

**CLEANUP PLAN**  
**FORMER NVF COMPANY**  
**400 W. MULBERRY STREET**  
**KENNETT SQUARE, PENNSYLVANIA**

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## 1.0 INTRODUCTION

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Environmental Alliance, Inc. (Alliance) has prepared this Cleanup Plan on behalf of Rockhopper, LLP to develop and evaluate the proposed remedial alternative for the former NVF Company property in Kennett Square, Pennsylvania (“the Site”). This Cleanup Plan has been prepared pursuant to the Pennsylvania Department of Environmental Protection’s (PA DEP’s) Pennsylvania Land Recycling and Environmental Remediation Standards Act (“Act 2”) Regulations. The Cleanup Plan is based upon the results and conclusions of the *Remedial Investigation Report, Former NVF Company, Kennett Square, Pennsylvania* (Alliance, August 2010), which is being submitted concurrent with this Cleanup Plan. The *Remedial Investigation Report* (the “RI Report”) presents the results of a detailed remedial investigation of the environmental conditions throughout the Site, an ecological assessment, and a human health risk assessment for the various media investigated. These aspects of the RI Report are summarized in Sections 2.2, 2.3 and 2.4 of this Cleanup Plan, respectively. These evaluations demonstrated that portions of the Site require remedial action to achieve compliance with the cleanup standards set forth in Act 2, consistent with the future development of the property.

This Cleanup Plan includes a summary of the completed soil and groundwater sampling that was conducted at the Site during the RI, and presents the proposed remedy. The proposed remedy provides for the excavation and offsite removal of soils impacted by polychlorinated biphenyls (PCBs) at concentrations above the Toxic Substance Control Act (TSCA) criterion of 50 parts per million (ppm). Additionally, potential exposure to soils containing substances at concentrations in excess of PA DEP Medium Specific Concentrations (MSCs) will be managed such that capping of these soils remaining onsite will be completed by the new development structures (buildings and parking areas). The capped areas will prevent direct contact human exposure to the impacted soil. The potential future uses will include both residential and commercial uses. Soil removal and/or pathway elimination will be used to protect the future property residents and commercial users. Residential lots that will be sold to individuals will have levels of PCBs no greater than 1 ppm. The Cleanup Plan also includes periodic inspection and maintenance of the disturbed area (i.e., erosion and sediment (E & S) control measures) during the development and remediation activities. In addition to the above, institutional

controls will be established to maintain the conditions resulting from the remediation activities. The institutional controls will include land use restrictions preventing the installation of wells and using groundwater for domestic purposes, since groundwater also contains substances in excess of MSCs.

Alliance has prepared this Cleanup Plan for the Site in accordance with Act 2 and the guidance set forth in PADEP's Land Recycling Program Technical Guidance Manual ("TGM").

This Cleanup Plan consists of the following sections:

- ◆ Section 1 Introduction
- ◆ Section 2 Background and Characterization of the Site
- ◆ Section 3 Evaluation of Remedial Alternatives
- ◆ Section 4 Design and Implementation of the Final Remedy
- ◆ Section 5 Attainment Monitoring
- ◆ Section 6 Post Remediation Care Program
- ◆ Section 7 Schedule
- ◆ Section 8 References
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- ◆ Section 10 Signatures

## 1.1 Contacts

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## **2.0 BACKGROUND AND CHARACTERIZATION OF THE SITE**

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### **2.1 Site Location, History, and Description**

The Former NVF Company Site consists of approximately 20 acres located at 400 West Mulberry Street within Kennett Square Borough, Chester County, Pennsylvania. Figure 1 presents a topographic map that also depicts the Site location. A Site Base Map showing the facility layout is presented as Figure 2. Refer to the RI Report for additional details concerning the Site history and background information.

NVF's Kennett Square Facility operated from approximately the 1920's into the 1990's. NVF produced laminated composite plastic materials including "Phenolite", and "Filamite Wound Products". These products consisted of plastic-coated sheets, rods, and tubes used in a variety of industrial and construction industry applications. For example, in one production process, sheets of textile materials were coated to produce the backing for electronic circuit boards. The processes utilized a variety of resins, epoxies, and solvents to produce and manipulate the plastic materials. Some of the chemicals (e.g., solvents and resins) that were used as components of the products may pose potential environmental concerns. Additionally, the industrial processes occurring at the site (machining, cutting, pressing, lubricating, etc) utilized chemicals that could have resulted in environmental concerns. For example, at one location polychlorinated-biphenyl (PCB)-containing oil was formerly used in press pit equipment based on its heat-transfer properties. The manufactured products of the plant, however, are relatively stable and inert, and do not constitute environmental contaminants. Additional description of environmental concerns, particularly PCBs, is included in the sections that follow.

The Site is within the limits of Kennett Borough, Chester County, Pennsylvania, which has an estimated population of 5,273 (2000 census). Currently, the Site contains a number of vacant industrial buildings on the eastern and northern portions. Paved parking areas are located in the south-central and western areas. A stormwater retention and cooling pond is present in the southwest corner of the property.

The Site is adjacent to a residential neighborhood to the east and north. Adjacent properties include residences across Mulberry Street that runs parallel to the northern property boundary, open land (former “Noznesky Junkyard”) to the west, a railroad track parallel to the southern boundary with a mushroom farm beyond the track, and commercial/industrial properties directly to the east. A baseball field is located southeast of the property. This baseball field is former NVF property that is not included in the scope of the RI or addressed in this Cleanup Plan. Additionally, NVF owned a small parking lot on the northeast quadrant of the intersection of Mulberry Street and Lafayette Street. This parking lot, which is associated with the proposed development, was not part of the NVF industrial plant production area and was not included in the RI or addressed in this Cleanup Plan.

## **2.2 Overview of the Remedial Investigation of the Site**

### ***2.2.1 Previous Work Prior to the RI***

As described in detail in the RI Report, the Site has a history of previous investigations and remedial actions related to a historical release of polychlorinated biphenyls (PCBs). These investigations and actions resulted in the current status of PCB contaminated soil and sediment on the property. Following is a brief summary of the origin of the PCB contamination issue as described in the RI Report, which is based on previous reports.

Based on review of regulatory files, NVF correspondence with Pennsylvania state regulators indicates that the use of PCB-containing oil took place prior to a time in the late 1960’s. At that time the No. 7 Press was converted to utilize steam heat in the production process. Prior to this, a eutectic heating oil known as Airchlor™ or Dowtherm™ was used to heat the press. The No. 7 Press was located in the Press Room illustrated on the Site Base Map (Figure 2). Based on information obtained during Site visits with NVF personnel, a storage tank formerly held PCB-containing oils in the vicinity of the Truck Shop room, northwest of the Press Room.

PCBs were identified in sediments in the drainage path from the property that flows to Red Clay Creek. Prior to 1982, a stormwater outfall, designated Outfall 001, existed at the property boundary, south-southwest of the Mixing Room as illustrated in Figure 2. Drainage from the “old” Outfall 001 passed to a swale parallel to the railroad tracks, which turned to the south at a location south of the current Retention Pond. During 1982, the Retention Pond was constructed west of the “old” Outfall 001, and during 1982-1983 a “new” Outfall 001 was established at a location south of the southeast area of the Retention Pond as shown on Figure 2. All stormwater drainage from the property was routed at that time to the Retention Pond. Non-contact cooling water was removed from the stormwater discharge during this period as well. Based on sampling conducted in the Press Pit No. 7 area and in downstream sewers and drainage paths, residual PCBs were identified throughout drainage paths on the property and in the swale south of the property. Various stages of sampling and remediation of the offsite drainage paths followed.

The most recent work performed to address the PCB issue in soil and sediment is the Final Report for NVF Company’s Storm Water Retention Pond Lining Project, by Environmental Alliance, July 7, 2004 (Revised August 27, 2004) (“Final Report”). In this document, it is described that the storm water retention pond that was constructed at the facility in 1982 was used as a means of collecting and containing PCB-contaminated sediments from the facility’s storm drain system. The pond area received and currently receives storm water drainage from areas throughout the facility. PCBs in pond sediments were identified as a concern in the pond area, where the Site’s outfall is located. A sewer cleaning and pond lining project was conducted in 2000 to flush the impacted sediments and contain them in the pond. Additionally, an area of PCB-contaminated soil in the northeastern part of the property was capped. The Final Report dated July 2004 (that was submitted to EPA) describes this project.

### ***2.2.2 Findings of the RI Report***

The RI Report includes results of investigations conducted from February 2006 through February 2008. Details of the sampling events are presented in the RI Report. All results of the supplemental investigation of environmental conditions at the Site are presented in the RI Report

for the Site, which is being submitted to PADEP concurrent with this Cleanup Plan. During the RI, a large number of samples were collected and a broad variety of analyses were performed. A combination of biased and non-biased sampling methods was used to investigate the areas of concern identified throughout the NVF plant. Following are summaries of the soil and groundwater analytical results. Tables summarizing the analytical results are presented in the RI Report. Maps illustrating the data are presented in Figures 6 through 17 in the RI Report. Select maps illustrating the final summary of the soil and groundwater data from the RI are included in this Cleanup Plan and are referenced below.

### **Soil Contamination Summary**

Based on the results of the February 2006 through February 2008 soil sampling events conducted for the RI, the COCs in soil at levels above PA-Soil-MSD-Direct Contact (DC)-Residential (RES) appear to be limited to select SVOCs (benzo(a)pyrene and dibenzo(a,h)anthracene), Metals (arsenic and lead), and PCBs. Figure 3 illustrates the soil constituents detected above respective PA-Soil-MSD-DC-RES values. Figure 4 illustrates the soil constituents detected above either the PA-Soil-MSD values and the following total PCB screening levels: greater than (>) 1 mg/kg to less than or equal to ( $\leq$ ) 50 mg/kg and > 50 mg/kg.

### **SVOCs**

The portion of the Site where SVOC impact to soil occurred is limited to the alleyway located near the eastern edge of the property (adjacent to the storage/warehouse buildings located between W. Cedar St. and Mulberry St.). SVOC constituents exceeding PA-Soil-MSD-DC-RES are benzo(a)pyrene (samples SB-06, S-113, S-114 and S-114 duplicate, S-24, and DPW-10) and dibenzo(a,h)anthracene (duplicate sample at location S-114 only). In most instances, constituent concentrations of benzo(a)pyrene and dibenzo(a,h)anthracene were only slightly in exceedance of respective PA-Soil-MSD-DC-RES (2,500  $\mu\text{g}/\text{kg}$  for both compounds). SVOC impacts to soil are believed to be due to an isolated release or releases from day-to-day operations associated with chemical processing of raw materials into final products at the facility, although documentation of such release(s) could not be found. Potential remedial options for soil above the Statewide Health Standards (SHS) associated with SVOC-impacted soil will be evaluated in the Cleanup Plan.

## **Metals**

Two metals were reported above their respective PA-Soil-MS-DC-RES during the February 2006 through February 2008 soil sampling events: arsenic (ranging from 12.5 to 139 mg/kg) and lead (ranging from 543 to 733 mg/kg).

- ◆ Arsenic was detected above its PA-Soil-MS-DC-RES (12.0 mg/kg) in the alleyway (paved) in the east-central portion of the Site near the maintenance shop (DPW-06, DPW-06A, and SB-10), in a sample (SS-25) taken underneath the floor slab of the former No. 17 Treater Room (northwest building area), in samples (DPW-04, DPW-04A, S-7, and SB-22) taken along the southern property boundary (paved area adjacent to a former mixing room and maintenance parts building), and in a sample (DPW-12) taken in the northern portion of the alleyway located near the eastern edge of the property (adjacent to the storage/warehouse buildings located between W. Cedar St. and Mulberry St.).
- ◆ Lead was detected above its PA-Soil-MS-DC-RES (500 mg/kg) in samples (SB-20 and S-22) taken in the southern portion of the alleyway located just west of the W. Cedar St. entrance to the facility.

