not explosive.
Auto-ignition Temperature: Not Applicable
Flash Points: Not Applicable

SECTION VI – ACCIDENTAL RELEASE MEASURES

If spilled, use dustless methods (vacuum) and place into covered container for disposal (if not contaminated or wet). Use adequate ventilation to keep exposure to airborne contaminants below the exposure limit.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND STORAGE

Do not allow water to contact the product until time of use. DO NOT BREATHE DUST. In dusty environments, the use of an OSHA, MSHA or NIOSH approved respirator and tight fitting goggles is recommended.

SECTION VIII – EXPOSURE CONTROL MEASURES

Engineering Controls: Local exhaust can be used, if necessary, to control airborne dust levels.

Personal Protection: The use of barrier creams or impervious gloves, boots and clothing to protect the skin from contact is recommended. Following work, workers should shower with soap and water. Precautions must be observed because burns occur with little warning -- little heat is sensed.

WARN EMPLOYEES AND/OR CUSTOMERS OF THE HAZARDS AND REQUIRED OSHA PRECAUTIONS ASSOCIATED WITH THE USE OF THIS PRODUCT.

Exposure Limits: Consult local authorities for acceptable exposure limits

SECTION IX - PHYSICAL/CHEMICAL CHARACTERISTICS

Appearance: Gray to gray-brown colored powder; Some products contain coarse aggregates.

Specific Gravity:	2.6 to 3.15	**Melting Point:**	>2700°F
Boiling Point:	>2700°F	**Vapor Pressure:**	Not Available
Vapor Density:	Not Available	**Evaporation Rate:**	Not Available
Solubility in Water:	Slight	**Odor:**	Not Available
pH:	13 (10%)	**Volatile Organic Content (VOC):**	0 g/L

SECTION X - REACTIVITY DATA

Stability: Stable.
Incompatibility (Materials to Avoid): Contact of silica with powerful oxidizing agents such as fluorine, chlorine trifluoride, manganese trioxide, or oxygen difluoride may cause fires
Hazardous Decomposition or By-products: Silica will dissolve in Hydrofluoric Acid and produce a corrosive gas – silicon tetrafluoride.
Hazardous Polymerization: Will Not Occur.
Condition to Avoid: Keep dry until used to preserve product utility.

SECTION XI – TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Ingestion
Toxicity to Animals:
LD50: Not Available
LC50: Not Available
Chronic Effects on Humans: Conditions aggravated by exposure include eye disease, skin disorders and Chronic Respiratory conditions.
Special Remarks on Toxicity: Not Available

SECTION XII – ECOLOGICAL INFORMATION

Ecotoxicity: Not Available
BOD5 and COD: Not Available
Products of Biodegradation: Not available
Toxicity of the Products of Biodegradation: Not available
Special Remarks on the Products of Biodegradation: Not available

SECTION XIII – DISPOSAL CONSIDERATIONS

Waste Disposal Method: The packaging and material may be land filled; however, material should be covered to minimize generation of airborne dust. This product is not classified as a hazardous waste under the authority of the RCRA (40CFR 261) or CERCLA (40CFR 117&302).

SECTION XIV – TRANSPORT INFORMATION

Not hazardous under U.S. DOT and TDG regulations.

SECTION XV – OTHER REGULATORY INFORMATION

US OSHA 29CFR 1910.1200: Considered hazardous under this regulation and should be included in the employers' hazard communication program
SARA (Title III) Sections 311 & 312: Qualifies as a hazardous substance with delayed health effects
SARA (Title III) Section 313: Not subject to reporting requirements
TSCA (May 1997): Some substances are on the TSCA inventory list
Federal Hazardous Substances Act: Is a hazardous substance subject to statues promulgated under the subject act
California Regulation: WARNING: This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.
Canadian Environmental Protection Act: Not listed
Canadian WHMIS Classification: Considered to be a hazardous material under the Hazardous Products Act as defined by the Controlled Products Regulations (Class D2A, E- Corrosive Material) and subject to the requirements of Health Canada's Workplace Hazardous Material Information (WHMIS). This product has been classified according to the hazard criteria of the Controlled Products Regulation (CPR). This document complies with the WHMIS requirements of the Hazardous Products Act (HPA) and the CPR.

SECTION XVI – OTHER INFORMATION

HMIS-III:

Health –
0 = No significant health risk
1 = Irritation or minor reversible injury possible
2 = Temporary or minor injury possible
3 = Major injury possible unless prompt action is taken
4 = Life threatening, major or permanent damage possible

Flammability-
0 = Material will not burn
1 = Material must be preheated before ignition will occur
2 = Material must be exposed to high temperatures before ignition

	3 = Material capable of ignition under normal temperatures
	4 = Flammable gases or very volatile liquids; may ignite spontaneously
Physical Hazard-	0 = Material is normally stable, even under fire conditions
	1 = Material normally stable but may become unstable at high temps
	2 = Materials that are unstable and may undergo react at room temp
	3 = Materials that may form explosive mixtures with water
	4 = Materials that are readily capable of explosive water reaction

Abbreviations:

ACGIH	American Conference of Government Industrial Hygienists
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CPR	Controlled Products Regulations (Canada)
DOT	Department of Transportation
IARC	International Agency for Research
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicity Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TWA	Time-weighted Average
WHMIS	Workplace Hazardous Material Information System

Last Updated: August 23, 2013

NOTE: The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to silica contained in our products. END OF MSDS.

Attachment 10.1.21
Activity Hazard Analyses (AHAs)

PARSONS

Activity Hazards Analysis

Activities- Field

AHA No. 001

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 001	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D - Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Chmura	**Date:** March 7, 2007
	Superintendent/Competent Person	**Reviewed by:**	**Date:**
Work Operation: Field Activities		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Outdoor, Physical Activity	Heat Stress ▪ Prickly Heat (Heat rash) ▪ Heat Cramps ▪ Heat Exhaustion ▪ Heat Fatigue ▪ Heat Collapse ▪ Heat Stroke	▪ Adjust work schedules. ▪ Mandate work slowdowns as needed. ▪ Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided. ▪ Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. ▪ Maintain worker's body fluids at normal levels. ▪ Train workers to recognize the symptoms of heat related illness	▪ Monitor workers physical conditions ▪ Monitor outside temperature versus worker activity.
Outdoor activities	Cold Related Injuries Frostbite Hypothermia	▪ Educate workers to recognize the symptoms of frostbite and hypothermia. ▪ Identify and limit known risk factors. ▪ Warm clothes and boots. ▪ Assure the availability of enclosed, heated environment on or adjacent to the site. ▪ Assure the availability of dry changes of clothing. ▪ Assure the availability of warm drinks. ▪ Educate workers concerning restricted visibility associated with winter clothing (e.g., hoods restricting peripheral vision).	▪ Monitor workers physical conditions ▪ Monitor outside temperature versus worker activity. Start (oral) temperature recording at the job site: ▪ At the Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status. ▪ At a worker's request. ▪ As a screening measure whenever any one worker on the site develops hypothermia.

	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	
	Snow	▪ Have warm clothes available for cold temperatures.	
	Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	
	High winds, dust storm	▪ Wear goggles if dust/debris is visible.	
	Pollen	▪ Take medication (i.e. anti-histamine), in consultation with doctor, to minimize allergic reaction to pollen. Wear dust mask, if necessary.	
	Icy Conditions	▪ Salt/sand icy surfaces as appropriate. ▪ Workers will be aware of potentially slippery surfaces and wear proper footwear.	
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions	
	Worker injury (slips, trips, and falls) due to uneven site surface	▪ Worker visual inspection (attention) to walking/working surface. ▪ Wearing appropriate safety footwear properly (such as boots with ankle support, laces tied, proper soles,etc.).	
	Biological Hazards (ticks, bees, mosquitoes, snakes, etc.)	▪ Personnel will be aware of potential exposure to biological hazards. ▪ Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, boots etc.) and insect repellant.	

	Site Hazards Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site. ▪ Training of all personnel decontamination procedures (if appropriate to visit). ▪ Appropriate PPE will be worn dependent on site conditions and actions levels. (if appropriate to visit) ▪ Must sign off on health and safety plan. ▪ Visitor will be escorted around site by a 40 hour trained individual unless cleared with the SSO.	
	Insects, rodents, animals, etc.	▪ Wear Tyvek coveralls. Apply bug repellant spray or lotion to exposed skin.	
	Vegetation	▪ Create a clear path or route with mechanical equipment, whenever possible. Wear appropriate PPE for the vegetation (i.e. leather gloves, Carhart coveralls and face shield for vegetation that could cause cuts/punctures and/or is higher than waist level.	

Training Requirements:

A work permit must be obtained prior to performing any intrusive work at the Astoria Site. The Parsons Safety Representative must receive a work permit from a Con Edison representative on a daily basis.

Visitors will report to the Site Safety Officer who will give a short health and safety orientation and require sign off on the PSP. The SSO will determine if the visitor can access the site based on verification of 40-hour training or 8 hour Supervisor training or if the visitor(s) will need to be escorted by a 40-hour trained individual onsite.

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Site Visit or Site Walk

AHA No. 002

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 002	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Chmura	**Date:** March 8, 2007
	Superintendent/Competent Person	**Reviewed by:**	**Date:**
Work Operation: Site Visit or Site Walk		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Site visit/walk	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions	▪ Inspect job site and staging area and identify any concerns. ▪ Inspect job site daily.
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	
	Snow	▪ Have warm clothes available for cold temperatures.	
	Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	
	High winds, dust storm	▪ Wear goggles if dust/debris is visible.	
	Icy Conditions	▪ Salt/sand icy surfaces as appropriate. ▪ Workers will be aware of potentially slippery surfaces and wear proper footwear.	
	Site Traffic	▪ Be aware of moving equipment/vehicles onsite.	

		▪ Make eye contact with equipment/vehicle operators prior to moving into their path or reach of moving parts.	
	Cold and Heat Stress	▪ Visitors will dress accordingly to prevent injuries from extreme heat, or cold. ▪ SSO will monitor for cold/heat stress symptoms.	
	Biological Hazards (ticks, bees, mosquitoes, snakes, etc.)	▪ Personnel will be aware of potential exposure to biological hazards. ▪ Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, boots etc.) and insect repellant.	
	Site Hazards Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site. ▪ Training of all personnel decontamination procedures (if appropriate to visit). ▪ Appropriate PPE will be worn dependent on site conditions and actions levels. (if appropriate to visit) ▪ Must sign off on health and safety plan. ▪ Visitor will be escorted around site by a 40 hour trained individual unless cleared with the SSO.	

Training Requirements:

Visitors will report to the Site Safety Officer who will give a short health and safety orientation and require sign off on the PSP. The SSO will determine if the visitor can access the site based on verification of 40-hour training or 8 hour Supervisor training or if the visitor(s) will need to be escorted by a 40-hour trained individual onsite.

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Operation- Motor Vehicle

AHA No. 003

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 0003	**Date:** September 15, 2014	**New:** No
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:** 05/22/08
Required Personal Protective Equipment: Wear seat belt at all times; make sure that clothing will not interfere with driving. Use headlights at all times.		**Analysis by:** Region Mgrs	**Date:** 04/2008
	Superintendent/Competent Person	**Reviewed by:** John Ott	**Date:** 05/22/08
Work Task/Activity: Operating a Motor Vehicle		**Approved by:** Greg Beck	**Date:** 05/29/08

Job Step	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Accessing in/out of a vehicle	Back strain	▪ Entering - place your buttocks in the vehicle seat first and then move your legs into the vehicle. ▪ Adjusting Seat – if the vehicle has power/electric seats, then adjust the seat position prior to entering the vehicle. If no power/electric seats, then adjust seat position only while facing forward when sitting in seat, and before securing seatbelt. ▪ Exiting – move your legs out of the vehicle first.	
	Knee strain	▪ Entering – if a vehicle has running boards, then step onto the running board with your left foot first while placing your left hand on the door arm rest and right hand on the steering wheel. Place your right foot into the vehicle and sit on the seat before positioning yourself in front of the steering wheel. ▪ Exiting – move your legs out of the vehicle so that your left foot is placed on the running board first. Place your left hand on the door arm rest and right hand on the steering wheel before placing your right foot onto the ground.	
	Struck against	▪ Note the position of the driver's seat and the distance between the seat and the dashboard or steering wheel to allow access into the vehicle without striking knee/leg. Adjust seat as necessary as stated above.	