Soils impacted by either arsenic or lead do not appear to be a Site-wide concern, as extensive sampling for these substances has revealed only isolated areas impacted by constituent concentrations above respective PA-Soil-MS-DC-RES. In addition, arsenic concentrations for the eastern United States have been reported to range from <0.1 – 73.0 mg/kg (Shacklette and Boerngen, 1984), indicating that arsenic concentrations slightly above the PA-Soil-MS-DC-RES of 12.0 mg/kg may in fact represent natural background concentrations. Potential remedial options of soil above the SHS associated with metals-impacted soil will be evaluated in the Cleanup Plan.

## **PCBs**

The focus of the PCB investigation portion of the RI was to verify PCB sampling results obtained in prior investigations and to characterize the nature and extent of PCB-impacted soil at the Site with respect to several possible clean-up standards, including Pennsylvania Statewide

Health Standards promulgated under Act 2, as well as federal disposal standards set forth in the Toxic Substances Control Act (TSCA) regulations.

One of the potential future uses of the property includes residential application. Thus, a relevant standard for comparison is 1 mg/kg for total PCBs in soil. Alliance selected a screening level for total PCBs of 1 ppm for the PCB investigation activities, since one of the potential future uses for a portion of the Site includes residential property.

The results of the PCB investigation showed widespread PCB impacts to soil (primarily surface soil 0'-2' bgs) at the Facility. The highest PCB concentrations (exceeding 50 ppm for total PCBs) were confined to four distinct locations:

1. The area immediately adjacent to the retention pond in the southeast corner of the property.
2. The area located north of the former "Outfall 001" in the south-central portion of the property.
3. An area located underneath the floor slab in the north-central building area.
4. The "Cap" area in the northeast part of the property.

The elevated results in all four areas are consistent with historical investigations and clean-up efforts. Broader areas of lower-level PCB soil impacts (below 50 ppm for total PCBs) were found throughout the grassy portions of the northern and western portions of the Site, as well underneath select asphalt-paved areas and building floor slabs. Several figures presented in the RI were created to depict the results of the PCB sampling events conducted under the RI. Refer to the RI Report to review these figures.

- ◆ Figure 9 in the RI Report shows locations where PCB sampling results exceeded a respective PA-Soil-MSD-DC-RES for individual arochlor(s).
- ◆ Figure 10 in the RI Report depicts total PCB concentrations in samples taken from the surface (0'-2' bgs) depth interval, with color coding of sample locations to represent total PCB concentrations within different concentration ranges.

- ◆ Figure 11 in the RI Report depicts total PCB concentrations in samples taken from the 2'-4' bgs depth interval, with color coding of sample locations to represent total PCB concentrations within different concentration ranges.
- ◆ Figure 12 in the RI Report depicts total PCB concentrations in samples taken from the depth intervals below 4' bgs, with color coding of sample locations to represent total PCB concentrations within different concentration ranges.
- ◆ Figure 13 in the RI Report depicts an enlarged view of the southwest portion of the Site showing total PCB concentrations in all samples taken in the area for the purpose of illustrating the extent of soil in this region with total PCB sample results above 50 ppm.
- ◆ Figure 14 in the RI Report depicts an enlarged view of the south-central portion of the Site showing total PCB concentrations in all samples taken in the area for the purpose of illustrating the extent of soil in this region with total PCB sample results above 50 ppm.
- ◆ Figure 15 in the RI Report depicts an enlarged view of the north-central portion of the Site showing total PCB concentrations in all samples taken in the area for the purpose of illustrating the extent of soil in this region with total PCB sample results above 50 ppm.

In addition to the areas investigated during the RI, two other known areas of PCB-impacted soil exist on Site. As described previously, an area of soil in the northeastern part of the property with total PCB concentrations greater than 50 ppm was capped during the 2001-2002 soil remediation project due to inaccessibility of the subject soil and proximity to the building. Also, the soil underlying the liner of the retention pond in the southeast corner of the property contains total PCB concentrations generally ranging between 10 and 50 ppm, based on historical data. Both of these areas will be addressed by the proposed remedy described in this Cleanup Plan. Figure 4 in this Cleanup Plan presents a summary of soil constituents detected above either the PA-Soil-MSL values and the following total PCB screening levels: > 1 mg/kg to ≤ 50 mg/kg and > 50 mg/kg. The proposed site remedy described in Section 3 addresses each of these impacted soil areas.

### **Groundwater Contamination Summary**

Figure 5, reproduced from the RI Report, illustrates the groundwater constituents detected above respective PA Act 2 GW MSL – RES values. Figure 6 illustrates the groundwater contours

obtained from water level measurements during the July 2007 groundwater sampling event. Based on the results of the sampling events, the COCs in groundwater at levels above MSCs appear to be limited to select VOCs, PCBs, and Metals.

### VOCs

Three areas of VOC groundwater impacts were identified. These areas are the former solvent UST area in the northeast portion of the Site, the alley area near the Maintenance Shop in the east-central portion, and one location in the far northwest corner.

- ◆ In the former solvent UST area in the northeast portion of the property (labeled former Process Chemical Storage), elevated toluene concentrations up to 120,000 µg/L and low-level benzene (up to 27 µg/L) and dichloromethane (DCM) (up to 200 µg/L) concentrations were identified. Impacted wells include MW-3 and MW-4. Toluene, benzene, and DCM were not reported in wells outside of this area, which were also downgradient of wells MW-3 and MW-4. Thus, the extent of groundwater contamination associated with these substances has been defined.
- ◆ In the east-central part of the Site near the Maintenance shop, low levels of TCE (up to 26 µg/L), PCE (up to 46 µg/L), and DCM (up to 7.6 µg/L) were identified. Impacted wells include DPW-7, DPW-8, and the water supply well PW-2. None of these constituents were identified at levels above MSCs in wells downgradient of this area, including DPW-3, DPW-6, DPW-11, and the water supply well PW-3. Therefore, no offsite migration of these VOCs in concentrations that exceed their respective MSCs from the impacted area was demonstrated based on these data.
- ◆ In the northwest corner of the property, PCE (up to 9.8 µg/L) was reported in samples collected from DPW-2. This well is on the western edge of the property and groundwater gradient (and therefore flow direction) is to the west. However, higher concentrations of PCE (up to 312 µg/L in December 2004) were previously reported (W.B. Saitterwaite Associates, Inc., 2005) in a nearby monitoring well on the former junkyard property. The anomalous, low-level PCE detections in DPW-2 may be associated with the groundwater contamination at the junkyard. Review of historical aerials that were presented in Appendix VI of the RI Report suggest that the junkyard activities may have extended on

to the current NVF property during the past, and therefore may constitute a potential source of the PCE detection at in DPW-2.

### **PCBs**

Individual PCB aroclor concentrations were detected slightly above respective PA Act 2 GW MSC – RES values at DPW-01, POMW-01, DPW-03, DPW-05, and DPW-10, located in the eastern, southern, and southwestern portions of the Site. Aroclor 1242 (up to 2.2 µg/L), 1248 (up to 0.87 µg/L), and 1254 (up to 1.1 J µg/L) were identified in groundwater. Each of the locations exhibiting PCBs in groundwater is within or near an area with some level of PCB detections in soils. PCBs have very low aqueous solubilities, and the low level PCBs detected in the samples are believed to be associated with sediments in the unfiltered groundwater samples. Based on current data, and the likely presence of the PCBs adhered to sediment in the wells, no significant PCB migration in groundwater is expected.

### **Metals**

Two dissolved metals were reported above their respective MSCs during the February 2006 sampling event: nickel (up to 0.134 mg/L) and thallium (up to 0.0238 mg/L). Each of these detections was from a monitoring well located in the former solvent AST area. No detection above the respective MSCs for these compounds was reported in the June and July 2007 sampling events. Antimony was detected at a concentration (0.012 J mg/L) above its MSC (0.006 mg/L) in June of 2007, but was reported non-detect (< 0.0097 mg/L) in July 2007. Therefore, these reported metals detections were not verified. Metals do not appear to be a Site-related groundwater concern.

#### ***2.2.3 Notice of Intent to Remediate***

A Notice of Intent to Remediate (NIR) was also submitted to PADEP and to the Borough of Kennett Square on June 4, 2010. A public notice of the issuance of the NIR was published in the local daily newspaper (The Kennett Paper) on June 10, 2010. A copy of the NIR is included in Appendix I.

### **2.3 Summary of Ecological Assessment of the Site**

The Site consists entirely of developed industrial land. All areas of the property underlie paved roads and parking lots, buildings, mowed grass areas, and the plastic-lined retention pond. Thus, there are no threatened or endangered species, exceptional value wetlands, habitats of concern, or species of concern on the property. All surrounding properties consist of residential, commercial, or industrial properties. A Pennsylvania Natural Diversity Inventory (PNDI) Search was performed using the Pennsylvania Department of Conservation and Natural Resources (DCNR) online system to verify that no threatened or endangered species exist within the project area. The PNDI documentation that was provided in the RI Report states that no impacts to federally listed or proposed species are anticipated from the project.

### **2.4 Summary of the Human Health Risk Assessment**

During the RI, various substances were identified in soil and groundwater at concentrations that exceed PADEP's published MSCs for residential property. Act 2 states in Section 250.405 states that a Baseline Risk Assessment Report or a Risk Assessment Report is not necessary if the department determines in its approval of either the RI Report or Cleanup Plan, that specific remediation measures can be implemented that address the potential risks at the Site. These remedial measures can include engineering and institutional controls (such as deed restrictions). It is the intention of the property owner to develop the property and conduct remediation consistent with the proposed development of the property. The specific remedial actions to be employed will be addressed in Section 4 of this Cleanup Plan. The following summarizes the response actions that will be employed at the Site:

#### **Groundwater**

Groundwater presently is not used for domestic purposes at the Site. As part of any future development of the property, public water will be supplied to all future users of the property. As such, deed restrictions will be placed on the future properties, consistent with the Uniform Environmental Covenants Act (UECA), to prevent future use of groundwater. This will

eliminate the groundwater ingestion pathway as a potential exposure route. Regarding the potential for vapor intrusion into future buildings, no COCs were identified in excess of the PADEP's screening values for vapor intrusion. Thus, the vapor intrusion pathway is not complete.

### **Soil**

Substances were identified in soil above Act 2 MSCs based on residential direct contact exposure. The future development plans for the Site include the potential for both residential and non-residential uses. Currently, it is envisioned that the area of the property that will be developed for fee simple residential property will be remediated to the statewide health standards in Act 2. Other areas of the site will either have soil excavated for offsite disposal (i.e., soils with PCBs in excess of 50 mg/kg), or potential exposures to soil with concentrations of COCs in excess of the Act 2 MSCs that will be managed via engineering controls (such as capped with asphalt parking areas) and institutional controls (deed restrictions & notices).

Based on the above, a Baseline Risk Assessment Report and/or a Risk Assessment Report is not considered necessary. The procedure to address human health risks during development of the property is addressed in the following sections.

## **2.5 Remedial Action Objectives**

The Proposed Development Conceptual Plans (Appendix II) contain a combination of residential and commercial/public agency facilities. Specific development plans are not yet available for the Site. As such, this Cleanup Plan describes the general strategy and approach that will be used to address the contaminated soil present at the Site. The remediation strategy focuses on meeting the cleanup requirements of individual areas based on their future use. Based on the conclusions of the Remedial Investigation Report, this Cleanup Plan is designed to address the following remedial action objectives (RAOs):

- ◆ Remove and dispose offsite all soils containing total PCBs greater than 50 ppm.
- ◆ For all planned residential lots that will be sold to individual owners, remove and relocate all soil containing COCs above Statewide Health Standards (SHS) and any PCB impacted soil containing greater than 1 ppm total PCBs. The soil will be relocated to other portions of the Site that will be developed as non-residential property.
- ◆ For planned multi-family residential areas (i.e., apartments), cap by buildings and paved surfaces all impacted soil containing COCs above SHS and any total PCBs above 1 ppm (but not exceeding 50 ppm).
- ◆ For commercial and government agency areas, eliminate direct contact pathways to surface soils containing COCs at concentrations that exceed Act 2 SHS or total PCBs greater than 1 ppm (but not exceeding 50 ppm) by capping these areas by buildings and paved surfaces.
- ◆ For all planned green spaces (parks, landscaping, stormwater retention areas) remove and relocate (to an area planned for capping) or cover with at least two feet of clean soil all COCs above Statewide Health Standards and any PCB impacted soil containing greater than 1 ppm total PCBs (but not exceeding 50 ppm).
- ◆ Through institutional controls, prevent the future use of groundwater beneath the Site and restrict the land zoning classification to be consistent with the remedy.

### **3.0 EVALUATION OF REMEDIAL ALTERNATIVES**

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As described in Section 2.3, there are no current ecological risks associated with the Site. As described in Section 2.5, the proposed remedial actions for the Site include soil removal (both onsite relocation and offsite removal), and capping such that direct contact human exposure pathways are eliminated and remaining potential exposures are within acceptable limits.

Section 304 (j) of Act 2 states the final remediation plan for a site shall include remediation alternatives and a final remedy that considers an evaluation of various criteria. Only one alternative is considered practical under the proposed development. The proposed alternative is the proposed remedy that will be conducted in coordination with the brownfield development. No action could be considered, but since human exposures under no action would not be acceptable, no action would not be a possibility under the proposed development.

The proposed remedy includes:

- ◆ Remove and dispose offsite all soils containing total PCBs greater than 50 ppm.
- ◆ For all planned residential lots that will be sold to individual owners, remove and relocate all COCs above Statewide Health Standards and any PCB impacted soil containing greater than 1 ppm total PCBs. The soil will be relocated to other portions of the Site that will be developed as non-residential property. In particular, the stormwater retention pond area will likely be filled with these soils and brought to grade. This area is a likely candidate for future development with either a building or paved parking surface to be located on this area.
- ◆ For all planned green spaces (parks, landscaping, stormwater retention areas) remove and relocate (to an area planned for capping) or cover with at least two feet of clean soil all COCs above Statewide Health Standards and any PCB impacted soil containing greater than 1 ppm total PCBs (but not exceeding 50 ppm).
- ◆ For multi-family residential (i.e., apartment buildings) and commercial/government agency areas, eliminate direct contact pathways to surface soils containing COCs at

concentrations that exceed Act 2 Site-Specific Standards or total PCBs greater than 1 ppm (but not exceeding 50 ppm) by capping these areas by buildings and paved surfaces.

- ◆ Through institutional controls, prevent the future use of groundwater beneath the Site and restrict the land zoning classification to be consistent with the remedy.

Figure 7 illustrates the impacted areas for which the above actions would apply. Figure 7 also illustrates the general areas of the property that will be developed as residential and commercial. In general, the eastern portion of the property will be developed for residential purposes and the western portion of the property will be developed for commercial purposes. As discussed previously, the final development plans will be presented to PA DEP prior to Site work.

Section 304 (j) of Act 2 lists six factors that must be considered for each remedial alternative. The six factors are listed below and discussed in the following subsections for the proposed remedy.

1. Long Term Risks and Effectiveness
2. Reduction of Toxicity, Mobility and Volume of Regulated Substances
3. Short Term Risks and Effectiveness
4. Implementability
5. Cost
6. Incremental Health and Economic Benefit

### **3.1 Section 304 (j)(1) -- Long Term Risks and Effectiveness**

The long-term risks and effectiveness of the proposed remedy are to be evaluated against the following criteria. These six criteria are discussed below:

- 1. The magnitude of risks remaining after the completion of the remedial action:**
  - ◆ In all proposed residential areas, soil with COCs at concentrations greater than MSCs will be removed.

- ◆ In all proposed non-residential areas, potential exposure will be controlled through pathway elimination. Therefore the unacceptable risks posed by soils will be eliminated.

**2. The type, degree and duration of post remediation care required, including, but not limited to, operation and maintenance, monitoring, inspections and reports and their frequencies or other activities which will be necessary to protect human health and the environment:**

No post remediation care to ensure compliance with Act 2 standards is required for the individual planned residential lots under the proposed remedy, since remediation will have been completed to conditions below the Act 2 Statewide Health Standards for residential property. Post remediation care of capped areas in the non-residential portion of the property will require inspection of areas to ensure the integrity of those areas. An Operations and Maintenance (O&M) Plan will be implemented in perpetuity to ensure compliance. The O&M Plan will ensure that no one is using groundwater and that no unacceptable exposures occur.

**3. Potential for exposure of human and environmental receptors to regulated substances remaining at the Site:**

The proposed remedy will prevent direct contact exposure of human receptors to areas of soil that exceed Act 2 standards. No environmental receptors were identified within the project area.

**4. Long term reliability of any engineering and voluntary institutional controls:**

The proposed remedy removes or covers the contaminated media exceeding Act 2 standards. Institutional controls will be implemented to ensure the integrity of the cap and prevent the future use of groundwater beneath the Site and prevent human exposures to contaminants by capping all potential direct contact human exposures. These institutional controls are commonly used techniques that are reliable and will stay in place in perpetuity.

**5. Potential need for repair, maintenance, or replacement of components of the remedy:**

The O&M Plan and Environmental Covenant will ensure compliance with this requirement.

**6. Time to achieve cleanup standards:**

The proposed remedy is anticipated to require the same amount of time to complete as construction of the proposed development. Currently, there is no schedule for the implementation of the development activities. The actual project schedule is dependent on final development plans and approvals and has not been fully developed. Elements of the schedule are discussed in Section 7.

**3.2 Section 304 (j)(2) -- Reduction of Toxicity, Mobility and Volume of Regulated Substances**

- ◆ The potential toxicity will be reduced by reducing the maximum concentration of COCs present at the Site.
- ◆ The volume of COCs will be reduced by excavation with offsite disposal of the soil containing >50 ppm total PCBs.
- ◆ The mobility of COCs will be reduced through capping. Capping reduces the potential for migration of soils containing adhered COCs to drainage features and water bodies.

**3.3 Section 304 (j)(3) -- Short Term Risks and Effectiveness**

The short-term risk of the proposed remedy is low. There will be no direct risk to the general public associated with the excavation and offsite disposal or capping of the impacted soil. Potential short-term risks to environmental receptors will be mitigated through the use of dust control and erosion and sediment control measures. Potential short term risks to the workers who complete the excavation will be mitigated through the use of a Site Safety Plan implemented consistent with 29 CFR §1910.120. Upon completion of the remedy, the potential direct contact exposure to soils exceeding Act 2 standards will be eliminated.

### 3.4 Section 304 (j)(4) -- Implementability

The proposed remedy can be implemented using conventional construction techniques and readily available materials. The remedy will take into consideration local, state, and/or federal permitting requirements. Several contractors have been located in the area to provide the necessary equipment and materials to complete the project. The soil containing PCBs above 50 ppm that will be removed from the property will be transported by licensed carriers and will be disposed of at a licensed disposal facility permitted to handle such waste.

### 3.5 Section 304 (j)(5) -- Cost

The major costs of implementing the remedy will be soil excavation, transport and disposal (T&D), sampling/documentation/oversight, and earth moving. Costs associated with capping by impervious surfaces and soil cover are considered to be included in the costs of general development of applicable areas. The capital, operation, and maintenance (O&M) costs estimated for the proposed remedy, given the known extent of impacts, is summarized as follows. The actual amount of soil to be excavated will be determined through the delineation and post-excavation sampling described in Section 4 of this Cleanup Plan. Note that this cost estimate is subject to change as the development plans are updated, as input from PA DEP is received, as post-excavation sample results are obtained, and new data are made available.

**Capital Cost:**

Soil Excavation, T&D (based on 1,481 tons) (PCBs >50 ppm)	\$ 750,000
On-Site Earth Moving for Remedy (based on 12,777 tons)	\$ 250,000
Work Plan, Soil Sampling, Oversight, Documentation	\$ 125,000
Groundwater Monitoring (6 additional quarters)	\$ 45,000
Final Report	\$ 20,000
O&M Cost: O&M (annual inspection and report) for 30 years	\$ 50,000
<b>Present Worth Cost:</b>	\$1,240,000

The present worth cost is the capital cost plus 30 years of O&M cost.

Note that the estimated cost of earth moving is based on an approximate development plan; the estimate assumes that approximately 50% of the impacted soil that does not have to be disposed of offsite will need to be relocated onsite.

### **3.6 Section 304 (j)(6) -- Incremental Health and Economic Benefit**

Since only one alternative is presented in this Cleanup Plan, it is not necessary to compare incremental health and economic benefits. However, removal of the contaminated soil containing total PCB impacts above 50 ppm will be the most expedient and beneficial alternative with respect to incremental health and economic benefit. Capping all remaining impacted soils along with O&M monitoring of the cap will have the same effect of eliminating potential human exposures.

### **3.7 No Action Alternative**

The No Action Alternative is not analyzed in this Cleanup Plan because it provides no benefits under any of the six criteria described above. The No Action Alternative will not be considered further.

## **4.0 DESIGN AND IMPLEMENTATION OF THE FINAL REMEDY**

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The design of the remedial actions discussed in this Cleanup Plan is based on the conclusions presented in the Remedial Investigation Report, as summarized in Section 2.0 of this Cleanup Plan. The following sections address the design and implementation of the final remedy for the Site.

### **4.1 Pre-Excavation Delineation**

Additional soil sampling may be conducted prior to implementation of the remedy to further delineate the impacted areas that require remediation as depicted in Figure 7. This will be done to increase the efficiency of the excavation effort, and potentially decrease T&D costs in select areas. The need for and location of pre-excavation sampling will be based on the final development plans for the Site. As such, the details and specific location for any pre-excavation sampling can not be provided at this time. The final excavation limits will be based on a combination of Pre-Excavation and Post-Excavation sampling. Post-Excavation sampling will be used to demonstrate attainment as discussed in Section 4.4.5.

The depth, number, and type of analyses required at each pre-excavation delineation sampling location will depend on the COCs being delineated. Samples will be analyzed for either of PCBs, PAHs, lead, or arsenic, as applicable. The results for PCBs will be compared to the 50 ppm threshold for offsite disposal, as well as the 1 ppm level for soil relocation and/or capping. The results of the PAHs, lead, and arsenic soil analyses will be compared to their respective SHS.

#### ***4.1.1 Sampling and Analysis Plan***

Alliance standard operating procedures (SOPs) for implementation of this task include:

- ◆ Utility mark-out call/Site utility check.
- ◆ Health & safety tailgate meetings/documentation.
- ◆ Documentation of field activities.
- ◆ Documentation of field sample locations on maps.
- ◆ Flagging of sample locations in the field with accompanying recording of location using a hand-held global positioning system (GPS) unit.
- ◆ Completing sample chain of custodies for samples collected.

The surface soil samples will be collected using manual (e.g., hand auger) or direct push methods. If used, typical industry standards for soil sampling using the direct-push drilling methodology and a macro-core sampler with acetate liner will be implemented. Soil borings will be advanced to the required depth, with soil being homogenized in a stainless steel bowl. Soil samples will be collected typically representing even two-foot sampling intervals (e.g., 0-2', 2-4', etc.) using either decontaminated stainless steel (or Teflon™ coated) spatulas/knives, dedicated plastic scoops, or by hand using dedicated nitrile examination gloves. The soil samples will be containerized within laboratory supplied bottle ware, labeled using Alliance's sample designation scheme, and placed within iced coolers while in the field (stored at 4 degrees Celsius). Samples will be sent under proper chain of custody to Lancaster Laboratories, Inc., a Pennsylvania accredited laboratory, for analysis via EPA method 8082 for PCBs, 8270 for PAHs, and 6010 for lead and/or arsenic, as applicable.