	Slip/fall	▪ Be aware of "black ice" that forms on pavement when the snow melts into water during the day time due to the sun or warmer temperatures, and turns into ice when the sun goes down or temperatures drop below 37 F.	
Backing up a Vehicle	Personnel Injury/ Property Damage	▪ Physically check behind the vehicle for people, animals or objects (i.e. toys) before backing up. ▪ Look behind while backing and check side view mirrors. ▪ Use a spotter whenever possible, or if view is obstructed.	
Driving to/from a work location	Vehicle Accident/ Property Damage	▪ Complete the ParsonsU safety modules on Defensive Driving ▪ Follow the Smith System "Five Keys to Space Cushion Driving" – Aim High in Steering, Get the Big Picture, Keep Your Eyes Moving, Leave Yourself an Out and Make Sure They See You. ▪ Complete vehicle inspection before driving and check for proper equipment/supplies. Keep windows, mirrors and eye glasses clean. ▪ Adjust seat position and mirrors to reduce the "blind spot" and increase visibility of surroundings. ▪ Plan your travel route and check maps for directions, discuss with colleagues or use a GPS system. **Note:** Follow all manufacturer safety recommendations when using any GPS device, such as using voice guidance, and entering destination data only when the vehicle is stopped. ▪ Look ahead for driving hazards and plan a strategy to avoid the hazard. Give yourself plenty of lead time (approx. 15 seconds) when approaching vehicles and objects, position yourself in traffic to minimize risk and leave enough space to react safely. ▪ Keep your eyes on the move - check side view and rear view mirrors every 5-8 seconds. Be alert for signs of other distracted or aggressive drivers. ▪ Follow the 4-second rule for maintaining a safe distance when following other vehicles. Before changing lanes, look over each shoulder briefly to check the "blind spot". Make sure other drivers see you – avoid "blind spots", establish eye contact and use lights or horn to increase visibility. ▪ Wear sun glasses to reduce sun glare, as needed. Remove sun	▪ Complete vehicle inspections as per Parsons Vehicle Safety Policy (i.e. daily, weekly, monthly, annual, etc). ▪ Inspect fluid levels, air pressure in tires, wiper blade condition, adjust mirrors and seat positions appropriately, watch fuel level and fill up fuel tank when level is below half. ▪ All company vehicles shall have a safety inspection performed as required by the State the vehicle is registered in (i.e. annually, biannually, etc), or by a certified inspection station annually if an inspection is not required by the State the vehicle is registered in. ▪ Follow vehicle maintenance schedule in accordance with manufacturer's recommendations to reduce the potential of a

		glasses when driving in tunnels, after dusk or with overcast skies (i.e. cloudy). ▪ Properly secure and/or stow materials, tools and equipment inside and outside vehicles (i.e. trunk, pick up) to prevent shifting or falling off of vehicle.	mechanical failure or breakdown while driving.
Driving to/from a work location (cont'd)	Vehicle Accident/ Property Damage	▪ Whenever possible, select parking spaces that will allow the vehicle to pull forward in the parking space to increase visibility when pulling out of the space, or back into a parking space.	
	Smoke/Fire (engine compartment)	▪ Pull over to the side of the road in a safe location. ▪ Turn off engine. ▪ Exit the vehicle and stand a safe distance away from the vehicle and other vehicle traffic. ▪ Call for assistance as appropriate (i.e. "911", AAA) ▪ Do not open the hood of the vehicle until the smoke has dissipated and there is a fire extinguisher available.	▪ Check engine temperature gauge to determine if engine is overheating. ▪ Look under the vehicle for signs or leaking fluids.
	Foreign Body (eye)	▪ Drive with the vehicle windows in the up position, whenever possible. ▪ Keep dust/debris free from air vents.	
	Unfamiliar vehicle	▪ Drive at reduced speeds with the vehicle until the driver is familiar / comfortable with the handling ability of the vehicle.	
	Weather /Road conditions	▪ Check road and weather conditions prior to driving. ▪ Be prepared to adjust driving habits/speed, if road conditions change for the worse (i.e. rain, snow, fog, etc). ▪ Be aware of "black ice" that forms on pavement when the snow melts into water during the day time due to the sun or warmer temperatures, and turns into ice when the sun goes down or temperatures drop below 37 F. ▪ Do not use cruise control in the rain, snow, ice or other conditions that can create a slippery road surface. ▪ Travel during daylight hours, whenever possible. ▪ Give yourself plenty of time to allow for delays due to road construction, work zones, accidents or other unforeseen circumstances. ▪ Apply Rain-X or other similar product to windshield to reduce	▪ Check the tire tread depth and reduce normal driving speed in adverse weather conditions when the tire tread depth is nearing the end of service life.

		the effect of rain and splashed water onto the windshield. ▪ Using headlights or driving lights at all times is recommended, but required when driving during inclement weather, when windshield wipers are in use, or traveling through a road construction zone.	
Driving to/from a work location (cont'd)	Distractions	o Stop driving a vehicle, regardless of the speed or location (i.e. 5 mph or on a private road), when the potential of being distracted exists. ▪ Drivers are prohibited from using communication devices (i.e. cell phones, PDA, etc) while operating any motor vehicle. ▪ Avoid performing other tasks that take away your focus while driving (i.e. reading directions/map or newspaper, eating food, writing, looking at passengers while talking, improper use of GPS) - pull over to the side of the road in a safe location.	
	Fatigue/Falling asleep	▪ Get adequate rest prior to driving. ▪ Pull over and rest/take a micro break (i.e. 15 minute power nap), if experiencing signs/symptoms of fatigue or drowsiness. ▪ Share driving duties with another person. ▪ Do not take medications that could cause drowsiness.	▪ Read and follow instructions/warnings when taking prescription or over the counter medications.
	Medical Condition (i.e. heart attack, seizure, etc)	▪ Follow habits (i.e. proper diet, exercise, sleep, etc) for maintaining good health and visit your personal physician as appropriate. ▪ Consider enrolling in the Parsons Wellness for Life Program.	
	Impairment	▪ Do not take medications that could cause impairment to judgment. ▪ A zero tolerance for alcohol consumption prior to and during driving must be maintained. ▪ A zero tolerance for using controlled substances prior to and during driving must be maintained.	▪ Read and follow instructions/warnings when taking prescription or over the counter medications.

	Flat tire/blowout	▪ Drive with two hands on the steering for increased control in the event of an unexpected tire blowout. ▪ Find a safe place to pull over to the side of the road. Do not park on the shoulder of a busy highway. ▪ Do not attempt to change a flat tire without the proper training and physical ability/fitness. Call "911", AAA and/or your supervisor for assistance as appropriate. ▪ Install "donut" spare tire on the rear of vehicle. If flat tire is on the front, move a normal sized rear tire to the front.	▪ Check air pressure of spare tire. ▪ Know the location and use of the jack and lug wrench. ▪ Make sure the ground is firm and level, the parking break is applied and wheels chocked before changing a tire.

Training Requirements:

All drivers are required to have a current valid driver's license for the type of vehicle being operated (i.e. Commercial Drivers License). All vehicles must have the required State vehicle registration and/or inspection documents. It is company policy that all wireless device use, whether "hand-held" or "hands free", ***is prohibited*** while driving any vehicle at any time as follows: for business use *at any time*; or for *personal use* during business hours; and as defined by law.

All employees operating a company vehicle, rental vehicle or personal vehicle for company business are required to familiarize themselves with the contents of this AHA before operating a vehicle.

PARSONS

Activity Hazards Analysis

Operation- Heavy Equipment or Machinery

AHA 004

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 004	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Blauvelt	**Date:** December 7, 2005
Work Operation: Operation of Heavy Equipment or Machinery	**Superintendent /Competent Person:** TBD	**Reviewed by:** J. O'Loughlin	**Date:** December 8, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Motorized Equipment Operation	Equipment Maintenance	▪ The equipment must be maintained in a proper functioning condition. ▪ All motors must be shut off and electrical, mechanical and hydraulic components locked when making repairs. ▪ Safety shut off system must be tested daily and not disabled. ▪ Bleed off pressure on hydraulic lines before undoing fittings. ▪ Do not leave tools or parts loose on the equipment after maintenance has been performed.	▪ Follow the maintenance manual recommended procedures for each piece of equipment.
	General Use	▪ All equipment must be inspected daily prior to use. ▪ Equipment must be operated and maintained in accordance to manufacturer's guidelines. ▪ Any equipment that is unattended must be immobilized and secured against accidental movement. ▪ All heavy equipment will have a back up alarm ▪ Drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists must be aware of the	

		location of this device. This device must be tested prior to job initiation and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency stop; ▪ The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of rotating equipment; ▪ A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment; ▪ Drillers, helpers and geologists must secure all loose clothing when in the vicinity of drilling operations; ▪ Only equipment that has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be allowed; ▪ No person shall climb the drill mast while tools are rotating; and ▪ No person shall climb the drill mast without the use of ANSI-approved fall protection (approved belts, lanyards and a fall protection slide rail) or portable ladder that meets the requirements of OSHA standards.	
	Fire Hazard	▪ All motors must be shut off during refueling. • Smoking in the vicinity of the drilling rig is not permitted. • An A-B-C fire extinguisher must be maintained on the drilling rig and associated motorized equipment. • Fuel containers will not be stored within 10’ of the drilling rig motor. • Fuel will be stored in UL approved safety containers with contents clearly label.	
	Operation of Motorized Equipment	▪ Operators of motorized equipment will be trained in the	

		proper operation of that apparatus.	
	Tip Over	▪ Equipment will be shut off and stabilized accordingly. ▪ Visual inspection of access route to sampling areas for soft spots, holes, rocks, etc. ▪ Operator Training ▪ Rollover protection (cab or equivalent)	
	Struck By Pinch Points	▪ All personnel will be aware of moving machinery and parts and wear appropriate PPE when near machinery (e.g., hard hat, safety glasses, gloves etc.). ▪ Keep observers back from active operations. Get operator's attention before approaching.	
	Noise Exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 85 decibels (dBA) averaged over an eight-hour day.	

Training Requirements:

All personnel engaged in the operation of heavy equipment and machinery will have knowledge and experience in working with and operating the equipment. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Fueling-Motor Vehicle

AHA No. 005

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 005	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Blauvelt	**Date:** December 7, 2005
	Superintendent/Competent Person	**Reviewed by:** J. O'Loughlin	**Date:** December 8, 2005
Work Operation: Fueling of motor vehicle		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Fueling the vehicle	Overflow/Spills of fuel on to pavement.	▪ Ensure that fuel pumps have a UL listed automatic closing valve. ▪ Follow distributors instructions on pump. ▪ Use approved safety containers. ▪ Be aware of capacity of fuel tank/container. ▪ Do not "squeeze in" extra gasoline to fill up tank. ▪ Inform gas station attendant of fuel spill.	▪ Follow operations manual maintenance and inspection procedures for each piece of equipment used on site.
	Explosion	▪ Follow distributors instructions on pump. ▪ Ensure that all fuel is in approved safety containers. ▪ No smoking or open flame with in 50 feet. ▪ Equipment/Motors that use flammable fuel shall be shut down during fueling, servicing, or maintenance. ▪ Turn cell phones off during fueling of vehicle.	
	Spill on clothing	▪ Workers should be aware of capacity of fuel tank. ▪ Wear gloves while fueling. ▪ Change clothing if saturated with fuel.	

Training Requirements:

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Fueling-Heavy Equipment and Machinery

AHA No. 006

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 006	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Blauvelt	**Date:** December 7, 2005
	Superintendent/Competent Person	**Reviewed by:** J. O'Loughlin	**Date:** December 8, 2005
Work Operation: Fueling of equipment and machinery		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Fueling the equipment	Overflow/Spills of fuel on to pavement	▪ Ensure that fuel pumps have a UL listed automatic closing valve. ▪ Be aware of capacity of fuel tank. ▪ Do not "squeeze in" extra fuel to fill up tank. ▪ Have berms or absorbent pads available. ▪ All fluid containing vehicles and equipment involved on the project site (except for properly parked personal vehicles) spotted on non-impervious surfaces (e.g., soil, bluestone, etc) will be parked over full length/width of vehicle equipment polyethylene sheeting	▪ Follow operations manual maintenance and inspection procedures for each piece of equipment used on site.
	Explosion	▪ Ensure that all fuel is in approved safety containers. ▪ No smoking or open flame with in 50 feet. ▪ Equipment/Motors that use flammable fuel shall be shut down during fueling, servicing, or maintenance. ▪ Turn cell phones off during refueling vehicle. ▪ Ensure that all heavy equipment has a fire extinguisher and that the fire extinguisher is readily accessible.	▪ The fire extinguishers must be inspected and approved at specific intervals.

	Spill on clothing	▪ Workers should be aware of capacity of fuel tank. ▪ Wear gloves while fueling. ▪ Change clothing if saturated with fuel.	
	Site Location	▪ Provide refueling driver with directions to site and accessible route to equipment/machinery. ▪ Ensure that there is road (gravel, mats) for refueling truck to drive/park on.	
	Hazardous Site contamination	▪ Decontaminate equipment/machinery prior to refueling and remove from exclusion zone. ▪ Decontaminate refueling truck if contact with potential contaminated material. ▪ Provide training/awareness to driver, escort on site if need be.	

Training Requirements:

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Sampling- Soil

AHA 007

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 007	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Blauvelt	**Date:** December 7, 2005
Work Operation: Soil Sampling- (e.g., split spoon drilling etc.)	**Superintendent/Competent Person:** TBD	**Reviewed by:** J. O'Loughlin	**Date:** December 8, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Soil Sampling	▪ Inhalation of contaminated dust ▪ Inhalation of volatile contaminants ▪ Ingestion of contaminants ▪ Skin/eye contact with contaminated materials	▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash eyes with large amounts of water. ▪ If a person breathes in a large amount of organic vapor, move the exposed person to fresh air. Perform artificial respiration if breathing stops. ▪ Obtain medical treatment for all of these situations as required. ▪ Wear appropriate safety equipment (i.e., goggles, gloves, and boots) as appropriate for reducing risk of contamination.	
	Pinch Points/Overhead equipment	▪ All personnel will be aware of moving machinery and parts and wear appropriate PPE when near machinery (e.g., hard hat, safety glasses, gloves etc.). ▪ Keep observers back from active operations. Get operator's attention before approaching.	

	Noise Exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 85 decibels (dBA) averaged over an eight-hour day.	
General Chemical Exposure	Chemical exposure to chlorinated hydrocarbons, petroleum hydrocarbons	▪ Monitoring to determine exposure and action levels	
		▪ Dust control measures such as wetting down of soil	
		▪ Wear proper PPE – inner glove and nitrile outer glove, Tyvek, and respirator (if necessary)	
		▪ Follow proper decontamination procedures when leaving the “exclusion zone”	
		▪ Practice good personal hygiene; wash up before eating, eat or drink in designated clean areas	
		▪ Eyewash bottle or station to treat eye irritation	
		▪ Training	
General Worker Activities	Worker injury (slips, trips, and falls) due to uneven site surface	▪ Worker visual inspection (attention) to walking/working surface	
		▪ Wearing appropriate safety footwear properly (such as boots with ankle support, laces ties, proper soles, etc.)	
		▪ Training	
Mobilization of drill rig or excavator	Vehicle equipment accidents (rollover) due to uneven site surface	▪ Visual inspection of access route to sampling areas for soft spots, holes, rocks, etc.	
		▪ Operator training	
		▪ Rollover protection (cab or equivalent)	
	Vehicle equipment accidents due to overhead power lines and structures	▪ Visual inspection of access route	

		▪ Operator training	
	Open Holes from excavation	▪ Use barricades around excavation (as required)	
	Underground utilities	▪ Call Dig Safely New York One Call Center to have utility companies check site.	
	Pinch hazards of equipment	▪ Review Standard Operating Procedures (SOP) for equipment	
		▪ No loose clothing or jewelry while operating equipment	
	Flying objects	▪ Wear appropriate PPE (such as safety glasses and hard hats. Goggles if a splash hazard. Face shield for more severe exposure.	
Procuring sample from excavator bucket and placing in sample container	Struck by overhead hazards	▪ Wear hard hat	
		▪ Pay attention to equipment operator (equipment operator must pay attention to you too!)	
		▪ Do not position your body between equipment and a fixed point if possible	
		▪ Be in communication with each other (radio, hand signals or verbal communication)	
Field Testing	Exposure to analytical chemicals	▪ Follow SOP with field kit or field instrument for handling analytical chemicals or instrument	
Packing samples for off-site shipment to lab	Accidental breakage of glass bottles	▪ Wear cut-resistant gloved during packaging of glass bottles	
		▪ Training	
	Chemical Exposure	▪ Wear necessary PPE (see potential chemical exposure section above and/or field kit SOP)	
		▪ Immediate clean-up of spills	
Backfilling Excavation	Worker engulfment (when hole is large enough to enter)	▪ Check excavation prior to backfilling	

De-mobilization of drill rig	Uneven site surface (rollover)	▪ Visual inspection of access route to sampling areas for soft spots, holes, rocks, etc.	
		▪ Operator training	
		▪ Rollover protection (cab or equivalent)	
	Vehicle equipment accidents due to overhead power lines and structures	▪ Visual inspection of access route	
		▪ Operator training	
	Equipment Contamination	▪ Decontamination (see HASP)	
		▪	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Sampling- Processing

AHA 08

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 08	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** T. Drachenberg	**Date:** December 5, 2005
Work Operation: Sediment Sampling- (e.g., split spoon drilling etc.)	**Superintendent/Competent Person:** TBD	**Reviewed by:** J. O'Loughlin	**Date:** December 8, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Packing sample for off-site shipment to lab	Accidental breakage of glass bottles	▪ Wear cut-resistant gloves during packaging of glass bottles. ▪ Immediate clean-up of spills.	
	Back Injury, muscle strain/stress	▪ Personnel will utilize proper lifting techniques or ask for help with moving/lifting objects.	
	Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site and decontamination procedure. ▪ Appropriate PPE will be worn (e.g., safety glasses, gloves, etc.). ▪ Personnel will follow decontamination procedure. ▪ Screen for COCs with PID and mercury meter analyzer over samples and in workers breathing zone. ▪ Ventilate work area with fans or vents	

	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Personnel will clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions	
	Heat and Cold Stress	▪ The SSO will implement the cold/heat stress control program as appropriate to conditions. ▪ SSO will monitor workers for heat/cold stress symptoms.	
	Eye Injury	▪ PPE (safety glasses, etc.) will be worn.	