A duplicate sample will be collected for every 20 samples collected. A matrix spike and matrix spike duplicate will be collected per sampling event. One equipment (rinsate) blank will be collected for each day of sampling. The collected samples will be stored at 4 degrees Celsius and analyzed according to the procedure described above.

All sample containers will be labeled to include the following information: sample identification number, project name, date and time of sample collection, type of analysis requested and name of sampler. Field personnel will complete proper chain-of-custody records. Field personnel will enter the following information into a bound field logbook: the location where a sample was obtained, sample identification number, date and time of sample collection, weather conditions at the time of sampling and any additional remarks. Sampling locations will be marked with flags and/or spray paint and recorded with a hand-held global positioning system (GPS) unit.

Decontamination of non-dedicated sampling tools (e.g., hand auger, stainless steel bowl, macro-core sampling shoe and barrel, etc.) with tap water andalconox wash, tap water rinse, and deionized or distilled water rinse followed by air drying will be conducted after each sample boring. Disposable sampling equipment (e.g., latex gloves) will be collected and properly disposed.

#### ***4.1.2 Evaluation of Results***

Once the results of the sampling and analysis have been received, they will be compared to the RAO for each targeted COC. Any results that exceed the RAO for the targeted COC will need to be addressed either by removal/offsite disposal, relocation, or capping.

The results of the pre-excavation sampling, in conjunction with existing sampling results, will determine the final dimensions of the area(s) that will be excavated or capped. Upon final delineation, the limits of the proposed excavation area(s) will be forwarded to PADEP for final approval before implementing the remedial action.

#### **4.2 Plans and Permits**

Section 902(a) of Act 2 provides that state and local permits are not required for remediation activities undertaken entirely on Site if they are undertaken pursuant to the requirements of Act

2. Alliance and Rockhopper, LLP will, however, take reasonable measures to comply with the substantive requirements of local and state laws.

Following delineation activities and prior to any land disturbing activities, all applicable borough, county, and state requirements will be reviewed. The subject plans and permits will be prepared consistent with the Site development activities, since these earth-disturbing activities also require the subject permits. Applicable permits will be obtained as described further below.

#### ***4.2.1 NPDES Permitting***

The disturbed area associated with the remedy is anticipated to be greater than one acre in size and will have a point source discharge. Therefore, an application for a NPDES General Permit for Stormwater Discharges Associated with Construction Activities will be submitted to the Chester County Conservation District (CCCD).

#### ***4.2.2 Erosion and Sediment Control Plan***

An Erosion and Sediment Control (“E & S”) Plan will be developed consistent with state regulations (25 P.A. Code Chapter 102) and industry standards and implemented prior to any land-disturbing activities. The PADEP Bureau of Watershed Management and the Chester County Conservation District (“CCCD”) require that an E & S Control Plan be developed for earthwork activity in excess of 5,000 square feet. The CCCD requires the E & S Control Plan to be developed in accordance with the Erosion and Sediment Pollution Control Program Manual (“ESPCM”) published by the PADEP Bureau of Water Quality Protection, Division of Waterways, Wetlands and Erosion Control (March 2000).

The ESPCM lists various Best Management Practices (“BMPs”) for earth disturbances associated with land development and construction activities. The ESPCM provides design standards for the BMPs to achieve the regulatory standard of minimizing the potential for accelerated erosion and sedimentation.

The ESPCM requires that an E & S Control Plan consider the following factors in connection with controlling potential erosion and sedimentation.

1. The existing topographic features of the Site and adjacent areas.
2. Physical characteristics of the Site soils.
3. Characteristics of the earth disturbance activities and past, present and proposed land use and proposed Site alterations.
4. Project area runoff amount and upstream watershed area.
5. Waterway classification of waters receiving runoff.
6. Best management practices.
7. Maintenance program.

The Erosion and Sedimentation Control Plan that will be developed for the Site following delineation activities will consider these factors and include appropriate controls for the construction activities described in this Cleanup Plan.

### **4.3 Site Preparation**

Once the limits of the proposed excavations are known, stakes will be put in the ground to mark the excavation limits in the field. Alliance will prepare a staging area and likely rent a small office trailer to coordinate Site activities.

#### ***4.3.1 Install Erosion and Sediment Control Measures***

Erosion and Sediment control measures will be installed according to the E & S Control Plan (to be developed following delineation activities and consistent with development of the property). At a minimum, silt fence will be installed downgradient and sidegradient with respect to the area(s) of disturbance (between the excavation area(s) and the current outfall of surface water drainage).

### **4.3.2 Demolition**

Demolition of some or all of the existing structures on the property will be conducted to enable the development to proceed. This work will be conducted by licensed demolition contractors under permits issued by Kennett Square Borough. Closure of all underground storage tank (UST) and Above Ground Storage Tank (AST) systems will be conducted by licensed contractors. Additional sampling of environmental media associated with tank systems will be conducted in accordance with tank closure requirements. The data will be used in conjunction with the RI data to complete the characterization of the Site and define remediation areas.

Asbestos containing material (ACM) will be removed prior to demolition. Identification and removal of ACM will be conducted by qualified licensed consultants and contractors.

Remediation of ACM is beyond the scope of this Cleanup Plan.

Monitoring and inspection of the soils beneath the buildings after they are exposed will be performed after building demolition and daily during slab removal. This monitoring will include visual inspection, PID measurements, and discretionary sampling for laboratory analysis if warranted based on field observations. The purpose of the monitoring and inspection will be to identify any additional potential areas of impacts that were not evident prior to slab removal. Should COCs at concentrations above the limits proposed for remediation be identified based on laboratory analysis of samples collected during the monitoring and inspections, vertical and horizontal delineation of soil impacts will be conducted. All impacted areas will be addressed in accordance with the remedy.

Any land clearing of remediation areas will be performed in accordance with the Site E&S Control Plan and conducted by workers following the Health and Safety Plan (“HASP”) (Appendix III).

#### **4.4 Soil Excavation**

Following demolition and land clearing activities, the impacted areas will be ready for soil excavation. The horizontal extent of the excavation area(s) will be determined based on the depicted proposed remediation areas in Figure 7, incorporating any additional delineation sampling as described in Section 4.1 and 4.3.2 above. The soil will be excavated to varying depths dependent on the vertical delineation results. As stated, delineated locations will be identified through stakes installed around the perimeter of excavation area(s).

##### ***4.4.1 Health and Safety***

A Site Safety Plan (“Health and Safety Plan”) has been prepared consistent with OSHA 1910.120 regulations for hazardous waste site operations. At a minimum, health and safety precautions will include use of disposable and/or chemical resistant gloves for handling impacted soil, field clothes, level D personal protective equipment, and proper training on the above aspects as appropriate to the activities involved. All soil excavation activities will be conducted according to current OSHA regulations related to excavations. Emergency information, procedures, and phone numbers will be properly posted and/or available in the field copy of the Health and Safety Plan. Material Safety Data Sheets (MSDSs) will be available on Site for all known constituents of concern. Real-time air monitoring will be conducted both inside and downwind of excavation areas through the use of a photo-ionization detector (PID). Respirators will be worn if air concentrations are encountered that exceed action levels as described in the Health and Safety Plan in Appendix III.

#### **4.4.2 Excavation Equipment**

Excavation will be by mechanical means and may include any or all of the following pieces of equipment:

- ◆ Bulldozer
- ◆ Track-hoe excavator
- ◆ Front-end loader
- ◆ Backhoe
- ◆ Dump trailers (lined with cover)
- ◆ Roll-off dumpsters (lined with cover)

A bulldozer and track-hoe excavator will be the primary pieces of heavy equipment that will be used for the excavation of Site soils. A front-end loader and track-hoe excavator will be the primary pieces of heavy equipment that will be used for the loading of excavated soils into dump trailers or roll-off dumpsters for off-Site disposal.

Soil is intended to be excavated directly into vehicles for relocation onsite to proposed cap areas, or, in the case of total PCBs above 50 ppm, the soil will be loaded into lined and covered waste hauling vehicles for offsite removal and disposal. If unexpected Site conditions arise, it may be necessary to temporarily stage the contaminated soils on Site before loading them into a dump trailer. Any staged contaminated soils will be placed on and covered by plastic or loaded into lined, covered roll-off containers situated adjacent to excavation areas. For soil to be disposed of offsite, each vehicle removing impacted soil from the Site will be inspected at the construction entrance and accumulated soil will be removed from the tires prior to departure from the Site.

#### **4.4.3 Excavation Area**

As described in the introduction of this Section, the exact area(s) of excavation will be based on a review of the results of the pre-excavation soil delineation sampling. Specifically, excavation

will continue horizontally until soil concentrations are reached that show results less than the RAO for the COCs previously identified (total PCBs, PAHs, arsenic, lead). The currently estimated maximum extent for the excavation area(s) are depicted on Figure 7 and are summarized as follows:

#### **Soils Containing PCBs Above 50 ppm**

- ◆ Surface Area: 10,207 ft<sup>2</sup>
- ◆ Average Depth: 3.9 ft
- ◆ Volume: 1,481 yd<sup>3</sup>
- ◆ Approximate Weight: 2,221.5 tons

#### **Soils Containing Total PCBs above 1 ppm and $\leq$ 50 ppm, or above SHS Criteria**

- ◆ Surface Area: 139,298 ft<sup>2</sup>
- ◆ Average Depth: 3.3 ft
- ◆ Volume: 17,036 yd<sup>3</sup>
- ◆ Approximate Weight: 25,554 tons

The actual area and volume of soil to be remediated will be determined following delineation activities described in Sections 4.1 and 4.3.2. Refer to Section 4.4.5 for post-excavation sampling procedures that will assure the achievement of the remedial goal.

#### **4.4.4 Soil Management**

Excavated soils will be staged, characterized, and relocated onsite or disposed offsite according to applicable state and federal regulations. Where possible, excavated soils will be directly loaded into lined dump trucks or lined roll-off containers for immediate disposal to a permitted landfill. A profile for the contaminated solids generated at the Site will be prepared and approved by licensed waste disposal facilities. The soil scheduled for excavation will be

characterized and disposal approved prior to commencement of land disturbing activities. Disposal will be consistent with all applicable state and federal regulations.

#### ***4.4.5 Post-Excavation Sampling***

Following excavation of the identified soil areas, a post-excavation sampling event will be conducted in each excavated area. Post excavation sampling will be conducted in each area requiring remediation in accordance with Act 2 Chapter 250.703 (d). The post-excavation results will determine if either the RAOs have been met or if further excavation activities are required, which would initiate another round of post excavation sampling.

Random grab soil samples will be taken from the sidewall and bottom wall to verify the extent of the excavation. It is proposed that 80% of the samples will be sidewall samples and 20 % bottom wall samples. Both sidewall and bottom walls will be represented in each attainment area. The number of samples required in each location will be dependent on the regulations stated in Chapter 250.703(d). These include the following which apply to each separate excavation area:

- ◆ For all soil volume equal to or less than 125 cubic yards, at least 8 samples will be collected.
- ◆ For soil volumes up to 3,000 cubic yards, at least 12 samples will be collected.
- ◆ For each additional soil volume of up to 3,000 cubic yards, an additional 12 samples will be collected.