Training Requirements:

All personnel shipping hazardous materials will have appropriate DOT training.

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Decontamination- Large Equipment

AHA 09

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 09	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Blauvelt	**Date:** December 7, 2005
Work Operation: Equipment Decontamination	**Superintendent/Competent Person:** TBD	**Reviewed by:** J. O'Loughlin	**Date:** December 8, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Process items through decontamination in accordance with the PSP	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site and decontamination procedure. ▪ Appropriate PPE will be worn. ▪ Personnel will follow decontamination procedure ▪ All equipment brought on site will come to the site free of contamination. Decontamination of previously (off-site) contaminated equipment on site is prohibited.	
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Personnel will clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	
	Heat and Cold Stress	▪ The SSO will implement the cold/heat stress control program as appropriate to conditions.	
	Eye Injury	▪ PPE (safety glasses, etc.) will be worn.	
Hot Water High Pressure	Hot Water Burns	▪ Prior to decontamination of large equipment, personnel	

Spray/Steam Clean		will ensure that all other workers are outside of the decontamination areas. ▪ Personnel will wear appropriate PPE (e.g. gloves, tyvek, splash goggles, etc.). ▪ Face shield is required when using a pressure washer	
	Icing of Equipment	▪ Visually inspect equipment following decontamination to identify ice building that may be present in joints/moving parts of the equipment.	
	Icy Conditions	▪ Salt/sand icy surfaces that may be created in and around the decontamination areas as appropriate.	
	Spill/Leak of contaminated Water	▪ Decontamination area will be designed to collect all contaminated wash/rinse water and to prevent the spread of run off. ▪ Berms and absorbent pads will be available for use in controlling spills.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Decontamination- Personnel

AHA 010

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 010	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Blauvelt	**Date:** December 7, 2005
Work Operation: Personnel Decontamination	**Superintendent/Competent Person:** TBD	**Reviewed by:** J. O'Loughlin	**Date:** December 8, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Decontaminate personnel exiting from the Exclusion zone	General	▪ Personnel should dress in suitable safety equipment to reduce exposure. ▪ Personnel will follow decontamination procedure ▪ Collect rinse water and dispose of per appropriate standard operating procedures. ▪ Follow decontamination procedures.	
	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to chemicals of concern at the site and decontamination procedure. Review chemicals of concern. ▪ Appropriate PPE will be worn (e.g. tyvek, nitrile gloves, safety glass, etc.).	
	Slips, Trips, Falls	▪ Chairs or stools will be available for sitting/balancing while removing PPE. ▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately.	

		▪ Personnel will notify the SSO of any unsafe conditions.	
	Heat and Cold Stress	▪ The SSO will implement the cold/heat stress control program as appropriate to conditions.	
	Icy Conditions	▪ Salt/sand icy surfaces that may be created in and around the decontamination areas as appropriate.	
	Eye Injury	▪ PPE (safety glasses, splash goggles) will be worn.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to, initial 40-hour, 8-hour Supervisor and annual 8-hour refresher.

Medical qualification, training and fit-testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120(f)

All assigned employees working at potentially contaminated sites are required to familiarize themselves with this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Decontamination- Portable Tools

AHA 011

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 011	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Blauvelt	**Date:** December 7, 2005
Work Operation: Tool Decontamination	**Superintendent/Competent Person:** TBD	**Reviewed by:** J. O'Loughlin	**Date:** December 8, 2005
		Approved by:	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
General	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to contaminates at the site and decontamination procedures. ▪ Appropriate PPE will be worn (e.g., gloves, splash goggles, Tyvek, etc.). ▪ Personnel will follow decontamination procedures. ▪ All tools brought on site will come to the site free of contamination. Decontamination of previously (off-site) contaminated equipment on site is prohibited.	
	Eye Injury	▪ PPE (safety glass, etc.) will be worn.	
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Personnel will clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	
Remove gross contamination with brush.	Damaging equipment or tools	▪ To clean instrumentation: follow manufacturer's instructions.	

Place in decontamination bucket or rinse with decontamination solution	Spill/leakage	▪ Workers will have berms or spill absorbent pads nearby to prevent the spread of contaminated water. ▪ Decontamination area will be designed to minimize exposure and maintain spill containment.	
Clean with wash solution	Chemical reaction with wash solution	▪ A fire extinguisher will be located in an accessible location on site. ▪ Review the chemicals of concern and use appropriate wash solution.	
Rinse with water	Contamination remains	▪ Personnel will repeat proper decontamination procedure.	
	Icy Conditions	▪ Salt/sand icy surfaces that may be created in and around the decontamination areas as appropriate.	
	Icing of Equipment	▪ Visually inspect equipment following decontamination to identify ice building that may be present in joints/moving parts of the equipment.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8-hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Utility Clearance Keyholing

AHA 012

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 012	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Hard Hat, Safety Glasses/Face Shield, Hearing Protection, Safety Shoes, Dielectric Work Gloves, Leather Work Gloves, Traffic Vest (if working near vehicles)	**Analysis by:** M. Vetter	**Date:** 7/7/09
	Superintendent/Competent Person	**Reviewed by:** **Shane Blauvelt**	**Date:** **7/7/09**
Work Operation: Hand Clearing		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Load tools and travel to site	1. Strains 2. Pinches 3. Traffic Accidents	1. Use proper lifting techniques 2. Wear gloves 3. Inspect vehicle before driving. Check for fire extinguisher and first aid kit. Drive defensively.	1. Complete vehicle inspection checklist
Site set-up	1. Hazardous site conditions 2. Traffic Hazards 3. Slips, trips, and falls. 4. Explosion, electrocution, utility damage from underground utilities.	1. Review scope of work prior to start of activities. Conduct site reconnaissance by walking site to become aware of marked utilities; other site activities; slip, trip, and fall hazards; methods of ingress and egress; and emergency evacuation routes and gathering locations. Review weather conditions. 2. Wear highly visible clothing when adjacent to traffic/construction vehicles. Set-up work zone away from traffic, if possible. Use traffic cones, caution tape, and signage to mark out work zone. Follow applicable traffic patterns. Use spotter when backing up vehicles. 3. Maintain good housekeeping procedures. Store tolls neatly away from work zone. Keep hoses and tools out of pedestrian traffic areas. 4. Confirm Digsafe NY, NJ One Call or other appropriate locaters have been called and have responded to mark-out request. Identify utility markings.	1. Complete Parsons Pre-Drill Protocol forms

Use of hand tools	1. Cuts and bruises from use of tools 2. Explosion, electrocution, utility damage from underground utilities.	1. Wear proper PPE. Use the proper tools in the manner they were designed for. 2. Identify all above ground electrical devices and possible electrical supplies. Use extreme caution and work slowly when the location of underground utilities are suspected or unknown near the excavation area. Prior to drilling, clear location to at least 5ft below ground surface. Look for signs of previous excavation work (i.e. sand bedding, tracer or warning tapes, saw cuts, and patched asphalt). Ensure hand tools have electrically non-conductive handles and/or workers wear 1kV dielectric gloves under leather work gloves.	1. Document equipment inspection prior to use. 2. Ensure dielectric gloves are tested and stamped with expiration date. 3. Check capacity of electric lines in vicinity. If working adjacent to electric lines exceeding 1,000 volts, higher rated dielectric protection and/or possible other control measures will be required
Use of Saw cutting tool to remove asphalt/concrete.	1. Cuts from saw blade 2. Electrocution, utility damage from underground utilities.	1. Check saw blade periodically (every hour and at breaks) to be sure it is securely attached to the arbor of the road saw. Keep the saw blade in the cut, and allow it to come to a full stop before removing from cut. 2. Ensure hand tools have electrically non-conductive handles and/or workers wear 1kV dielectric gloves under leather work gloves.	1. Document equipment inspection prior to use. 2. Ensure dielectric gloves are tested and stamped with expiration date. 3. Check capacity of electric lines in vicinity. If working adjacent to electric lines exceeding 1,000 volts, higher rated dielectric protection and/or possible other control measures will be required
Air knife use	1. Equipment set-up 2. Cuts, bruises, burns from high air pressure. 3. Striking by air hose or connector 4. Striking by blowing debris 5. Hearing loss 6. Explosion,	1. Secure equipment shall with chokes to prevent equipment from rolling out of place. Workers shall stand clear of equipment at all times. The equipment shall be set up on stable solid flat ground surface to prevent tip overs. 2. Only trained personnel shall operate the unit. Do not point air nozzle at body or other people. Delineate work zone so that high pressure dissipates before leaving the work area. Use two hands to operate air nozzle. 3. Check that all mechanical hose connections are secure. Make sure all manual connections are “positive locked” and have	1. Document equipment inspection prior to use, including all connections. 2. Ensure dielectric gloves are tested and stamped with expiration date. 3. Check capacity of electric lines in vicinity. If working adjacent to electric lines exceeding

	electrocution, utility damage from underground utilities. 7. Entrapment in excavation	safety cables properly attached. 4. Delineate work zone to minimize possible contact by others. Check that deflector is in place on the air nozzle. Wear safety glasses and full face shield. Use ground cover over excavation to prevent flying debris. 5. Wear hearing protection 6. See above for use of hand tools. 7. Keep arms and legs out of excavation to avoid possible cave-ins of large debris that may pinch or entrap body parts.	1,000 volts, higher rated dielectric protection and/or possible other control measures will be required.
Soil vacuuming	1. Equipment set-up 2. Cuts, bruises, burns from high suction. 3. Contacting others with suction hose. 4. Hearing Loss 5. Explosion, electrocution, utility damage from underground utilities. 6. Entrapment in excavation	1. See above for air knife use. 2. Only trained personnel shall operate the unit. Avoid contact with open end of suction hose. Do not attempt to unclog hose while vacuum is applies. Shut down vacuum and depressurize hose with shut-off valve before removing clogs. Use two hands to operation suction hose. 3. Delineate work zone to minimize possible contact by others. 4. Wear hearing protection 5. See above for use of hand tools. 6. See above for air knife use.	1. Document equipment inspection prior to use, including all connections and valves. 2. Ensure dielectric gloves are tested and stamped with expiration date. 3. Check capacity of electric lines in vicinity. If working adjacent to electric lines exceeding 1,000 volts, higher rated dielectric protection and/or possible other control measures will be required

Training Requirements: All personnel engaged in the hot work will have knowledge and experience working with air knives, soil vacuuming, and other necessary equipment. All necessary certification and permits will be provided prior to start of work. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Lifting/Hoisting

AHA 013

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 013	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Blauvelt	**Date:** December 7, 2005
	Superintendent/Competent Person	**Reviewed by:** J. O'Loughlin	**Date:** December 8, 2005
Work Operation: Trench Excavation		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Site Area Preparation	Vehicle and heavy equipment traffic in work area	▪ Operation of heavy equipment in accordance with the Project Safety Plan. ▪ Be alert when working around heavy equipment. ▪ No heavy equipment will be operated without a ground guide (someone on the ground guiding the equipment operator). ▪ Barriers, warning signs, designated walkways or other safeguards must be provided where pedestrians are exposed to the risk of collision.	Follow operations manual maintenance and inspection procedures for each piece of equipment used on site.
Excavation	Contact with underground or overhead utilities	▪ Verify utilities and other hazards above and below ground have been cleared. Contact the UFPO to clear underground utilities. ▪ The excavation equipment cannot be operated within 10 feet of power lines up to 50kV. Additional distances for excavations in the vicinity if higher voltage power lines are required	Have a competent person on site during excavation. Complete the appropriate excavation work permits.
	Excavation collapse	▪ Verify proper engineering controls are implemented (sloping, benching or protective devices) are being initiated. ▪ Keep stockpiled material at least 2 feet from the edge of the trench. ▪ Have appropriate stairs, ladders or ramps every 25 feet if trench is deeper than 4 feet and personnel are entering trench.	Competent person will verify that engineering controls are appropriate for site conditions and stability of soil.