Soil sampling equipment, sample handling and documentation, and decontamination and QA/QC procedures will follow those that were described for the potential pre-excavation delineation sampling (see Section 4.1). The post-excavation samples will be submitted to the laboratory for analysis of applicable COCs to determine if further excavation is required. If results are found to exceed the RAO, excavation will occur followed by a second round of post-excavation sampling. Upon receipt of post-excavation results that are below the applicable RAO for each Site

excavation area, the excavations will be backfilled as described in Section 4.4.6. At the conclusion of backfilling activities, the Site will be graded consistent with the final development of the Site. Development in accordance with construction plans will then proceed in each area. In areas where no construction is planned, disturbed areas will then be seeded/planted according to the E & S Control Plan and a vegetative cover established to prevent soil erosion.

#### ***4.4.6 Backfill and Compaction***

Each excavation area will be backfilled with clean fill from offsite or relocated soil from onsite as applicable. The fill material will be compacted to engineering specifications for the development.

#### ***4.4.7 Equipment Decontamination***

Following last use on Site, each piece of equipment coming in contact with contaminated soils will be decontaminated prior to leaving the Site.

### **4.5 Construction Quality Assurance/Quality Control**

Quality Assurance and Quality Control (“QA/QC”) will be performed throughout the construction activities to assure that all construction activities meet the requirements set forth in this Cleanup Plan. Alliance personnel will serve as construction managers for the soil remediation work and will be on Site during the course of the construction project. Quality Assurance begins with the identification and specification of materials and equipment required to complete the proposed work.

Quality Control entails the verification that specifications set forth in this Cleanup Plan are met in the field. The contractor(s) will be required to provide documentation to verify compliance with any engineering specifications reported in this Cleanup Plan. Alliance personnel will field

verify and confirm that the grading, excavation points, sub-grade compaction, will be performed as specified, as well as supervise the Site restoration.

#### **4.6 Site Security Plan**

The work is being conducted within a construction site and measures will be taken to ensure that no public contact to the work area is permitted. During working hours, personnel will be responsible for alerting anyone that comes near the work area to stay away. During construction activities, access to the work areas will be restricted to authorized personnel. Construction fencing will be installed around the entire perimeter of the excavation areas to restrict access. The fencing will have entrance(s) left open while work is being conducted and closed each night at the conclusion of the day's activities.

#### **4.7 Post Remediation Care Program**

The Post Remediation Care Program for the Site is described in Section 6.0 of this Cleanup Plan.

#### **4.8 Operation and Maintenance Plan**

An Operation and Maintenance (O&M) Plan will be specified in the Environmental Covenant required for the property. The O&M Plan will be prepared using As-Built drawings of the completed development. Key features of the O&M Plan will include:

- ◆ Non-disturbance of capped areas.
- ◆ Non-use of Site groundwater.
- ◆ Soil management plan for all land disturbing activities.
- ◆ Inspection and maintenance of pavements and soil covers that serve as soil caps.
- ◆ Periodic Reporting to PADEP on the status and results of O&M activities.

- ◆ Notification to PA DEP in the event of soil disturbing activities, change of ownership, and change in land use.

## 5.0 ATTAINMENT MONITORING

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### 5.1 Groundwater Monitoring

#### 5.1.1 Results of Groundwater Monitoring

Attainment of Site-Specific Standards for groundwater has been demonstrated through groundwater sampling and confirmation sampling during the Remedial Investigation. Attainment has been demonstrated at the Point of Compliance (POC), which is the downgradient (south and west) property boundary. As discussed in Section 2.2.2 (findings of RI Report, Groundwater Contamination Summary), the only COCs that were detected in downgradient monitoring well samples (with one exception discussed below) were PCBs. Because PCBs have little or no solubility in groundwater, it was concluded that the PCBs were associated with suspended solids in the groundwater samples. The suspended solids have low potential for migration within the aquifer. The exception that was noted is the detection of low levels of PCE in one monitoring well (DPW-2) in the far northwest corner of the property, adjacent to the Noznesky's Junkyard property. As explained in the RI, the Noznesky's Junkyard property is known to be contaminated with solvents at higher levels than those seen at NVF and the detection of PCE in groundwater along the boundary of the junkyard is believed to be associated with the junkyard.

The site has a long history of operation and therefore the observed groundwater impacts are expected to have reached a level of stabilization. No offsite groundwater plume migration is indicated. Monitoring of groundwater for six additional quarters will confirm attainment of groundwater standards at the POC.

A total of eight quarters of groundwater monitoring of monitoring wells at the downgradient point of compliance (POC) are proposed to demonstrate attainment. The eight quarters to be evaluated will include the two previous sampling events for each of the wells included in the program. The proposed monitoring wells to be used for demonstration of attainment include:

POMW-2, POMW-3, POMW-4, DPW-4, DPW-5, PW-3, DPW-11, DPW-9, and DPW-10. All of these wells are located in downgradient monitoring positions with respect to Site groundwater flow as illustrated in Figure 6. Analysis of the samples will include VOCs, PCBs (total and dissolved), and select dissolved Metals (Nickel, Thallium, and Antimony). VOCs, total PCBs, and select dissolved Metals (Nickel, Thallium, and Antimony) are the only COC parameters that were previously identified in groundwater in specific locations above SHS.

### ***5.1.2 Groundwater Sampling Methodology***

The sampling techniques to be used during the monitoring program will be the same as those utilized during the remedial investigation. Groundwater samples will be collected in accordance with Alliance SOPs. Sampling of the wells will be conducted using EPA low-flow methodology (U. S. EPA, 1996). Purging will be conducted at a slow rate using a bladder pump or peristaltic pump and dedicated tubing, and the parameters pH, conductivity, temperature, and dissolved oxygen will be monitored for stabilization. The samples will be collected after the parameters stabilize. Samples will be collected in laboratory-supplied bottle ware with appropriate preservatives, placed in an iced cooler, and delivered to the laboratory under chain of custody documentation.

### ***5.1.3 Groundwater Monitoring Reporting***

The results of the groundwater monitoring program will be presented in the Final Report, which will include a description of how the groundwater standard has been achieved.

## **5.2 Soil Attainment**

Attainment of Soil standards will be demonstrated through the post-excavation soil sampling (described in Section 4.0) during implementation of the site remedy. The cleanup standards to

be used are the Site-Specific Standards listed in the remedy. The results of the soil sampling will be presented in the Final Report.

### **5.3 Final Report**

A Final Report to PADEP detailing the activities and results of the Cleanup Plan will be prepared after the soil excavation work and all restoration activities have been completed. The report will include text, tables, figures, and appendices. The report will include an evaluation of the remedy and comparison of analytical results to applicable Act 2 standards. The Final Report will include an evaluation of the results of the soil and groundwater sampling and monitoring programs described above.

## 6.0 POST REMEDIATION CARE PROGRAM

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### 6.1 Purpose of Program

The purpose of a Postremediation Care Plan is to document any O&M requirements that are needed to maintain the standards following completion of the remedy.

The remedy includes the following:

- ◆ Remove and dispose offsite all soils containing total PCBs greater than 50 ppm.
- ◆ For all planned residential lots that will be sold to individual owners, remove and relocate all soil with COCs above Statewide Health Standards and any PCB impacted soil containing greater than 1 ppm total PCBs.
- ◆ For all planned green spaces (parks, landscaping, stormwater retention areas) remove and relocate (to an area planned for capping) or cover with at least two feet of clean soil all COCs above Statewide Health Standards and any PCB impacted soil containing greater than 1 ppm total PCBs (but not exceeding 50 ppm).
- ◆ For multi-family residential and commercial/government agency areas, eliminate direct contact pathways to surface soils containing COCs at concentrations that exceed Act 2 residential direct contact MSCs or total PCBs greater than 1 ppm (but not exceeding 50 ppm) by capping these areas by buildings and paved surfaces.
- ◆ Through institutional controls, prevent the future use of groundwater beneath the Site and restrict the land zoning classification to prevent future development of the area for residential or commercial purposes.

The Postremediation Care Plan is designed to ensure that all of the above objectives will continue to be met into the future. This will be done through implementation of the O&M Plan.

## **6.2 Erosion and Sediment Control Measures Inspection**

During the remedy implementation stage of the project, inspection of the erosion and sediment control measures will be conducted following excavation activities until a vegetative cover has been established that stabilizes the disturbed area. Inspections will occur monthly with any necessary repairs conducted immediately following inspection.

## **6.3 Institutional Controls including O&M**

Following completion of the above actions, an O&M Plan will be implemented. The O&M Plan will be specified in the Environmental Covenant required for the property. The O&M Plan will be prepared using As-Built drawings of the completed development and as such, the details cannot be presented herein. Key features of the O&M Plan will include:

- ◆ Non-disturbance of capped areas.
- ◆ Non-use of Site groundwater.
- ◆ Soil management plan for all land disturbing activities.
- ◆ Inspection and maintenance of pavements and soil covers that serve as soil caps.
- ◆ Periodic Reporting to PADEP on the status and results of O&M activities.
- ◆ Notification to PA DEP in the event of soil disturbing activities, change of ownership, and change in land use.

Controls restricting future groundwater use as well as land zoning will be placed in the deed(s) for the Site. This notice will prohibit future owners from removing the notice from the deed(s) without PADEP approval.

## **7.0 SCHEDULE**

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The soil excavation and removal, capping, and relocation actions are dependent on the overall construction schedule for the development. A project schedule has not been fully developed at this time. The schedule depends of completion of the design, approvals of the development, and funding availability. The work will be done in phases and those phases are not yet established. After necessary approvals and the development plan is in place, a project schedule will become available to PA DEP.

## 8.0 REFERENCES

---

Environmental Alliance, 2004, Final Report for NVF Company's Storm Water Retention Pond Lining Project, July 7, 2004 (Revised August 27, 2004).

PADEP. November 2001 PA Code Title 25, Environmental Protection, Chapter 250, Administration of the Land Recycling Program. *The Land Recycling and Environmental Remediation Standards Act* (Act 2).

PA DEP. June 2002. *Pennsylvania's Land Recycling Program Technical Guidance Manual*.

PA DEP. 2000. *Erosion and Sediment Pollution Control Program Manual* published by the PADEP Bureau of Water Quality Protection, Division of Waterways, Wetlands and Erosion Control.

Pennsylvania Code, 1997, Chapter 250, Environmental Protection, Subchapter C, Statewide Health Standards, Appendix A, Tables 1 through 5.

Pennsylvania Code, 1997. Title 25, Chapter 250: Land Recycling Program.

Pennsylvania Geologic Survey, 1980, Map 1, Geologic Map of Pennsylvania.

Shacklette and Boerngen, 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States, U.S. Geological Survey Professional Paper 1270, United States Government Printing Office.

U. S. Environmental Protection Agency, 1996, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, EPA/540/S-95/504, April.

## **9.0 PUBLIC COMMENTS**

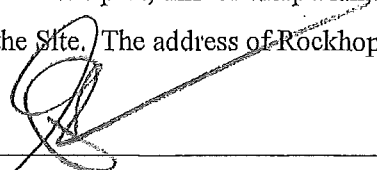
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No public comments were received during the 30-day public notice period subsequent to advertisement of the NIR on July 10, 2010.

## 10.0 SIGNATURES

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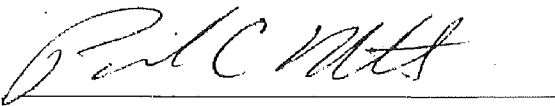
This Cleanup Plan has been prepared by Alliance on behalf of Rockhopper, LLP, whom is the party participating in the remediation of the Site within the meaning of Section 501 of Act 2 and will be seeking liability protection under Section 501 of Act 2 for the conditions at the Site as described in the RI Report, this Cleanup Plan, and ultimately the Final Report that will be prepared for the Site. The address of Rockhopper, LLP is set forth below.