		▪ Competent person to verify stability of soil on each day, after change in weather ▪ Backfill trench as soon as possible after work is complete to prevent potential safety issues. Trenches will not remain open overnight.	
	Slips, Trips, Falls	▪ Have appropriate signs and barriers with in the excavation area. ▪ Keep observers away from excavation ▪ Place a fence or barricade around trench if leaving it open after work hours.	
	Pinch Points	▪ Maintain awareness of procedures underway and be attentive of work operations. ▪ Wear hard hats when around machinery and equipment. ▪ Keep observers back from active operations. Get operators attention before approaching.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8-hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Sampling - Groundwater

AHA 014

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 014	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** S. Blauvelt	**Date:** December 7, 2005
	Superintendent/Competent Person	**Reviewed by:** J. O'Loughlin	**Date:** December 8, 2005
Work Operation: Sampling Groundwater		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Groundwater Sampling	▪ Inhalation of volatile contaminants ▪ Ingestion of contaminants ▪ Skin/eye contact with contaminated water	▪ If exposure to contaminated materials occurs, promptly wash contaminated skin using soap or mild detergent and water. ▪ Wash eyes with large amounts of water. ▪ If a person breathes in a large amount of organic vapor, move the exposed person to fresh air. Perform artificial respiration if breathing stops. ▪ Keep the affected person warm and at rest. Obtain medical treatment for all of these situations as required. ▪ Wear appropriate safety equipment (i.e., goggles, gloves, and boots, tyvek) as appropriate for reducing risk of contamination.	
	Pinch Points/Overhead equipment	▪ All personnel will be aware of moving machinery and parts and wear appropriate PPE when near machinery (e.g., hard hat, safety glasses, gloves etc.). ▪ Keep observers back from active operations. Get operator's attention before approaching.	
	Noise Exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 85 decibels (dBA) averaged over an eight-hour day.	

General Chemical Exposure	Chemical exposure to NAPL	▪ Monitoring to determine exposure and action levels	
		▪ Wear proper PPE – inner glove and nitrile outer glove, Tyvek, and respirator (if necessary)	
		▪ Follow proper decontamination procedures when leaving the "exclusion zone"	
		▪ Practice good personal hygiene; wash up before eating, eat or drink in designated clean areas	
		▪ Eyewash bottle or station to treat eye irritation	
		▪ Training	
Field Testing	Exposure to analytical chemicals	▪ Follow SOP with field kit or field instrument for handling analytical chemicals or instrument	
Packing samples for off-site shipment to lab	Accidental breakage of glass bottles	▪ Wear cut-resistant gloved during packaging of glass bottles	
		▪ Training	
	Chemical Exposure	▪ Wear necessary PPE (see potential chemical exposure section above and/or field kit SOP)	
		▪ Immediate clean-up of spills	
	Equipment Contamination	▪ Decontamination (see HASP)	

PARSONS

Activity Hazards Analysis

Geophysical Investigation

AHA 015

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 015	**Date:** September 15, 2014	**New:** Yes
Location: Brooklyn, New York	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves (task dependent)	**Analysis by:** A. Merget	**Date:** November 25, 2008
	Superintendent/Competent Person	**Reviewed by:** D. Martoccia	**Date:** November 25, 2008
Work Operation: Geophysical Investigation		**Approved by:**	**Date:**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Geophysical Investigation Survey	▪ Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions	Inspect job site and staging area and identify any concerns. Inspect job site daily.
	▪ Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	▪ Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	
	▪ Snow	▪ Have warm clothes available for cold temperatures.	
	▪ Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	
	▪ High winds, dust storm	▪ Wear goggles if dust/debris is visible.	
	▪ Icy Conditions	▪ Salt/sand icy surfaces as appropriate. ▪ Workers will be aware of potentially slippery surfaces and wear proper footwear.	

	Site Traffic	▪ Be aware of moving equipment/vehicles onsite. ▪ Make eye contact with equipment/vehicle operators prior to moving into their path or reach of moving parts. ▪ Work area protection using hazard tape, traffic cones, signs and barricades to alert drivers and pedestrians of the work area. ▪ Use of a trained flagger when diverting traffic.	
	Cold and Heat Stress	Visitors will dress accordingly to prevent injuries from extreme heat, or cold. SSO will monitor for cold/heat stress symptoms.	
	Biological Hazards (ticks, bees, mosquitoes, snakes, etc.)	Personnel will be aware of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, boots etc.) and insect repellant.	
	Site Hazards Material Exposure	▪ Site walk through prior to work if uncertain of site layout and equipment. Purpose of inspection is to identify any potential site hazards in the area where work will be. Facility Manager will determine if his/her presence during work is required. ▪ Training and safety awareness of potential exposure to contaminates at the site. ▪ Training of all personnel decontamination procedures (if necessary). ▪ Appropriate PPE will be worn dependent on site conditions and actions levels. ▪ Must sign off on health and safety plan. ▪ Previously unidentified hazards will be brought to the attention of the Con Edison representative immediately.	
	Lack of communication	Prior to commencement of daily activities, methods of communication will be discussed. Personnel will have access to a cell phone or other means of communication. The activities for the day will be discussed and understood prior to daily start up with review of safety issues.	

Training Requirements:

Visitors will report to the Site Safety Officer (SSO) who will give a short health and safety orientation and require sign off on the PSP. The SSO will determine if the visitor can access the site based on verification of 40-hour training or 8 hour Supervisor training or if the visitor(s) will need to be escorted by a 40-hour trained individual onsite.

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity.

Activity Hazards Analysis

Decontamination- Area Setup

Project Name & Number: Honeywell Smith Street Brooklyn Coal Tar Site Remedial Investigation	**AHA No.** 016	**Date:** February 1, 2011	**New:** No
Location: Brooklyn, NY	**Contractor:** Parsons		**Revised:**
Required Personal Protective Equipment:	Level D-Long pants, safety glasses, hard hat (in presence of heavy equipment), steel-toed boots, gloves (leather work gloves for construction efforts and clearing).	**Analysis by:** R. Absolom	**Date:** April 27, 2005
	Superintendent/Competent Person	**Reviewed by:** Dale R. Dolph, CHST	**Date:** 3/7/11
Work Operation: Decontamination Area Setup		**Approved by: G. Beck**	**Date: 8/11/2005**

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Decontamination area set up	Vehicle and heavy equipment traffic in work area	▪ Operation of heavy equipment in accordance with the PSP. ▪ Be alert when working around heavy equipment. ▪ Ground guides for the backing of all vehicles. ▪ No heavy equipment will be operated without a ground guide. ▪ Barriers, warning signs, designated walkways or other safeguards must be provided where pedestrians are exposed to the risk of collision.	▪ Follow operations manual maintenance and inspection procedures for each piece of equipment used on site.
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects.	
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	
	Snow	▪ Have warm clothes available for cold temperatures.	
	Lightning	▪ Do not begin or continue work until lightning subsides for	

		20 minutes.	
	Cold and Heat Stress	▪ Implement the cold/heat stress program as appropriate to conditions. ▪ SSO will monitor workers for cold/heat stress symptoms.	
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	
	Injury from Hand Tool Operation	▪ Personnel awareness of potential hazards from hand tool operation. ▪ SSO will ensure that all tools used onsite are in proper working order and are in good condition. ▪ Personnel to inform SSO or Project Manger if tools require repair or replacement.	
	Biological Hazards (ticks, bees, mosquitoes, snakes, etc.)	▪ Personnel will be aware of potential exposure to biological hazards. ▪ Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, boots etc.) and insect repellant. ▪ Personnel will wear thick gloves when clearing plants or debris from work area.	
	Injury from Power Tool Operation	▪ All tools will be in good working order. ▪ No damaged equipment will be issued until repaired or replaced. ▪ When power operated tools are designed to accommodate guards, the guard must be in place on the tool.	▪ Follow operations and maintenance procedures for each piece of equipment used on site.

		▪ Fuel powered tools may be refueled, serviced, or maintained only while the tools are stopped and not operating.	

Training Requirements:

All personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8 hour Supervisor and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of chemical for more than 30 days in a year, then them must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f).

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

HAZWOPER Template - Subcontractor Safety Plan (SSP)

Instructions for Completing this SSP – Delete from final version

Your actual SSP will begin with the cover/signature page

Welcome to the Honeywell Syracuse Portfolio

Health and Safety Program

(HSP²)

NOTE: The yellow highlight is used to show you where instructions are and where you are to modify this template. After providing the information requested, delete the yellow highlighted instructions. You can turn the yellow highlighting feature off or on throughout the entire document by clicking on TOOLS, OPTIONS, VIEW, HIGHLIGHT, from the toolbar.

Every Subcontractor working on a Honeywell Syracuse Portfolio Site (and their lower tier subcontractors) must establish, implement and maintain a written Subcontractor Safety Plan (SSP) and a copy must be maintained at each work site. The minimum requirements for establishing, implementing and maintaining an effective written Subcontractor Safety Plan are referenced in the contract and are described more thoroughly in the Honeywell Syracuse Portfolio Health and Safety Program (HSP²) guidance document. The Subcontractor and their lower tier subcontractors shall comply with the contract terms and shall complete their SSP to include detailed and specific descriptions relating to the following elements:

- Accountability/Responsibility/Key Line Personnel
- Statement of Subcontractor's Safety and Health Policy
- Drug and Alcohol Free Workplace
- Medical Surveillance Program
- Identification of Competent/Qualified Persons
- Scope of Work Evaluation
- Hazard/Risk/Exposure Assessment
- Hazard Control Measures/Job Safety Analyses (JSA's)
- Subcontractor Periodic Safety Audits/Inspections
- Subcontractor's Risk Mitigation – Two-Week Look Ahead Plan
- Compliance Requirements Policy

- Written Progressive Disciplinary Program
- Hazard Correction Policy
- Training and Instruction
- Project Site Orientation
- Employee Communication System
- Recordkeeping
- Incident/Near Miss Incident Investigations
- Emergency Action Plan
- Site-Specific Medical Emergency Plan
- Hazard Communication Program
- Respiratory Protection Program
- Medical Surveillance Program
- Other written programs as specified by regulatory agency or contract Requirements
- SSP Review and Modifications
- Detailed List of Tables, Forms, Appendices and Attachments

This SSP template has been prepared as an aid for use by Subcontractors and their lower tier subcontractors. Subcontractors should include the scope of work and corresponding safety requirements associated with their lower tier subcontractors in their SSP, unless the lower tiered subcontractor chooses to write a similarly detailed version themselves. This model SSP template was written for a broad spectrum of subcontractor employers so it should be modified to provide the appropriate information for your scope of work. If a section of this SSP does not apply to your project, insert "not applicable" or N/A. Do not delete any sections or change the numbering sequence.

The requirements you write into this SSP must be followed and compliance to those requirements must be audited by the Subcontractor's Project Manager in order to be effective. In other words, "Plan your Work and Work your Plan".

SUBCONTRACTOR SAFETY PLAN (SSP)

Prepared For:

Honeywell Syracuse Portfolio
Health and Safety Program

(Insert Office Name - Times New Roman 12 pt.)
(Insert Street Address - Times New Roman 12 pt.)
(Insert City, State and Zip Code - Times New Roman 12 pt.)

Project Name:

(Insert Client Name - Times New Roman 12 pt.)
(Insert Project Name - Times New Roman 12 pt.)
(Insert Street Address - Times New Roman 12 pt.)
(Insert City, State and Zip Code - Times New Roman 12 pt.)

Prepared By:

(Insert Subcontractor Name – Times New Roman 18 pt. Bold)

(Insert Street Address – Times New Roman 12 pt.)
(Insert City, State, and Zip Code – Times New Roman 12 pt.)
Author: (Insert Name and Title)

REVIEWED AND APPROVED BY:

Subcontractor Project Manager: _____ _____
Date

(INSERT DATE)

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LIST OF ACRYNOMS

ATV	All-Terrain Vehicle
BEI	Biological Exposure Index
CPR	Cardio Pulmonary Resuscitation
HSP^2	Honeywell Syracuse Portfolio Health and Safety Program
JSA	Job Safety Analysis
MSDS	Material Safety Data Sheet
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PM	Project Manager
PPE	Personal Protective Equipment
PSHEP	Project Safety, Health, and Environmental Plan
SCBA	Self-Contained Breathing Apparatus
SHSO	Site Health and Safety Officer
SSP	Subcontractor Safety Plan
TLV	Threshold Limit Value

1. RESPONSIBILITY/IDENTIFICATION OF KEY LINE PERSONNEL

The following personnel have the authority and responsibility for implementing the provisions of this Subcontractor Safety Plan (SSP) for:

1.1 Site Contact Information

Project Site Location | On-site Contact No.

1.2 Key Project Personnel

Contractor:
Address:
Telephone: | Email:
Company Executive responsible for project: | Contact No.

Manager/Superintendent: | Contact No.

Safety Representative/Manager: | Contact No.

Key Foreperson(s): | Contact No.

Client Project Management Point of Contact: | Contact No.

All managers and supervisors are responsible for implementing and maintaining the SSP in their work areas and for answering worker questions about the SSP. A copy of this SSP is available for any employee to review.

2. STATEMENT OF SUBCONTRACTOR'S SAFETY AND HEALTH POLICY

(Include or attach your company' Safety and Health Policy Statement – not a company Health and Safety Manual or Standard Operating Procedures.)

2.1 Drug and Alcohol Free Workplace

State your company's drug and alcohol policy.

Describe your company's drug and alcohol testing requirements. At a minimum, they must meet the Honeywell Syracuse Portfolio Health and Safety Program (HSP^2) requirements, summarized below:

- Pre-work. HSP^2 requirements call for pre-work testing for drugs and alcohol within two weeks prior to initial assignment for work on Honeywell projects, or a reasonable time frame acceptable to the Project Manager. Such testing will be repeated annually.
- Reasonable Suspicion. Project personnel may be tested if observed by trained management as exhibiting signs of use or possession of illegal drugs or alcohol.
- Post Accident. Personnel involved in an accident resulting in a fatality, disabling motor vehicle accident (requiring one or more vehicle to be towed away), injury requiring off-site medical treatment or property damage expected to result in > $5,000 in loss will be tested for drugs and alcohol.
- Random. Certain projects may be selected for random testing at the discretion of the HSP^2 Safety Director.

State your company's policy on the use of legally obtained prescription drugs which may affect the safe performance of a worker.

State the disciplinary measures that will result from a positive drug test or a worker's refusal to submit to drug or alcohol testing. At a minimum, workers who test positive or refuse to be tested will immediately be removed from Honeywell projects.

3. IDENTIFICATION OF COMPETENT/QUALIFIED PERSONS

(Provide the individual names and job titles of personnel assigned to the project, including the dates of training for the topics mentioned below. Add rows as necessary, and indicate the appropriate training information. Include copies of certifications in the Appendix. Include certifications for the competent/qualified personnel, when applicable.)

(If the scope of work for lower tier subcontractors is included in this SSP, then the identification of competent/qualified persons for the lower tier subs must also be included in this section).