---

Mr. George Beer  
Rockhopper, LLP  
722 Yorklyn Road  
Suite 350  
Hockessin, DE 19707

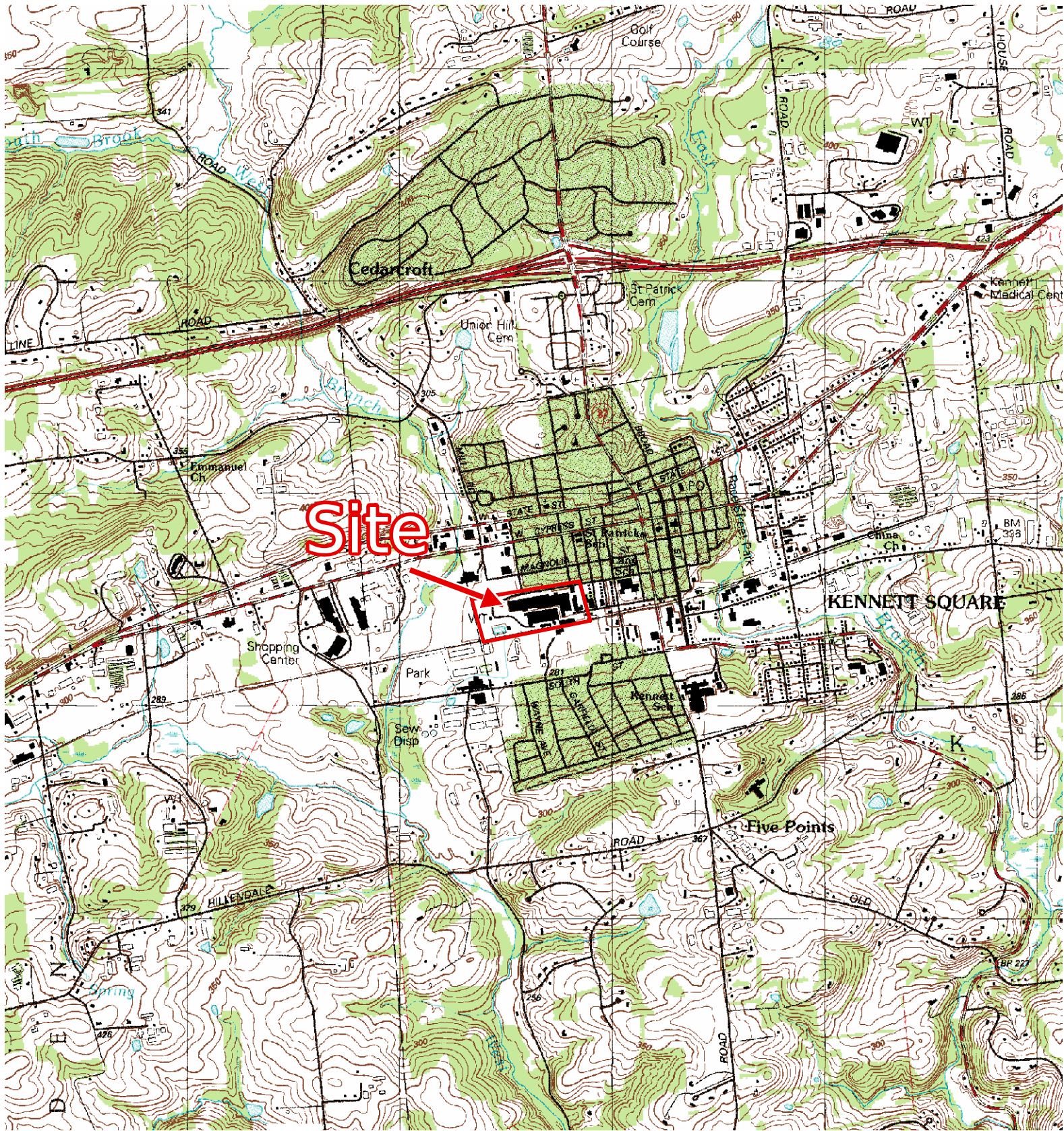
The address of the Consultant Responsible for Cleanup Plan Preparation is:



---

Mr. Paul Miller, P.E.  
Environmental Alliance, Inc.  
660 Yorklyn Road  
Hockessin, DE 19707

## Figures



0 1,000 2,000 4,000  
 Feet  
 1 inch = 2,000 feet



Environmental Alliance, Inc.

660 Yorklyn Road - Hockessin, Delaware 19707  
 Phone: (302) 234-4400 - Fax: (302) 234-1535

## NVF Facility Kennett Square, PA

### Site Location

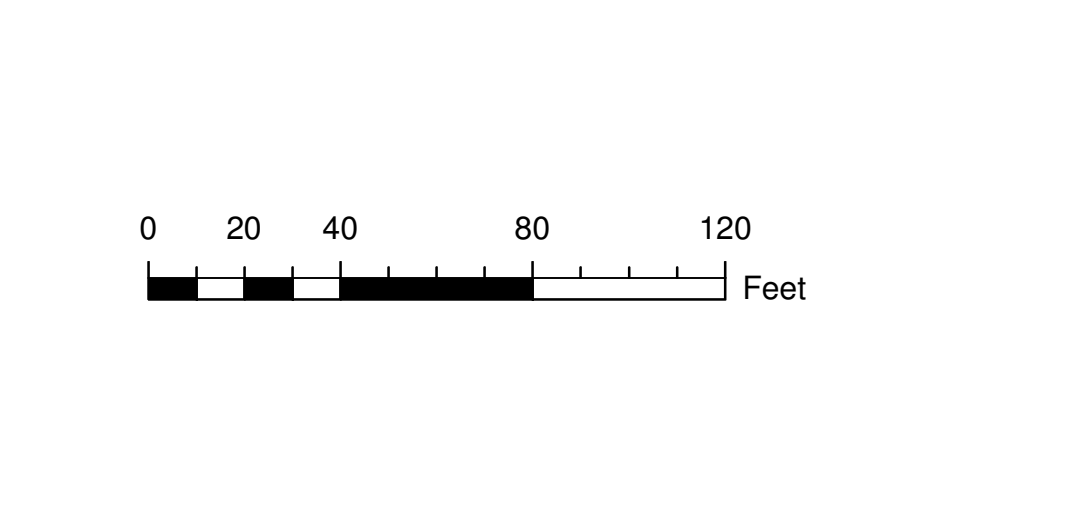
DRAWN BY: RSF	FILE NAME: 2307-Site location	SCALE: SEE DRAWING	FIGURE NO: <b>1</b>
APPROVED BY:	PROJECT NO: 2307	DATE: 03/31/2008	



Legend			

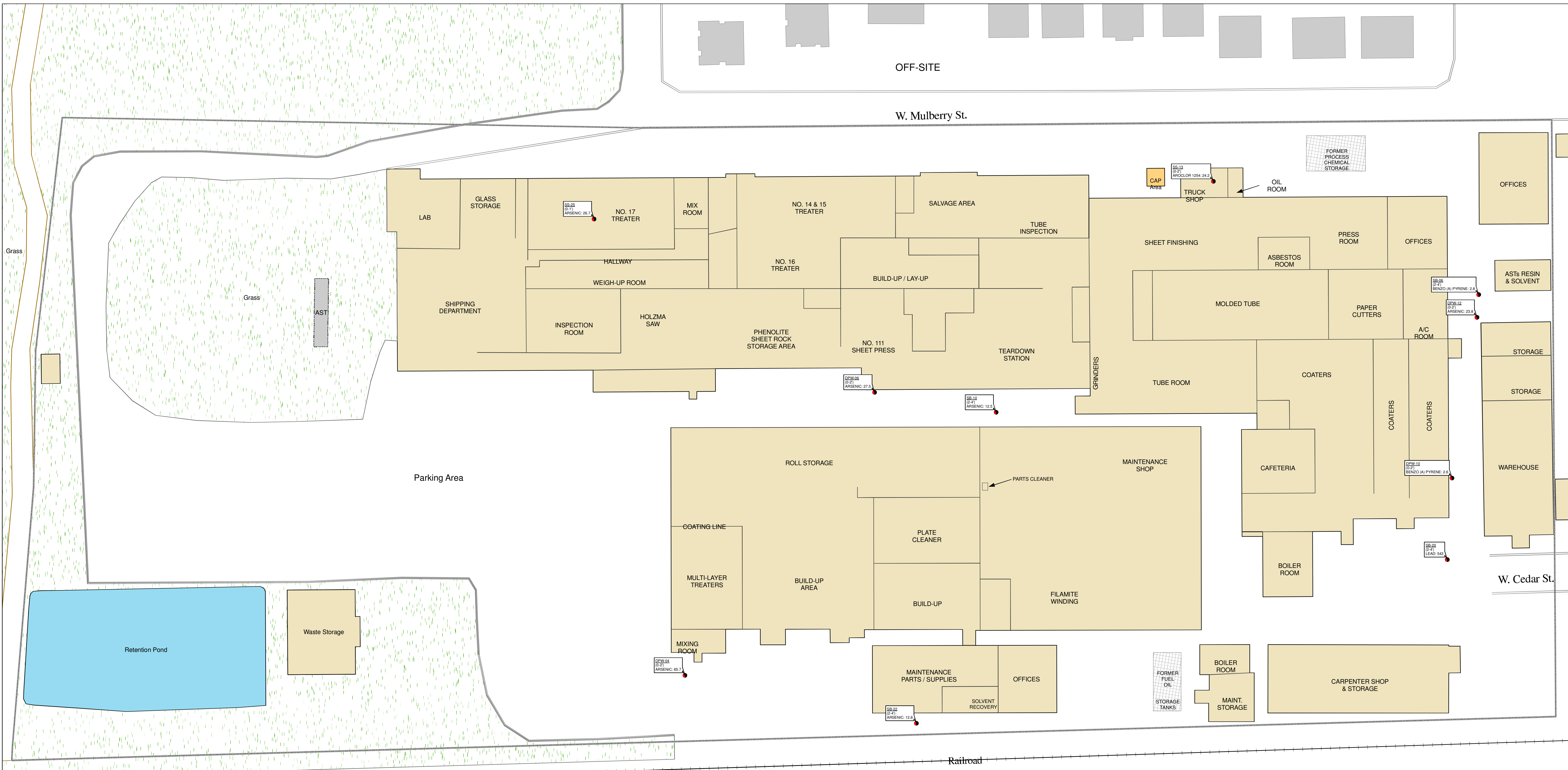
OFF-SITE

Data Sources:  
 Howell Kline Surveying, LLC  
 State of Pennsylvania DCOs  
 EA CAD Drawing: "2037-Geoprobe Locations.pdf"  
 NVF Company  
 Map Projection: NAD\_1983\_UTM\_Zone\_18N



**Environmental Alliance, Inc.**  
 660 Yorklyn Road - Hockessin, Delaware 19707  
 Phone: (302) 234-4400 - Fax: (302) 234-1535

<b>NVF Facility Kennett Square, PA</b>			
Site Base Map			
DRAWN BY: RSF	FILE NAME: 2307-Base_Map	SCALE: SEE DRAWING	FIGURE NO: <b>2</b>
APPROVED BY:	PROJECT NO: 2307	DATE: 04/04/2008	