3.1 Competent/Qualified Personnel

Name	Job Title	40-hr HAZWOPER	8-hr HAZWOPER Supervisor	8-hr HAZWOPER refresher expires	Other training (i.e. CPR, excavation, confined space)
Insert name or "Not applicable"	Insert job title	Insert date of completion	Insert date of completion or "Not applicable"	Insert expiration date	Insert date of completion

NOTE: This table may be expanded and included as an appendix. If so, describe its location.

Training requirements include:

- 40-hour HAZWOPER and 8-hour annual refresher certificates – required for general site workers (such as equipment operators, general laborers and supervisory personnel) engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazard.
- 8-hour HAZWOPER Supervisor certificate – required for on-site management and supervisors directly responsible for, or who supervise employees engaged in, hazardous waste operations.
- Respirator Clearance – required for all personnel that may need to wear a half facepiece, full facepiece or supplied air respirator, or self-contained breathing apparatus (SCBA). Provide dates of training, medical clearance and fit testing. Include copies of medical clearance and fit testing records in the Appendix.
- Excavation Competent Person certificate – required for daily inspections of excavations greater than four feet in depth, the adjacent areas, and protective systems for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are required when employee exposure can be reasonably anticipated.
- CPR/First Aid certification –A person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid in the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite. For on-the-water activities, time, rather than

distance, is the critical factor in determining whether first aid and CPR trained personnel are required. The vessel itself shall be considered the worksite.

- Confined Space Entry (Supervisor) certificate – the employer shall ensure that each entry supervisor knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure. Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin. Terminates the entry and cancels the permit as necessary. Verifies that rescue services are available and that the means for summoning them are operable. Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations. Determines, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained. Entrants and attendants, before assignment to a confined space operation, must demonstrate written documentation of confined space training appropriate to their assignment.

No worker will enter the exclusion zone, be exposed to hazardous substances or conditions or be assigned work unless they are properly trained, and the up-to-date documentation of such training has been submitted in advance.

4. SCOPE OF WORK EVALUATION

The work activities that will take place are described below. Activities of lower tier subcontractors will either be included in this section, or the lower tier subcontractor will complete their own SSP.

For this project, there *(insert "will" or "will not")* be any lower tier subcontractors. Lower tier subcontractor activities *(insert "are" or "are not")* included in this section. *(If there will be lower tier subcontractors, include the statement and table below):*

4.1 The lower tier subcontractors that will be working on the project will be:

SUBCONTRACTOR	WORK ACTIVITIES	HONEYWELL EVALUATION GRADE
Insert Company Name or N/A	i.e. Groundwater Sampling	B (for example)

NOTE: Each subcontractor must complete an HSP² Contractor Safety Evaluation package before being eligible to work on a Honeywell Syracuse Portfolio Project. Your Project Manager

or contact person will have access to a database of contractors that have submitted a Contractor Safety Evaluation package to determine the Evaluation Grade. If a "C" or "D" grade contractor is listed, justification must be included why the subcontractor is being used rather than an "A" or "B" grade subcontractor. Additional oversight and controls are required for the use of "C" or "D" contractors.

Major Activities of Contractor – describe activities in bullet format, in some degree of detail.

Major Activities of lower tier subcontractor(s) – describe activities in bullet format or insert "Not Applicable."

5. HAZARD/RISK/EXPOSURE ASSESSMENT AND CONTROL MEASURES

(Describe the major activities and identify the associated hazards, risks and exposures. Thoroughly describe the control measures that will be used to minimize the identified hazards. This may be presented as a Table in this section, or a Job Safety Analysis (JSA) may be used for each major activity and added to this SSP as an appendix.) Regardless of the format, the Risk Assessment or JSA shall be updated and communicated to all affected parties daily or as frequently as necessary.

Major hazards or risks and exposures associated with the scope of work evaluation are listed below.

5.1 Job Safety Analysis

Task	Hazards/Risks	Controls
Insert Task	Hazard or Risk	Control

5.2 Chemical Safety Analysis

Chemical or Class	PEL/TLV	Hazards, Target Organs

PEL = OSHA Permissible Exposure Limit
TLV = ACGIH Threshold Limit Value

5.3 Chemical Monitoring Requirements

Chemical	Instrument	Location	Frequency

5.4 Action Levels and Response Summary

Chemical (or Class)	Action Level	Response

Complete table in detail, or state: "For each major activity listed, a JSA has been developed and is included as an appendix."

Provide an evaluation of reasonably anticipated exposures, action limits, Permissible Exposure Limits (PEL's), other relevant Occupational Exposure Limits (OEL), and the response required when an action level or exposure limit has been reached.

Insert any applicable measures to mitigate identified risks or hazards, using the hierarchy of hazard controls:

- Elimination of hazard or substitution of safer method
- Engineering controls
- Administrative controls
- Personal Protective Equipment, and
- Emergency response equipment or supplies

Some of these measures should include methods for identification of work zones, the level of personal protective equipment (PPE) to be worn (including respiratory protection), action levels based on potential chemical exposures (i.e., personal monitoring, area monitoring, etc.) and procedures for decontaminating personnel and equipment. This section should include specifics, not broad generalities.

6. SUBCONTRACTOR PERIODIC SAFETY INSPECTIONS/AUDITS

Inspections and audits shall be performed by competent persons or observers in the various areas of our workplace. Inspections will focus on worker behaviors as well as site and equipment conditions. An inspection is not considered completed until all identified corrective actions are implemented.

Daily inspections are required by the Site Health and Safety Officer (SHSO), foreman or other responsible party. The completion of the daily inspection must be noted in the construction or safety log. Any corrective actions taken or required must be noted as well.

Periodic, documented inspections are performed according to the following schedule:

- At least weekly
- When we initially establish our SSP
- When new substances, processes, procedures or equipment which present potential new hazards are introduced into our workplace
- When new, previously unidentified hazards are recognized
- When occupational injuries and illnesses occur
- When we assign workers to unfamiliar processes, operations, or tasks, and
- Whenever workplace conditions warrant an inspection

Periodic inspections consist of identification and evaluation of workplace hazards or behaviors, and specifying corrective actions that will eliminate or mitigate the identified hazards. The corrective actions will be assigned to a responsible person with a target completion date and tracked to completion. Temporary or interim measures will be applied and documented as well.

7. SUBCONTRACTOR RISK MITIGATION: TWO-WEEK LOOK-AHEAD

The Risk Mitigation Two-Week Look-Ahead Form is used to review risk mitigation strategies for previously identified tasks at weekly progress meetings.

The addition of previously unanticipated activities that have not been evaluated for risks and mitigation strategies typically would require the completion of additional JSA(s).

8. COMPLIANCE REQUIREMENTS POLICY

Management is responsible for ensuring that all safety and health policies and procedures are clearly communicated and understood by all employees. Managers and supervisors are expected to enforce the rules fairly and uniformly.

All employees are responsible for using safe work practices, for following all directives, policies and procedures, and for assisting in maintaining a safe work environment.

Our system of ensuring that all workers comply with the rules and maintain a safe work environment includes:

- Informing workers of the provisions of our SSP
- Responding to concerns expressed by the workers
- Evaluating the safety performance of all workers
- Recognizing employees who perform safe and healthful work practices
- Providing training to workers whose safety performance is deficient
- Disciplining workers for failure to comply with safe and healthful work practices, and
- The following practices:
  - _____
    _____
    _____

9. WRITTEN PROGRESSIVE DISCIPLINARY PROGRAM

(Explain your company's program or include a written program in the Appendix)

10. HAZARD CORRECTION POLICY

Unsafe or unhealthy work conditions, practices or procedures shall be corrected in a timely manner based on the severity of the hazards. Hazards shall be corrected according to the following procedures:

- When observed or discovered
- When an imminent hazard exists which cannot be immediately abated without endangering employees or property, we will remove all exposed workers from the area except those necessary to correct the existing condition. Workers necessary to correct the hazardous condition shall be provided with the necessary protection, and
- All such actions taken and dates they are completed shall be documented on the appropriate forms

11. TRAINING AND INSTRUCTION

All workers, including managers and supervisors, shall have training and instruction on general and job-specific safety and health practices. Training and instruction shall be provided as follows:

- When the SSP is first established
- To all new workers
- To all workers with respect to hazards specific to each employee's job assignment
- To all workers given new job assignments for which training has not previously provided
- Whenever new substances, processes, procedures or equipment are introduced to the workplace and represent a new hazard
- Whenever the employer is made aware of a new or previously unrecognized hazard, and
- To supervisors to familiarize them with the safety and health hazards to which workers under their immediate direction and control may be exposed

Workplace safety and health practices for all locations include, but are not limited to, the following:

- Explanation of the employer's SSP
- HSP^2 requirements
- Honeywell Contractor's Safety Handbook
- Site Emergency Action Plan
- Measures for reporting any unsafe conditions, work practices and injuries, and
- Means for identifying when additional instruction is needed

In addition, we provide specific instructions to all workers regarding hazards unique to their job assignment, to the extent that such information was not already covered in other training.

12. PROJECT SITE EMPLOYEES ORIENTATION PROGRAM SUBJECTS

As a condition of working on a remediation project involving the potential for exposure to hazardous substances and health hazards, our workers will receive information about the following subjects:

- Names of personnel responsible for site safety and health

- Honeywell's contractor safety requirements
- Promptly reporting emergencies, incidents and unsafe conditions
- Emergency/evacuation plans
- Provisions for medical services and first aid including emergency procedures
- Safety, health and other hazards at the site
- Review of all activities on site and related Job Safety Analyses JSA's
- Proper use of personal protective equipment
- Work practices by which a worker can minimize risk from hazards
- Safe use of engineering controls and equipment on site
- Acute and chronic effects of compounds at the site
- Decontamination procedures, and
- Hygiene requirements - Availability of toilet, hand-washing, and drinking water facilities

In addition to the above-mentioned information, we also orient our employees on: (Line out or write "not applicable" – DO NOT delete - topics that are not covered in your employee orientation.)

12.1 Site Orientation Topics

Covered or N/A	Site Orientation Topic
	Good housekeeping
	Road and highway safety practices – flagging, traffic control
	Heavy equipment operation – cranes, excavators, articulating dump trucks, etc.
	Driver safety - defensive driving, operation of pick-up trucks, all-terrain vehicles (ATVs), etc.
	Ladder and scaffold inspection and safety rules;
	Use of elevated platforms – aerial lifts and scissor lifts
	Other fall protection measures
	Fire prevention including Hot Work Permits

	Cleaning, repairing and servicing equipment and machinery
	Proper use of hand and power tools
	Guarding of belts and pulleys, gears and sprockets, and conveyor nip points
	Machine, machine parts, and prime movers guarding
	Lockout/Tagout procedures
	Materials handling
	Chainsaw and other power tool operation
	Unsafe weather conditions – lightning, high winds, etc.
	Mobilization/demobilization
	Yard operations: moving vehicles and equipment, receiving and shipping
	Landing and loading areas – rigging, tag lines, landing areas, release of rigging
	Ergonomic hazards - proper lifting techniques
	Personal protective equipment
	Hazardous chemical exposures
	Hazard Communication/Right to Know
	Physical hazards
	Heat and cold stress
	Noise
	Ionizing and non-ionizing radiation
	Biological hazards – poisonous plants, animals, bloodborne pathogens, etc. and
	Other job-specific hazards, such as:
	•
	•
	•

13. EMPLOYEE COMMUNICATION SYSTEM AND POLICY

We recognize that open, two-way communication between management and staff on health and safety issues is essential to an injury-free, productive workplace. The following system of communication is designed to facilitate a continuous flow of safety and health information between management and staff in a form that is readily understandable and consists of one or more of the following checked items:

- New worker orientation including a discussion of safety and health policies and procedures
- Review of our SSP and Construction Manager's Project Safety, Health and Environmental Plan (PSHEP)
- Workplace safety and health training programs
- Regular daily and weekly safety meetings
- Effective communication of safety and health concerns between workers and supervisors, including translation where appropriate
- Awareness campaign: Posted or distributed safety information
- A system for workers to anonymously inform management about workplace hazards
- A labor/management safety and health committee that
  - Meets regularly
  - Keeps written records of the safety and health committees meetings
  - Reviews results of the periodic scheduled inspections
  - Reviews investigations of accidents and exposures
  - Makes suggestions to management for the prevention of future incidents
  - Reviews investigations of alleged hazardous conditions, and
  - Submits recommendations to assist in the evaluation of employee safety suggestion
- Other: _____
  _____

14. RECORDKEEPING POLICY

We have taken the following steps to document implementation of our SSP:

- Records of hazard assessment inspections, including:
  - The persons conducting the inspection

  - The unsafe conditions and work practices that were identified, and
  - The action(s) taken to correct the identified unsafe conditions or work practices
- Documentation of safety and health training for each worker, including:
  - The worker's name or other identifier
  - Training dates
  - Types/topics of training, and
  - Training provider
- Air monitoring and other exposure records
- Written reports describing in detail, any accidents, incidents or near misses. A root cause shall be determined for such events. Corrective actions will be implemented and communicated to all site team members.
- Other records are retained as required by contract specifications or by local, state or federal (Occupational Safety and Health Administration (OSHA) regulations). Where regulations do not specify the length of records retention, a minimum period of three years after project completion will be used.

15. INCIDENT/NEAR-MISS INCIDENT INVESTIGATIONS POLICY

Procedures for investigating workplace incidents and near-miss incidents include:

- Responding to the incident scene as soon as possible
- Implementing measures to prevent further injury or damage and to preserve evidence
- Providing First Aid or coordinating any needed medical care
- Reporting incidents and near-miss incidents immediately to the appropriate HSP^2 point-of-contact. DO NOT delay! Certain levels of incident require immediate communication to Honeywell's upper management, and possibly to regulatory authorities
- Interviewing injured workers and witnesses
- Examining the workplace for factors associated with the incident/near-miss incident
- Determining the root cause of the incident/near-miss incident
- Taking corrective action to prevent the incident/near-miss incident from reoccurring
- Recording the findings and corrective actions taken, and
- Coordinating post-accident substance abuse testing

16. EMERGENCY ACTION PLAN

(Use this section to describe alarm signals, reporting procedures, evacuation routes, assembly areas, head count procedure, etc.)

Suggest:

- Warning alarm: multiple horn blasts, repeated
- Assembly area: Command post/trailer area
- A head count will be performed at the assembly area. Individuals should not leave work for the day until they are accounted for and properly reassigned or dismissed
- Evacuation route: site specific

Describe the preventative measures and response for unanticipated spills or releases to the environment. Include materials to be staged (e.g., spill kits) and their locations, procedures for containment and cleanup and reporting requirements, using the chain-of-command concept.

17. SITE SPECIFIC MEDICAL EMERGENCY PLAN

(Provide the name of emergency treatment facilities (Emergency Room) including contact numbers and route to the hospital. Also provide contact information for a local Occupational Medicine Clinic (for non-emergency use) that your company has contracted with for the treatment of routine or non-emergency incidents. The Occupational Medicine Clinic is a valuable asset in post-injury management and return-to-work programs. Provide names of competent first-aid and CPR personnel with dates of training certification and expiration. Include copies of employee certificates in the Appendix.)

17.1 Emergency Medical Care

Hospital/Emergency Care	Address	Telephone Number(s)

17.2 Occupational Medicine Clinic

Occupational Medicine Clinic	Address	Telephone Number(s)

17.3 Competent First Aid/CPR Personnel

Name(s) Competent Persons	First Aid	CPR

	Expiration Date	Expiration Date

NOTE: This table may be expanded and included as an appendix. If so, describe its location.

18. HAZARD COMMUNICATION PROGRAM

(In this section provide the name of the Haz Com Officer, a program outline, a list of the hazardous chemicals to be used and a description of where material safety data sheets (MSDS's) will be located. Include the written HAZ COM program and MSDS's for all chemicals to be used on site as an Appendix.)

19. RESPIRATORY PROTECTION PROGRAM

(If applicable to this project, provide an outline or summary of your company's written Respiratory Protection Program.)

(In this SSP, provide a description of the change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life must be provided in this section. The employer shall describe in the respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data.)

(Include the written respiratory protection program and copies of individual records (i.e., medical clearance, fit test and training) as an Appendix.)

20. MEDICAL SURVEILLANCE AND RESPIRATORY PROTECTION PROGRAMS

All project personnel performing intrusive work or entering the restricted area where intrusive work is being conducted, must be involved in a medical surveillance program meeting, at a minimum, the requirements of 29 CFR 1910.120.

Describe your company's medical surveillance requirements for this project. Include any biological monitoring, the relevant Biological Exposure Indices (BEI's) and the action limits, if any, that would initiate such biological monitoring.

Written evidence of medical surveillance requirements shall be maintained on-site and submitted prior to work for each affected person.

20.1 Medical Surveillance Requirements

Name	Job Title	Respiratory Clearance	Medical Exam	Respirator Fit Test	Other Med Surveillance Requirement
Insert name"	Insert job title	Insert expiration date	Insert expiration date	Insert expiration date	Describe frequency

NOTE: This table may be expanded and included as an appendix. If so, describe its location.

21. OTHER WRITTEN PLANS OR PROGRAMS AS REQUIRED BY REGULATION AND APPLICABLE TO THIS PROJECT.

(If applicable, attach other written programs as an appendix. If a plan listed below is not applicable, write N/A or lineout. DO NOT delete.

21.1 Other Written Plans or Programs

Included or N/A	Name of Plan or Program
	Site sanitation plan
	Layout/material storage plans
	Access and haul road plan/traffic patterns
	Procedures and tests
	Wild fire prevention plan
	Diving plan
	Man overboard plan
	Fire Aboard/Abandon ship plan
	Asbestos abatement plan
	Lead abatement plan
	Abrasive blasting
	Critical lift procedures
	Dangerous weather contingency planning
	Demolition plan

	Formwork and shoring erection and removal plans
	Blasting plan
	Nighttime operations plan
	Control of Hazardous Energy (Lockout/Tagout)
	Operation of a Forklift
	Confined Space Entry
	100 % Fall Protection Plan
	Other:

(Include any of the applicable written programs as an Appendix.)

22. SUBCONTRACTOR SAFETY PLAN (SSP) REVIEW AND MODIFICATIONS

The SSP shall be submitted to the Project Manager (PM) at least ten days before commencement of any field activities. The SSP will be reviewed, and may be returned with comments or requests for more details or clarification. Fieldwork shall not commence until the PM has provided written acceptance that the SSP meets contractual requirements. The responsibility for completeness, accuracy and regulatory compliance of the SSP rests solely with the subcontractor.

Minor modifications, such as typographical corrections, changing names or updating contact information, may be made by means of a routine submittal to the PM. JSA's for a new activity or previously unanticipated methodology should be submitted to the PM for review at least ten days before commencement of the new activity, or as early as practicable. Acceptable JSA's become an appendix to the existing SSP.

23. LIST OF TABLES, FORMS, APPENDICES AND ATTACHMENTS

List in detail any tables, forms, appendices and attachments. These elements are attached to and become part of the completed PSP.

Tables

- _____
- _____
- _____
- _____

Forms

- _____
- _____
- _____
- _____

Appendices

- _____
- _____
- _____
- _____

Attachments

- _____
- _____
- _____
- _____

Attachment 10.2.1

PARSONS

Subcontractor Safety Plan Review

Date: _____ Project/Location: _____

Subcontractor: _____ Parsons Safety Manager: _____

The information provided here is based on a review of a subcontractor's safety plan. Areas identified as incomplete are reevaluated and modified based on the standards in the contract specifications and the Project Safety Program manual. Subcontractors resubmit corrected sections of the SSP to the Parsons Construction Manager within one week of receiving review documentation.

Section	Complete	Incomplete	Section	Complete	Incomplete
Site Specific Safety Plan			Specific Activity Hazard Analysis (AHA)		
Responsibilities assigned			Project Site Employees Orientation Program		
Compliance			Emergency Action Plan		
Hazard Communication			Site Specific Medical Emergency Plan		
Hazard Assessment			Identification of Key Line Personnel		
Accident Investigation			Identification of Competent & Qualified Personnel		
Hazard Correction			Written Progressive Disciplinary Program		
Training and Instruction			Written Trenching and Shoring Plan (if applicable)		
Recordkeeping			Written 100% Fall Protection Plan (if applicable)		
Scope of Work Evaluation			Other		

Additional Comments:

_____

_____

_____

_____

Reviewed by:

Name _____ Title _____ _____

Attachment 10.3

Honeywell Contractor Safety Handbook

This informational Handbook is intended to provide a generic, non-exhaustive overview of a particular standards-related topic. This publication does not itself alter or determine compliance responsibilities, which are set forth in OSHA standards themselves and in the Occupational Safety and Health Act of 1970. Since the regulations, interpretations and enforcement policy may change over time, it may be necessary to seek additional guidance on OSHA compliance requirements. Any and all deviations from the guidelines and rules set forth in this Handbook shall have prior approval by Honeywell.

This Handbook serves as a guide and reference for the minimum rules and standards for contractors performing capital work, maintenance, repair, dismantlement, remediation or other activities that have the potential for an incident.

This Handbook should be issued to each contract employee working at a Honeywell facility, location or site. The perforated page at the back of the Handbook must be signed and returned to the Honeywell contact/representative prior to commencing work. After reviewing each Section of this Handbook, specific attention should be focused on the topics that will be encountered during the project/task.

Contract employees must also be familiar with their company's health, safety and environmental policies, procedures and guidelines.

Revised 12/99

Contractor Safety Excellence

Our Mission
We will achieve a premier level of safety performance for contractors working at Honeywell locations through increased safety awareness, communication of expectations, following work processes that reduce at-risk behaviors and ensuring the proper management of incidents.

Our Commitment
We recognize that outstanding safety performance is essential to the welfare of our employees, contractors and to business excellence. We will continue to improve our global competitiveness by making safety an integral part of all business activities.

Our Safety Principles
- We strive to prevent all incidents that may lead to injuries or illnesses.
- Safety performance is a responsibility of line management and every contractor.
- We design safety into the work place.
- Individual behavior is the most important factor in preventing incidents.
- We expect and require every contractor to work safely.
- Working safely is good business.
- Safety is an integral part of our culture and total quality processes.
- Our safety process must react to all incidents, not just accidents.
- We continually improve our safety process by auditing the process and correcting the root cause of deficiencies.
- We promote safety, both on and off the job.
- We prepare for emergencies.

Table of Contents

A. Introduction

- This handbook sets forth the safety requirements of Honeywell International Inc. ("Honeywell")
- At Honeywell, it is our policy to provide a safe and healthful place in which to work. It is everyone's obligation to work safely and to correct unsafe acts, practices and/or conditions for the protection of yourself and others.
- It is extremely important that you understand how your work is to be done in a safe manner. If you don't know, stop and ask before you begin work.
- All work must conform to plant, local, state, and federal (OSHA) regulations (CFR 29 Part 1910 and 1926).
- The information in this handbook is general in nature and is to be considered the minimum.
  S ave
  A ll
  F ellow
  E mployees
  T his
  Y ear
- During your orientation, you will be informed of the specific safety requirements for your particular site or plant.

B. General Information

Site Entry

- Personnel, vehicles, and equipment are subject to search upon entering or exiting the site premises.
- Personnel may be required to pass a drug test or show proof of passing a drug test within the past thirty (30) days prior to working at the site.

Vehicle Safety

- Operators of vehicles and equipment shall observe all site traffic regulations. Seat belts are to be worn at all times.

Pedestrians

- Pedestrians have the right of way. Pedestrians should use walkways where provided and should not take shortcuts through operating areas, buildings or other areas.

Cameras

- Cameras are not allowed on site without the proper authorization.

Running

- Running is not permitted on site except in an extreme emergency.

Smoking

- Smoking is permitted in designated areas only. Discard smoking materials in approved containers.

Conduct

- Horseplay, fighting, gambling, sexual harassment and the possession or use of firearms, alcoholic beverages and illegal substances is strictly prohibited.

Dress Code

- Pants must cover top of steel-toed leather work shoe and be in good condition. Shirts must have at least 4" of sleeve. Long sleeve shirts may be required at specific locations or for certain tasks.

C. Emergency and Disaster Procedures

In the event there is an emergency, anyone can activate
the alarm any time there is a:

- Serious injury or illness
- Fire
- Major spill or release

When an alarm sounds, the following rules are in effect:

- All flame or hot work permits for welding, cutting, and spark producing equipment will be suspended until the all-clear signal is given.
- Smoking is prohibited.
- All traffic will pull to the side of plant roads and shut off engines until the all-clear signal is given.
- Report to your assembly point / area (if previously designated), or contact your Honeywell host.

Site Specific Emergency and Disaster Procedures

- Each Honeywell plant is equipped with an emergency alarm system, designated assembly areas and emergency phone numbers. The specific guidelines for reporting emergencies and disasters should be determined in your orientation.

D. Personal Protective Equipment (PPE)

Head Protection

- Contractors are required to wear approved hard hats that meet ANSI Z89.1-1971. Hard hats must be in good condition and be worn with brim to the front.

Eyes and Ears

- Each employee should know the location of the nearest eye wash/safety shower station in their area before starting work.
- Contractors are required to wear approved ANSI Z87.1 safety glasses with rigid side shields. Additional eye/face protection will be required when performing certain tasks (e.g.: welding, burning, grinding, chipping, sawing, drilling, handling chemicals or corrosive liquids, and pouring concrete or molten materials.) Check plant procedures.
- Approved hearing protection must be worn as specified in all posted areas and while working with or around high noise level producing tools, machines or equipment.

Fingers, Hand and Wrist

- Gloves suitable for the job being performed shall be worn unless the job cannot be done with gloves or wearing gloves increases the hazard.
- Tool holders should be used when driving stakes and wedges or when holding star drills, bull pins or similar tools.

Foot Protection

- In accordance with OSHA 1910.136, all contractors must determine if hazards are present (or are likely to be present) that may require the use of safety footwear.
- Safety footwear for contractors must be in accordance with ANSI Z41-1991, constructed of industrial quality leather and without urethane soles.
- Rubber boots with safety toe protection are required on jobs subject to chemically hazardous conditions.
- Metatarsal protection should be worn when using jack hammers, tamps and similar equipment which has the potential for foot injury above the toes.

Respiratory

- Respirators used by contractors must meet NIOSH/MSHA standards.
- Respirators must be inspected regularly and stored in a dust-free container.
- Employees required to wear a respirator must have a physician's approval and be fit tested. Employees must be clean shaven in the facial area to obtain an acceptable seal.
- Contractor must keep records of qualified users.

Skin

- If the possibility of skin contact with chemicals exists, personal protective equipment required by Material Safety Data Sheets shall be worn.

E. Hazard Communication / Right To Know

Upon beginning work at a Honeywell facility, each individual has the right to know information concerning the hazardous properties of any materials he/she may come in contact with. Training regarding potential hazards must be given to each individual and will include, but not be limited to, the following:

- An explanation of the hazard communication standard and the training requirements.
- An explanation of the project hazard communication program and it's location.
- Notification of the locations of the hazardous

chemicals.
- A description of the plant labeling and hazard rating system.
- A description of the Material Safety Data Sheet (MSDS), their use and location.

F. Permits

Certain types of work are not to be started until approval is given in the form of a signed permit. A written, properly authorized permit listed below may be required before you begin any activities in any production or operating area of the plant.

- **Work Permit** - required before any work can be started on any job in any area of the plant.
- **Line Breaking Permit** - required before breaking screwed, flanged, welded or other type joints on pipelines or vessels containing hazardous materials, or breaking into (disconnecting, drilling, sawing, etc.) non-hazardous materials under pressure.
- **Confined Space or Vessel Entry Permit** - required before entering tanks, vessels, manholes or similar confined spaces that have been in service or connected to operating process equipment and may contain potentially hazardous atmospheric conditions.
- **Lockout / Tagout Permit** - required for the service and maintenance of machines and equipment in which the *unexpected* energization or start up of the machines or equipment, or release of stored energy could cause injury to workers.
- **Excavation Permit** - required to minimize hazards during excavation work and ground breaking operations, specifically when a machine or hand tools are used at a depth greater than one foot. Excavations greater than four foot in depth must be inspected and approved by a competent person and have a Confined Space permit before access by personnel.
- **Hot Work Permit** - required before any flame or spark producing activity can begin in any production, operating, or some construction areas of the plant. This includes, but is not limited to:
  - Welding / Repair of pipe lines under pressure greater than 5 PSI.
  - Welding / Repair of pipe lines containing hazardous or flammable materials.
  - Welding / Repair on any pressure vessel, fired or unfired, under pressure or in the presence of hazardous or flammable materials.
  - Work on energized circuits.
  - Cutting / Burning of pipe lines, vessels, equipment, etc. that may have contained any hazardous material.
  - Grinding
  - Any hot work on carbon steel pipe lines, vessels, equipment, etc. that may have contained sulfuric acid will <u>not</u> be permitted without extensive review with project and plant personnel due to the possible generation of hydrogen gas.