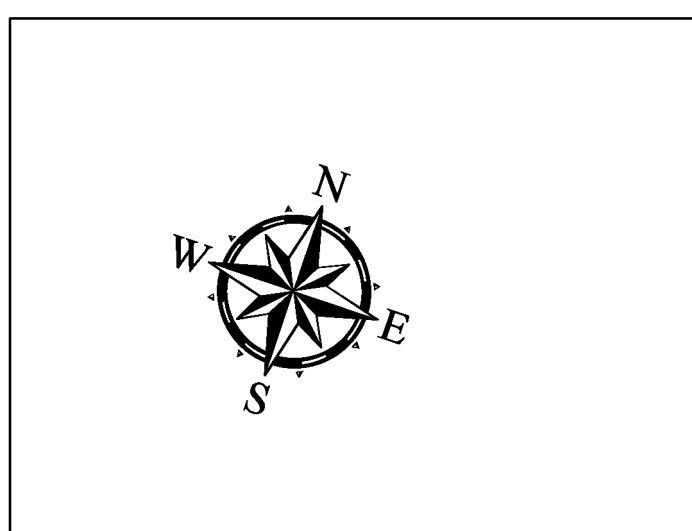


**Legend**

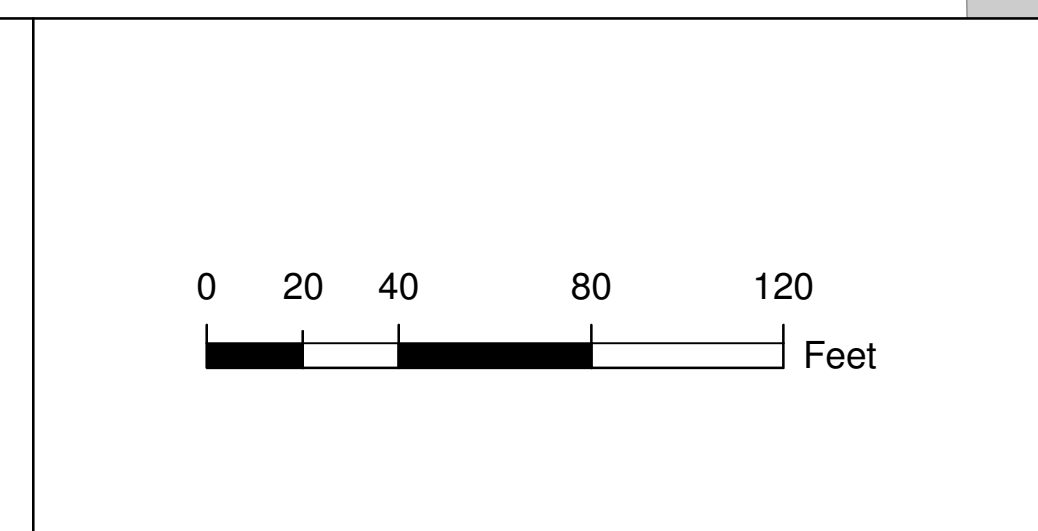
- Above Direct Contact PA-DC-RES MSC
- Dirt Road
- Interior Wall
- Approx. Site Boundary
- Railroad
- Edge of Pavement
- AST
- Former Storage
- NVF Property
- NVF Building
- Retention Pond
- Vegetation
- Offsite Facility

Constituent	PA-DC-RES	Units
ARSENIC	12.0	mg/kg
LEAD	500.0	mg/kg
BENZO (A) PYRENE	2.5	mg/kg
DIBENZO (A,H) ANTHRACENE	2.5	mg/kg
AROCLOR 1242	36.0	mg/kg
AROCLOR 1248	9.9	mg/kg
AROCLOR 1254	4.4	mg/kg
AROCLOR 1260	30.0	mg/kg

1) PA-DC-RES = Pennsylvania Direct Contact Residential Medium-Specific Concentration (MSC). Only results above this standard are posted on this map. (concentrations shown in mg/kg)  
 2) Sample dates vary  
 3) The data illustrated were collected through June 2007 prior to additional delineation



Data Sources:  
 Howell Kline Surveying, LLC  
 State of Pennsylvania DOQQs  
 EA CAD Drawing: "2037-Geoprobe Locations.pdf"  
 NVF Company  
 Map Projection: NAD\_1983\_UTM\_Zone\_18N



**Environmental Alliance, Inc.**  
 660 Yorklyn Road - Hockessin, Delaware 19707  
 Phone: (302) 234-4400 - Fax: (302) 234-1535

**NVF Facility  
 Kennett Square, PA**

**Site Characterization Soil Sampling  
 Locations Above Pennsylvania Direct  
 Contact Residential MSCs**

DRAWN BY: RSF	FILE NAME: 2307-Soil_Ana_above_ PA_MSC_char(2008-03)	SCALE: SEE DRAWING	FIGURE NO.:
APPROVED BY:	PROJECT NO.:	DATE:	<b>3</b>



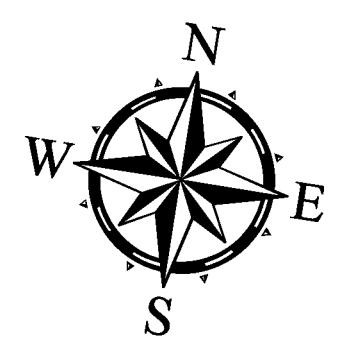


Constituent	PA-UA-2500-RES	Units
ANTIMONY	0.006	mg/L
AROCLOL 1248	1.3	ug/L
AROCLOL 1248	0.37	ug/L
AROCLOL 1254	0.37	ug/L
BENZENE	5	ug/L
DICHLOROMETHANE	5	ug/L
NICKEL	0.1	mg/L
TETRACHLOROETHANE	5	ug/L
THALLIUM	0.002	mg/L
TOLUENE	1000	ug/L
TRICHLOROETHYLENE	5	ug/L

1) PA-UA-2500-RES = Pennsylvania Used Aquifer, <=2500 mg/L  
 Total Dissolved Solids - Residential  
 Only results above this standard are posted on this map.  
 (Metal concentrations shown in mg/L; all other concentrations in ug/L)  
 2) Sample dates vary.

**Legend**

- Bedrock Well
- Existing Monitoring Well
- Monitoring Well / Soil Boring (June 2007)
- Dirt Road
- Interior Wall
- Approx. Site Boundary
- Railroad
- Edge of Pavement
- AST
- Former Storage
- NVF Property
- NVF Building
- Retention Pond
- Vegetation
- Offsite Facility



Data Sources:  
 Howell Kline Surveying, LLC  
 State of Pennsylvania DCOQs  
 EA CAD Drawing: "2037-Geoprobe Locations.pdf"  
 NVF Company  
 Map Projection: NAD\_1983\_UTM\_Zone\_18N



**Environmental Alliance, Inc.**  
 660 Yorklyn Road - Hockessin, Delaware 19707  
 Phone: (302) 234-4400 - Fax: (302) 234-1535

**NVF Facility  
 Kennett Square, PA**

*Groundwater Analytical Concentrations  
 Above Groundwater MSC's*

DRAWN BY: RSF	FILE NAME: 2307-GW_Analytical above_PA_MSC	SCALE: SEE DRAWING	FIGURE NO: <b>5</b>
APPROVED BY:	PROJECT NO: 2307	DATE: 03/11/2008	





**Legend**

- Approximate line between proposed Residential and Commercial/ Public Service Development Areas
- Estimated Extent of total PCB soil impact > 1ppm and <= 50 ppm and/or other COCs exceeding applicable statewide Health Standards
- Estimated extent of total PCB soil impact > 50 ppm
- > 1 ppm to <= 50 ppm Total PCBs
- > 50 ppm Total PCBs
- COC's > MSCs
- Soil Boring
- Direct Push Well / Soil Boring
- Monitoring Well
- Sediment Sample
- Dirt Road
- Interior Wall
- Approx. Site Boundary
- Railroad
- Edge of Pavement
- AST
- Former Storage
- NVF Property
- NVF Building
- Retention Pond
- Vegetation

Data Sources:  
 Howell Kline Surveying, LLC  
 State of Pennsylvania DCOCs  
 EA CAD Drawing: "2037-Geoprobe Locations.pdf"  
 NVF Company  
 Map Projection: NAD\_1983\_UTM\_Zone\_18N

**Environmental Alliance, Inc.**  
 660 Yorklyn Road - Hockessin, Delaware 19707  
 Phone: (302) 234-4400 - Fax: (302) 234-1535

**NVF Facility**  
**Kennett Square, PA**  
**Proposed Remediation Areas**

DRAWN BY: SKJ	FILE NAME: 2307-Proposed Remediation Areas.mxd	SCALE: SEE DRAWING	FIGURE NO: <b>7</b>
APPROVED BY:	PROJECT NO: 2307	DATE: 06/24/2010	

## Appendix I

### Notice of Intent to Remediate



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
BUREAU OF WASTE MANAGEMENT

## NOTICE OF INTENT TO REMEDIATE

Act 1995-2 requires 4 general informational items to be included in the NIR: the general location, listing of contaminants, intended use of the property, and proposed remediation measures. In addition attach a site map if available.

Property Name Former NVF Company

Address/Location 400 W. Mulberry Street

City Kennett Square Borough Zip Code 19348

Municipality (if more than one, list all) Kennett Square Borough

County Chester

Latitude 39 °(deg.) 50 '(min) 31.6 "(sec) Longitude 75 °(deg.) 42 '(min) 59.4 "(sec)

Horizontal Collection Method: Interpolation of aerial photo using ARC GIS software

Horizontal Reference Datum: NAD 83 Reference Point: N/A

Wish to participate in the DEP/EPA MOA:

Contact Dave Hess at [dahess@state.pa.us](mailto:dahess@state.pa.us) for details.

EPA ID Number, if known: N/A

**Provide a general description of the site contamination in plain language (e.g. fuel oil spill, historical chemical industrial area contamination), the names of any known primary contaminants to be addressed, and the intended future use of the property:** The property was historically a manufacturer of laminated composite plastic materials. The site soils were contaminated primarily by polychlorinated biphenyls (PCBs), and to a lesser extent by arsenic, lead and polynuclear aromatic hydrocarbons (PAHs). Groundwater is contaminated by volatile organic compounds (VOCs) including toluene, trichlorethylene, tetrachlorethylene, benzene, and dichloromethane. Additionally, groundwater contains PCBs (although the presence of PCBs in groundwater is believed to be the result of sediment in the groundwater samples), and select metals (antimony, nickel, thallium).

**Provide a general description of proposed remediation measures:** Development of the property will include removal and offsite disposal of PCB contaminated soil at levels above 50 ppm, and relocation and capping of other contaminated soils consistent with a pathway elimination remedy. The cleanup standards to be used will include a combination of Site-Specific and Statewide Health standards. A deed restriction will be emplaced to ensure that contaminated soils do not come into contact with future site users and residents. Additionally, the future use of groundwater will be restricted by institutional controls.

Will remediation be to a site-specific standard  or as a special industrial area ? If so, the municipality or municipalities must be provided 30-day comment period.

Remediator/Property Owner/Consultant. For each of these recipients of the approval of the final report, complete form below.

<b>Remediator</b>
Contact Person: George Beer
Relationship to site (e.g. owner, remediator, participating in cleanup, consultant): Owner
Phone Number: 302-235-2500
Company Name: Rockhopper, LLP
Address (street, city, state, zip): 722 Yorklyn Rd., Hockessin, DE 19707
Email Address: gbeer@delvaldevco.com
<b>Property Owner</b>
Contact Person: George Beer
Relationship to site (e.g. owner, remediator, participating in cleanup, consultant): Owner
Phone Number: 302-235-2500
Company Name: Rockhopper, LLP
Address (street, city, state, zip): 722 Yorklyn Rd., Hockessin, DE 19707
Email Address: gbeer@delvaldevco.com
<b>Consultant</b>
Contact Person: Paul Miller, P.E.
Relationship to site (e.g. owner, remediator, participating in cleanup, consultant): Consultant
Phone Number: 302-234-4400
Company Name: Environmental Alliance, Inc.
Address (street, city, state, zip): 660 Yorklyn Rd., Hockessin, DE 19707
Email Address: pmiller@envalliance.com

**Preparer of Notice of Intent to Remediate:**

Name: Paul Miller, P.E.