  Each plant may have permits that are required for other specific work procedures. Check with your supervisor for these permits.

G. Fall Protection

- 100% fall protection (i.e. two lanyards when moving in certain areas) is required for all work above six (6) feet.
- Safety full body harnesses must be arranged so the d-ring is in the rear.
- Safety belts are not to be used for support or as a lineman's belt.
- Lanyards must be secured to an anchorage point overhead that can support 5,000 lbs. using as short a line as possible, not to exceed five (5) feet..
- All fall protection equipment shall be inspected by the user prior to each use.
- Lanyards may not be tied-off to any pipe/conduit less than 2" in diameter.
- Safety harnesses shall be worn and tied off when performing work on the following:
  - Sloped roofs
  - Flat roofs without handrails, if within 6 feet of the edge of the roof or opening
  - Any suspended platform or stage
  - All scaffolding six (6) feet above supporting work surface
  - When working on the sixth step or higher

on a ladder
- Ladders near the edge of roofs or floor openings
- Any unguarded areas six (6) feet above any supporting work surface
- An aerial lift.

H. Barricades, Signs, and Floor Openings

All floor openings/penetrations (i.e. holes > 2") must be properly covered or guarded. Barricades and signs must be posted when working in or around the following:

- All manlifts and the immediate working area.
- In ceilings, pipe bridges, etc.
- Removing roofing panels, walls, etc.
- Swing radius of cranes and the area where the lift will be made and moved to.
- Any open excavation.
- Any confined space entry.

Types of Barricades

- Warning barricades call your attention to a hazard but offer no physical protection. Examples: yellow, red, blue synthetic tape on stands or posts, plastic, or wooden snow fence.
- Protective barricades warn and provide physical protection and shall withstand 200 lbs. of force in any direction with minimal deflection (3"). Examples: wood post and rail, cable and wood post and chain.

Guidelines

- Barricades shall be 42 inches high and maintained square and level.
- Barricades shall be erected before any work begins.
- Blinking lights must be used on road blocks after dark.
- An access opening or gate should be provided where practical.
- Barricades and signs shall be fully informative, legible, and visibly displayed.
- Barricades and signs shall be removed when no longer needed.

Hole Covers

- Must be installed immediately.
- Hole covers or barricades are required at any floor elevation.
- Material and equipment must not be stored on a hole cover.
- Must be secured to prevent movement and be marked with the word "HOLE" or "COVER".
- Must extend adequately beyond the edge of the opening (i.e. 3") and must not be more than 1" high.
- 3/4" plywood will be used providing the opening is less than 18". For any opening greater than 18 inches, 2 inch lumber of doubled ¾ inch plywood is required.

I. Ladders and Scaffolds

- Inspect ladders before use - identify defective ladders with "Do Not Use" tag.
- Only a "Type I" ladder with a minimum rating of 250 lbs. is acceptable.
- Metal ladders are prohibited.
- Fall protection must be worn when working on the sixth step or higher.
- When ascending and descending a ladder, face the approved side of the ladder, use at least one hand to grasp the ladder, and do not carry tools or materials in your hands.
- *All* ladders shall have a tie-off rope, non-skid safety feet and be tied-off.
- Never work off a ladder where the midpoint of the body (i.e. belt buckle) must be extended beyond the side rails.

Straight or Extension Ladders

- Follow the 4-to-1 rule when using an extension or straight ladder - position the base of the ladder one (1) foot from the supporting structure for every four (4) foot in height.
- If a ladder is used to reach a higher platform, the top of the ladder must extend three (3) feet past the platform.
- Do not work off of the top three (3) rungs of any straight or extension ladder.

Step Ladders

- Step ladders shall be set with all four (4) feet level.
- Ladders used in traffic areas must be secured or barricaded to prevent displacement.
- Never work off of the top two steps of step ladder.
- Never stand or sit on top of step ladders.

Scaffolding

- All scaffolds must conform to the OSHA Standard (Subpart L)
- All scaffolds are to be erected level - plumb on a firm base.
- When space allows, all scaffolds must be equipped with access ladders that extends three (3) feet past the landing gate. At landings, 42" high handrails rigidly secure, 21" high mid-rails rigidly secure, completely decked with safety planking or manufactured scaffold decking and rigidly secured toeboards on all four sides.
- A competent person must determine the feasibility and safety of providing fall protection for employees erecting and dismantling scaffolds, and train those employees accordingly.
- All scaffolds shall have a tag attached, completed by the competent person, stating what type of fall arrest system is required.
- All personnel working on scaffolds must be trained by a qualified person in the subject matter to recognize the hazards associated with the type of scaffold being used and the nature of any hazards (i.e. electrical, fall, falling objects, etc.).
- Retraining must be provided where inadequacies in an affected employee's work practices involving scaffolds are observed.
- Safety harness and tie-off required when working from scaffolding over one buck high.
- Personnel shall not climb or do any rigging from a scaffold, handrail, mid-rail or braces.
- No one may alter any scaffold member by welding, burning, cutting, drilling or bending.
- Scaffolds shall be tied off or stabilized with outriggers when its height exceeds three times the smaller dimension of its base, but tie-offs must not exceed 26 feet vertically.
- Scaffolds must be tied off horizontally every 30 feet.
- No one shall ride on a rolling scaffold when it is being moved. All tools and materials shall be removed or secured to the decking before moving the scaffold.

J. Housekeeping

Good housekeeping plays a key role in preventing accidents and fires. Good housekeeping is emphasized as a vital safety measure.

- Keep everything in its proper place - store materials and equipment in a safe and orderly manner.
- Put trash, scrap materials and other waste in the proper containers.
- Clean up tools and work areas as your job progresses - do not wait until the end of the work day.
- Keep the floor of the work area clear of tools, cords, and scrap materials.
- Insure that work tables are occupied only by work at hand and tools required for work being done.
- All work areas are to be left in orderly and clean condition at the end of each work day.
- Keep cords and hoses at least seven (7) feet overhead over walkways and work areas or lay them flat outside of walkways.
- Maintain clear access to all work areas. Do not block fire extinguishers, emergency equipment, electrical boxes or panels, or other safety/fire equipment.

K. Tools - Hand and Power

- Do not operate any tool without proper instruction.
- Only qualified persons are to use tools and equipment.
- Honeywell tools and equipment are not to be used by contractors.
- Do not use any tool or equipment for any purpose other than that for which it was designed.
- Personal tools are subject to inspection at any time.

- It is your responsibility to inspect all tools prior to each use. Do not use a tool that is deemed defective. Report and tag all defective tools.
- Do not lift electrical tools by the cord.
- Tools may be inspected and marked with color-coded tape each month. Check with your Supervisor for designations and do not use a tool without the appropriate color-coded tape.

Hand Tools

- Worn tools are dangerous! Replace or repair the tool.
- Every tool was designed to do a certain job. Use a tool for its intended use only.
- Tools subject to impact (chisels, star drills and caulking irons) tend to "mushroom." Keep them dressed to avoid flying spalls. Use tool holders.
- Don't force tools beyond their capacity or use "cheaters" to increase their capacity.

Power Tools

- Material should be secured when power tools are applied to it.
- Each power tool should be examined for damaged parts, loose fittings, and frayed or cut electrical cords before use.
- Portable electrical equipment and tools shall be grounded unless "double insulated." A ground fault circuit interrupter (G.F.C.I.) shall be used for working in damp areas when using permanent plant power or as otherwise required.
- Electrical cords shall be unplugged and air lines deactivated and bled down before adjusting, servicing, repairing, or changing bits and blades in electrical or pneumatic tools.
- Any pneumatic hoses exceeding ½ inch in diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure. All hose connections shall be properly secured.
- All tools shall be used with the correct shield, guard, or attachment recommended by the manufacturer.
- Only licensed and qualified personnel shall be allowed to operate power-actuated tools.
- Power tools should be unplugged when not in use.

L. Mobile Equipment

- Anyone who operates any mobile equipment (cranes, manlifts, pick-ups, forklifts, etc.) must demonstrate knowledge and competency for each make of equipment.
- All equipment will be inspected daily before use to insure it is in proper operating condition. If the equipment becomes defective in any way, notify your supervisor at once and place a "DANGER - DO NOT USE" tag on it.
- All equipment is to be supplied with seat belts, back-up alarm and fire extinguishers (back-up alarm is not required on pickup trucks.)
- Use of gas/diesel equipment inside operating building is prohibited unless approved by the Safety Department.

M. Cranes

- All operators must be certified and licensed to operate each make and model of crane.
- The operator is solely responsible for the safe operation of the crane.
- The operator has full responsibility for the safety of a lift and may not make a lift until safety is assured.
- A copy of the load chart, manufacturer's operators' manual and inspection record must be in the crane cab or on project site.
- All cranes and the immediate work area must be barricaded at all times.
- No load shall be swung over any persons.
- Outriggers must be leveled and fully extended when making a lift.
- No part of the crane, load, hoist (load and boom) lines, boom and tag line shall come within 10 feet of energized electrical lines.
- For pick and carry operations, consult the manufacturer's operator manual.
- Riding on crane hooks and/or "headache" balls is prohibited.
- Operators are not permitted to leave the crane while holding a live load.

- The use of suspended personnel platforms (crane baskets) must meet all OSHA requirements. The use of a crane or derrick to hoist employees on a personnel platform is prohibited unless all requirements of 1926.550 (g) are met. A company plan and check list must be used.
- A lift plan is required for any critical lift.
- Lifting in high winds (e.g. greater than 20 mph) is not recommended.

N. Material Handling Equipment

- All material handling machines must have backup alarms, horns, rollover protection structures and seat belts when provided by manufacturer.
- The operator must be trained to operate each make and model of machine.

O. Personnel Lifting Equipment

- The operator must be trained to operate all personnel lifts.
- All employees are to have a safety belt or safety harness on and tied off when working out of: manual personnel lifts, power platform lifts, scissors lifts, high-reach lifts, etc.
- Tie-off shall be made to the lifting equipment.
- Personnel are not to get under lifts.
- When exiting the lifting equipment onto a proper working elevated platform, the employee must be tied off to that platform immediately prior to, and during, that exit.

P. Cars, Pickups, and Trucks

You must have a valid driver's permit to operate any vehicles on plant property. You must obey the following rules:

- Wear your seat belt.
- Obey plant speed limits and stop signs.
- Motors must be shut-off when refueling.
- Stop at all railroad crossings.
- No more than three (3) people on a front bench seat, two (2) people if bucket seats.
- Mount and dismount the vehicle only when it is stopped.
- Keep arms, feet and bodies inside the vehicle.
- Look to the rear and sound your horn before backing up.
- Inspect the vehicle each day before use.
- Riding in the rear of a truck is prohibited unless approved seating with seat belts has been provided.

Q. Rigging

- All personnel who perform or assist in rigging operations shall have received appropriate training and be competent.
- Only ONE eye in a hook. Use a shackle to hold two (2) or more eyes.
- Tag lines are required to control lifted loads made by mechanical equipment. Never put hands on a load or wrap tag lines around your hands or body.
- Never raise a load over other people.
- Know the capacities of the rigging equipment and the weights of the loads.
- Never rig from any structural member until you are sure it will support the load.
- Never use plate grips, tongs, pipe clamps, etc. as substitutes for beam clamps.
- Two slings will be used unless impractical. If one sling is used, double wrapping is required.
- Continuous synthetic slings may be used only when heat or chemicals are not a factor, and where load permits.
- Flat nylon straps should not be used for erecting steel. Wide nylon straps may be used for lifting tube bundles, fiberglass ducts or other material that could be damaged by a metal sling. The use of flat nylon strap with any visible tear or defect is strictly prohibited.
- Steel slings should be used where heat or chemicals are a potential factor. The use of steel slings with damaged strands or other defect is strictly prohibited.
- The use of a come-a-longs with cracked or damaged handles is strictly prohibited.
- Chainfalls and come-a-longs must have OSHA approved safety spring return latches on all hooks.
- Daily, weekly, and monthly inspection records will be kept by the contractor.

R. Chain Falls and Hoists

- Inspect hoists daily (operations), monthly (maintenance) and annually (3rd party vendor).
- A chain hoist must be used within its rated capacity, marked on the equipment.
- Do not leave an unsecured and unattended load hanging on a hoist or chain fall.
- Do not stand or have any part of the body below a load suspended on a chain hoist.
- Do not wrap the load chain around the load to be lifted.
- Use of “cheater bars” is strictly prohibited.
- Use a shackle to connect straps to a hook.

S. Fire Protection and Prevention

- Be sure to locate the nearest fire extinguishers in your work area before starting work.
- As warranted by the project, a trained and equipped fire fighting organization (Fire Brigade) will be provided to assure adequate protection of life.
- All fire hydrants, fire extinguishers, fire blankets, etc. shall be clearly marked and not obstructed.
- Combustible materials shall be kept away from steam lines, radiators, heaters, hot process and service lines.
- For any job requiring hot work or open flame or welding, a fire extinguisher must be within 20 feet of where the work is taking place.
- Fire extinguishers shall be checked daily before starting work.
- Portable power equipment must not be refueled while running or when hot. Attach the ground wire before refueling.
- Store flammables in properly labeled metal type containers and in designated areas.
- Fire blankets must be used to protect equipment, control panels, instrumentation, etc. when welding, cutting, burning, or grinding overhead.
- “Borrowing” plant fire extinguishers is not permitted.

T. Material Handling / Stability Control

Proper material handling and stability control insures that personnel, material, and equipment are safe from unexpected movement such as falling, slipping, rolling, tripping, or any other uncontrolled motion.

- Clean up ragged metal edges.
- Pull all protruding nails and wires or bend them flush.
- Set on dunnage for ease of handling.
- Check all material and equipment to prevent rolling.
- Tie down all light, large-surface-area material that might be moved by the wind.
- Put absorbent on all grease and oil spills immediately and clean them up. Notify proper plant personnel of spills if significant.
- Salt or sand icy walk areas immediately.
- Use proper lifting techniques when moving material by hand.
- Know the weight of the object to be handled.
- Protect the area around and below you.

U. Welding and Burning

General

- Before beginning any flame or spark producing operations in the plant, check with your supervisor about any permits that may be required. Follow the requirements on the permit.
- Keep welding leads and burning hoses clear of passageways.
- Each welder is responsible for containing sparks and slag and/or removing combustibles to prevent fires. The welder is also responsible for making sure there is a fire watch and a good fire extinguisher for the duration of the operation.
- Provide adequate screens to protect vision of general public.

Welding - Electric

- All work must have a separate and adequate ground.
- Welding rods are not to be left in the electrode holder when not in use. Stub ends are to be put in proper containers - not on the floor.

- All weld arcs shall be shielded.
- All welding machines are to be shut off when not in use.
- Hard hats with the brim to the front must be worn during welding operations by the welder.
- An approved welding shield must be worn. Use no less than a No. 10 filter plate with safety plate on both sides of the filter plate.
- Powered welding machines should be operated in well ventilated area only and will be diesel fueled only, unless otherwise approved by safety.

Burning - Gas

- The operation of oxygen and fuel gas burning equipment shall only be done by trained and experienced personnel.
- Do not exceed 15 P.S.I. on the torch side of the gauge when using acetylene.
- Only an approved spark lighter should be used to light a burning torch. Do not use matches, cigarettes, lighters or hot work.
- Always clean burning tips with the proper type cleaner.
- All burning rigs must be broken down at the end of the shift with regulators removed and caps screwed down hand tight.
- Approved burning goggles must be worn and No. 4 lenses or darker must be used.
- Keep oil and grease away from oxygen regulators, hoses and fittings. Do not store wrenches, dies, cutters, or other grease covered tools in the same compartment with oxygen equipment.
- Compressed gas bottles shall be kept in bottle carts or secured in an upright position. They must be transported and stored in a secured, upright position with protective caps in place.
- Oxygen and acetylene compressed gas bottles should not be stored together. They must be stored a minimum of 20' apart or have a 5 feet high, 30 minute rated fireproof wall between the two bottles.
- All gauges, hoses, and torches should be inspected on a regular basis. A back flow preventer is required on all regulators.
- When in use, place cylinders and hoses where they are not exposed to sparks and slag from the burning operation.

- Any hot work on carbon steel pipe lines, vessels, equipment, etc. that may have contained sulfuric acid will <u>not</u> be permitted without extensive review with project and plant personnel due to the possible generation of hydrogen gas.
- Handle cylinders with care.
- Lift to upper levels with approved carts only.
- Do not strike an arc on cylinders.
- Do not use cylinders as rollers.
- Do not lift with slings or by the protective cap.

Protective Clothing

- Only cotton, woolen, leather or special fire retardant synthetic clothing should be worn when burning or welding. Synthetics are very flammable and melt and cause more serious burns when exposed to flames and high temperatures.

<u>V. Steel Erection</u>

General

- 100% tie-off is required at ALL times
- Containers shall be provided for storing or carrying rivets, bolts and drift pins, and secured against accidental displacement when aloft.
- A load shall not be released from the hoisting line until the members are secured with not less than two bolts, or equivalent at each connection and drawn up wrench tight.
- Tag lines are required for controlling loads.
- When bolts, drift pins or rivet heads are being knocked out/off, means shall be provided to keep them from falling.
- Impact wrenches shall be provided with a locking device for retaining the socket.

W. Accident / Incident Investigation

- Notify Honeywell personnel (project engineer, plant safety, construction safety, etc.) immediately after any injury (medical treatment and first aid cases), equipment or property damage, environmental excursions, or near-miss incidents.
- A Honeywell Contractor Incident Investigation Report shall be completed by the contractor company immediately upon knowledge of the incident.
- The report may be completed by an investigation team headed up by the contractor company, and assisted by the Honeywell project manager / engineer, site safety leader, the individual(s) involved and any other necessary personnel. All sections of the report are to be completed, signed and dated.

X. OSHA Reference Guide

Subject	Reference
Barricades	Subpart G - 1926.202 Barricades
Cars, Pickups & Trucks	Subpart O - 1926.601 Motor Vehicles
Chain Falls	Subpart H - 1926.251 Rigging Equip. for Mat. Handling
Compressed Gases	Subpart H - 1910.101 General Requirements
Concrete & Masonry	Subpart Q - 1926.700 Scope, Application & Requirements
Confined Space Entry	Subpart J - 1910.146 Permit-Required Confined Spaces
Cranes	Subpart N - 1926.550 Cranes & Derricks Subpart N - 1910.179 Overhead & Gantry Cranes
Demolition	Subpart T - 1926.850 Preparatory Operations
Egress	Subpart C - 1926.34 Means of Egress Subpart E - 1910.35 Definitions
Electrical	Subpart K - 1926.400 Introduction Subpart S - 1910.301 Introduction
Emergency Procedures	Subpart C - 1926.35 Employee Emergency Action Plans Subpart D - 1910.38 Employee Emergency Plans
Excavations	Subpart P - 1926.650 Scope, Application & Definitions
Eye Protection	Subpart E - 1926.102 Eye and Face Protection Subpart I - 1910.133 Eye and Face Protection

Subject	Reference
Fall Protection	Subpart E - 1926.104 Safety Belts, Lifelines & Lanyards Subpart M - 1926.500 Scope, Application & Definitions
Fire Protection	Subpart C - 1926.24 Fire Protection and Prevention Subpart F- 1926.150 Fire Protection Subpart L - 1910.155 Scope, Application & Definitions
First Aid	Subpart C - 1926.23 First Aid and

	Medical Attention Subpart D - 1926.50 Medical Services & First Aid Subpart K - 1910.151 Medical Services & First Aid
Floor Openings	Subpart M - 1926.502 Fall Protection Criteria & Practices Subpart D - 1910.23 Guarding Floor and Wall Openings
Foot Protection	Subpart E - 1926.96 Occupational Foot Protection Subpart I - 1910.136 Foot Protection
Hand Protection	Subpart I - 1910.138 Hand Protection
Hazard Communication	Subpart D - 1926.59 Hazard Communication
Hazardous Waste	Subpart D - 1926.65 Operations & Emergency Response Subpart H - 1910.120 Operations & Emerg. Response

Subject	**Reference**
Head Protection	Subpart E - 1926.100 Head Protection Subpart I - 1910.135 Head Protection
Hearing Protection	Subpart E - 1926.101 Hearing Protection Subpart G - 1910.95 Occupational Noise Exposure
Hoists	Subpart N - 1926.552 Mat. Hoist, Personnel Hoist & Elev.
Housekeeping	Subpart C - 1926.25 Housekeeping
Illumination	Subpart D - 1926.56 Illumination
Incident Investigation	Honeywell Contractor Near Miss/ Incident Investigation Report.
Ladders	Subpart X - 1926.1053 Ladders Subpart D - 1910.22 General Requirements
Lockout/ Tagout	Subpart K - 1926.417 Lockout and Tagging of Circuits Subpart J - 1910.147 Control of Hazardous Energy
Material Handling Equip.	Subpart O - 1926.602 Material Handling Equipment
Materials Handling	Subpart H - 1926.250 General Requirements for Storage
Mobile Equipment	Subpart O - 1926.600 Equipment
Permits	Per Site Specifics. Check With Your Site Contact.
Personal Protective Equip.	Subpart C - 1926.28 Personal Protective Equipment Subpart E - 1926.95 Criteria for Personal Protect. Equip.

	Subpart I - 1910.32 General Requirements

Subject	**Reference**
Personnel Lifting Equipment	Subpart L - 1926.453 Aerial Lifts Subpart N - 1926.552 Personnel Hoist & Elevators Subpart F - 1910.68 Manlifts
Respiratory Protection	Subpart E - 1926.103 Respiratory Protection Subpart I - 1910.134 Respiratory Protection
Rigging	Subpart H - 1926.251 Rigging Material Subpart N - 1910.184 Slings
Sanitation	Subpart D - 1926.51 Sanitation Subpart J - 1910.141 Sanitation
Scaffolds	Subpart L - 1926.451 Scope, Application & Definitions Subpart D - 1910.28 Safety Requirements for Scaffolding
Signaling	Subpart G - 1926.201 Signaling
Signs	Subpart G - 1926.200 Accident Prevention Signs & Tags Subpart J - 1910.145 Specifications for Signs & Tags
Stairways	Subpart X - 1926.1050 Scope, Application & Definitions
Steel Erection	Subpart R – 1926.750 Steel Erection
Tools - Hand & Power	Subpart I - 1926.300 General Requirements Subpart P - 1910.241 Definitions
Training & Orientation	Subpart C - 1926.21 Safety Training and Education Per Site Specifics. Check With Your Site Contact.
Ventilation	Subpart J - 1926.353 Ventilation and Protection Subpart G - 1910.94 Ventilation
Welding & Burning	Subpart J – 1926.350 Welding & Cutting Subpart Q - 1910.251 Definitions

Y. Acknowledgement Page - Read Carefully Before Signing Below

This is to acknowledge that I have received my copy of the Honeywell Contractor Safety Handbook and an orientation on its contents as well as other project rules and policies. I will read and abide by all rules and regulations in the handbook and any additional rules and regulations of my job. I understand that working safely, complying with and obeying any and all Company and Honeywell safety rules, regulations or standards is a condition of employment. Should I not comply with Company and/or Honeywell safety rules, regulations or standards, I am subject to disciplinary action including removal from the site and possible termination of employment. In consideration of my employment, I further agree that my employment and compensation can be terminated at any time, with or without cause or notice, at the option of either the Company or myself. I understand further that this handbook and the rules and regulations it contains do not in any way constitute a contract (either expressed or implied) of employment between the Company as my employer and me for any indefinite or specified period of time. The Company reserves the right to change its policies as summarized herein.

_____ _____

Print Full Name Signature

Contractor Company Name

_____

Craft

_____

Honeywell Contact/Representative

_____

Date

Note: The perforated last page and the back cover of this booklet contain the same wording. After properly endorsed, the perforated page is to be removed and given to the Honeywell contact/representative.

Rev. 12/99

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Rev. 12/99

* To be completed by the Contractor Company with assistance from Honeywell personnel

Date Incident Reported:	Honeywell Location:		Honeywell Contact:	
Date of Incident:	Time of Incident:	Name of Contractor Company:		
Name of Individual(s) Involved w/Incident:		Name of Injured Worker (if applicable):		Name of Supervisor/Foreman:
If an Individual was Injured, were they working under the direct supervision of Honeywell?		Age of Individual Involved:	Job Classification/Title/Craft:	
Length of Work Experience at Job Classification:		Length of Employment with Company:		Length of Time Working at Site:
Was the Individual Involved with the Incident Performing their Regular Job? If "No", explain why:		Date of Site Safety Orientation:		Last Formal/Documented Safety Meeting Attended:
Hours Worked that Day/shift Prior to the	Hours Worked that Week Prior to the Incident:	Consecutive Days/Shifts Worked Prior to the Incident:		Last Day Off Prior to the Incident:
Description of incident according to the individual(s) involved or injured (including what happened and how the incident occurred):				
According to the individual(s) involved with the incident or injured, what could have been done differently to prevent this incident from occurring? Why weren't these done prior to the incident?				
Describe any First Aid or Medical Treatment Provided On Site and/or at a Medical Facility. **NOTE: Any follow-up treatment at a later date must be communicated to Honeywell (Contractor Safety Leader).**				
Date that the Injured Individual Returned to Work?	Any Work Restrictions or Lost Time? If "Yes", describe: **NOTE: Any work restrictions or lost time at a later date must be communicated to Honeywell (Contractor Safety Leader).**			
Was there any Property Damage? If "Yes", describe:				

Contractor Supervisor/Foreman should complete the information below with an Investigation Team

Team Investigation – List the Possible Causes of the Incident Below.
For Each Possible Cause Listed Above, Reply "Why" or "Why not" the Cause Occurred.
Corrective Action(s) Taken - List Person(s) Responsible and Target Date:
Contractor Investigation Team - Leader & Members:

Date Incident Reported:	Honeywell Location:	Honeywell Contact:

Approval (Individual Involved/Injured):	Title:	Date:
Supervisor Approval (Print Name):	Title:	Date:
Honeywell Site Approval (Print Name):	Title:	Date:

HONEYWELL

01620 EXHIBIT 1
MOTOR VEHICLE ACCIDENT REPORT

Report #:_____

DATE OF ACCIDENT_____ **DAY OF WEEK**_____ **TIME**_____

LOCATION OF ACCIDENT_____

ACCIDENT INVOLVED: Employees, contractors, visitors, Vehicle vs. Vehicle, Vehicle vs. Property, Vehicle vs. Pedestrian

VEHICLE NO. 1		VEHICLE NO. 2 (or Pedestrian Info.)
	DRIVER'S NAME	
	STREET ADDRESS	
	CITY AND STATE	
	DRIVERS LICENSE NO.	
	PHONE NO. OR EXT.	
	OWNER'S NAME	
	STREET ADDRESS	
	CITY AND STATE	
	PHONE NUMBER	
	VEHICLE TYPE	
	MAKE, MODEL, YEAR	
	LICENSE PLATE	
	VEHICLE DAMAGE	
	PASSENGERS	
	VEHICLE REMOVED TO (auth.)	

INJURED (type, where taken):_____

POLICE DEPARTMENT/REPORT #:_____

WEATHER:_____

ROAD CONDITION: _____

ESTIMATED SPEED OF VEHICLE 1: _____ **VEHICLE 2:** _____

VEHICLE DEFECTS RELATING TO ACCIDENTS (Brakes, Lights, Tires, Steering)

VEHICLE 1: _____ **VEHICLE 2:** _____

STATEMENT DRIVER VEHICLE 1: _____

_____

_____

_____

STATEMENT DRIVER VEHICLE 2: _____

_____

_____

_____

INVESTIGATOR'S COMMENTS: _____

_____

_____

_____

PHOTOGRAPHS TAKEN?: _____

DIAGRAM:

INVESTIGATOR'S SIGNATURE: _____ **DATE:** _____

SUPERVISOR'S SIGNATURE: _____ **DATE:** _____

APPENDIX D

Generic Community Air Monitoring Plan

APPENDIX D

COMMUNITY AIR MONITORING PLAN FOR THE FORMER BARRETT MANUFACTURING AND MICA ROOFING SITE
NYSDEC Site Numbers 224197 & 224196
BROOKLYN, KINGS COUNTY, NEW YORK

Prepared For:

Honeywell

6100 Philadelphia Pike
Claymont, Delaware 19703

Prepared By:

PARSONS

200 Cottontail Lane
Somerset, New Jersey 08873

APRIL 2016

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

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