Title: Principal Engineer

Address: Environmental Alliance, Inc.  
660 Yorklyn Rd., Hockessin, DE 19707

Telephone: 302-234-4400

Email Address: pmiller@envalliance.com

**Email Image File of Site Map showing property lines and general area of site(s) to be remediated to:**  
(landrecycling@state.pa.us)



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
BUREAU OF WASTE MANAGEMENT

## NOTICE OF INTENT TO REMEDIATE INSTRUCTIONS

These instructions pertain to the Notice of Intent to Remediate (NIR). The NIR is a fill-in-the blank, check block, and brief narrative form. Complete the form to the extent that the particular information requested is known. Additional information may be attached with the NIR submission if desired. The procedures for submission of the NIR and notification requirements are detailed in the Land Recycling Technical Guidance Manual. You are encouraged to use the technical guidance provided in this manual when conducting site assessments.

### Property Name

This is the name the property, where the site(s) is located and is known by, especially if designated so in a permit or official records. If there is more than one location with a similar name, more specific information should be included. If an existing name is not available, the site owners name or name of the person seeking the release of liability protection can be used.

### Address/Location

Street address of the property. Provide the mailing address if different than the street address. If the street address is not available, provide the location of the property by road name with directions and distances from an established reference point.

### Municipality

Name of all municipalities in which the site is located.

### County

Name of county in which the site is located.

### Latitude and Longitude

Indicate the latitude and longitude from the approximate center of the site. Show the latitude and longitude in degrees, minutes, and seconds. Indicate method used to acquire the location (Horizontal Collection Method); the Horizontal Reference Datum (NAD27 or NAD83) used in determining latitude and longitude coordinates; and the Reference Point. If more than one site is listed in the NIR and locations are not in the immediate vicinity, list separate latitude and longitudes.

### DEP/EPA MOA

Indicate if you wish to participate DEP/EPA MOA (also known as Pennsylvania One Cleanup Program) for the site. Enter EPA ID Number, if known.

### General description

In a narrative, provide information concerning the site contamination, the names of any known primary contaminants to be addressed by the remediation, and the intended future use of the property.

### General description of proposed remediation measures

In a narrative, provide information concerning the proposed remediation measures to be performed.

### Site-specific standard or Special Industrial Area remediation

If known at the time of submission of the NIR, indicate if the site remediation will be to a site-specific standard or as a special industrial area. The municipality must be given a 30-day comment period if the remediation is to a site-specific standard or as a special industrial area remediation.

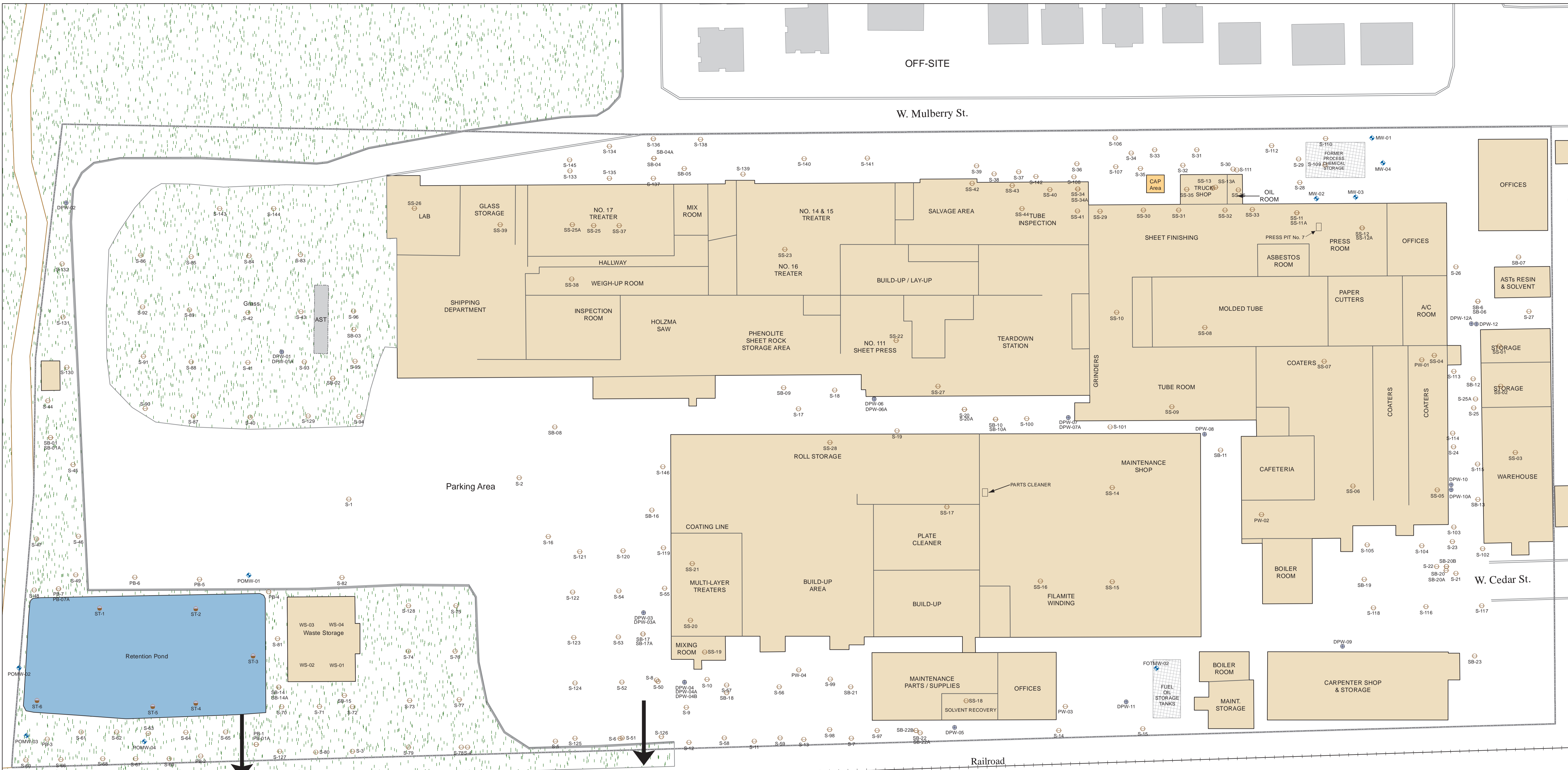
### Remediator/Property Owner/Consultant

For each of these categories provide the applicant name, site relationship (owner, remediator, consultant), phone number, company name, and address. These persons will be recipients of the approval of the final report.

**Preparer of Notice of Intent to Remediate**

Provide the name, title, address, and phone number of the person preparing the NIR. Indicate preparer name even if same as one listed above.

Submit an image file of the site showing property lines and general area of site(s) location to be remediated. Email to: [landrecycling@state.pa.us](mailto:landrecycling@state.pa.us)



OFF-SITE  
W. Mulberry St.

OFFICES

Parking Area

W. Cedar St.

Railroad

OFF-SITE

**DRAFT**

**Legend**

○ Soil Boring	— Dirt Road	▒ AST	■ NVF Building
⊕ Direct Push Well / Soil Boring	— Interior Wall	▒ Former Storage	■ Retention Pond
⊕ Monitoring Well	— Approx. Site Boundary	■ NVF Property	▒ Vegetation
● Sediment Sample	— Railroad	▒ Offsite Facility	
	— Edge of Pavement		

Data Sources:  
Howell Kline Surveying, LLC  
State of Pennsylvania DOQQs  
EA CAD Drawing: "2037-Geoprobe Locations.pdf"  
NVF Company  
Map Projection: NAD\_1983\_UTM\_Zone\_18N



Environmental Alliance, Inc.  
1812 Newport Gap Pike - Wilmington, DE 19808  
Phone: (302) 995-7544 - Fax: (302) 995-0941

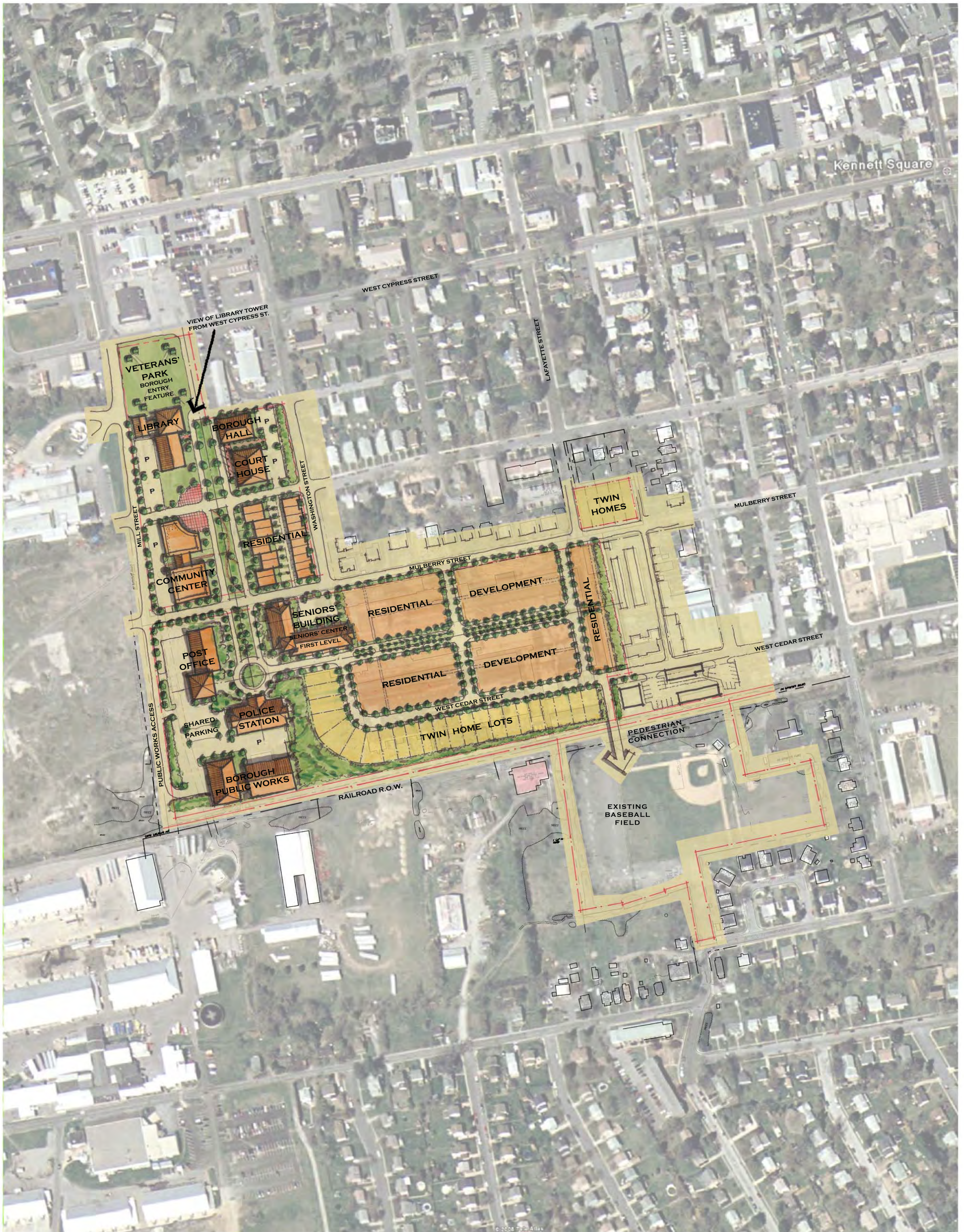
**NVF Facility  
Kennett Square, PA**

Site Base Map

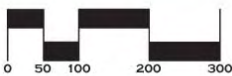
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APPROVED BY:	PROJECT NO: 2307	DATE: 04/04/2008	<b>1</b>

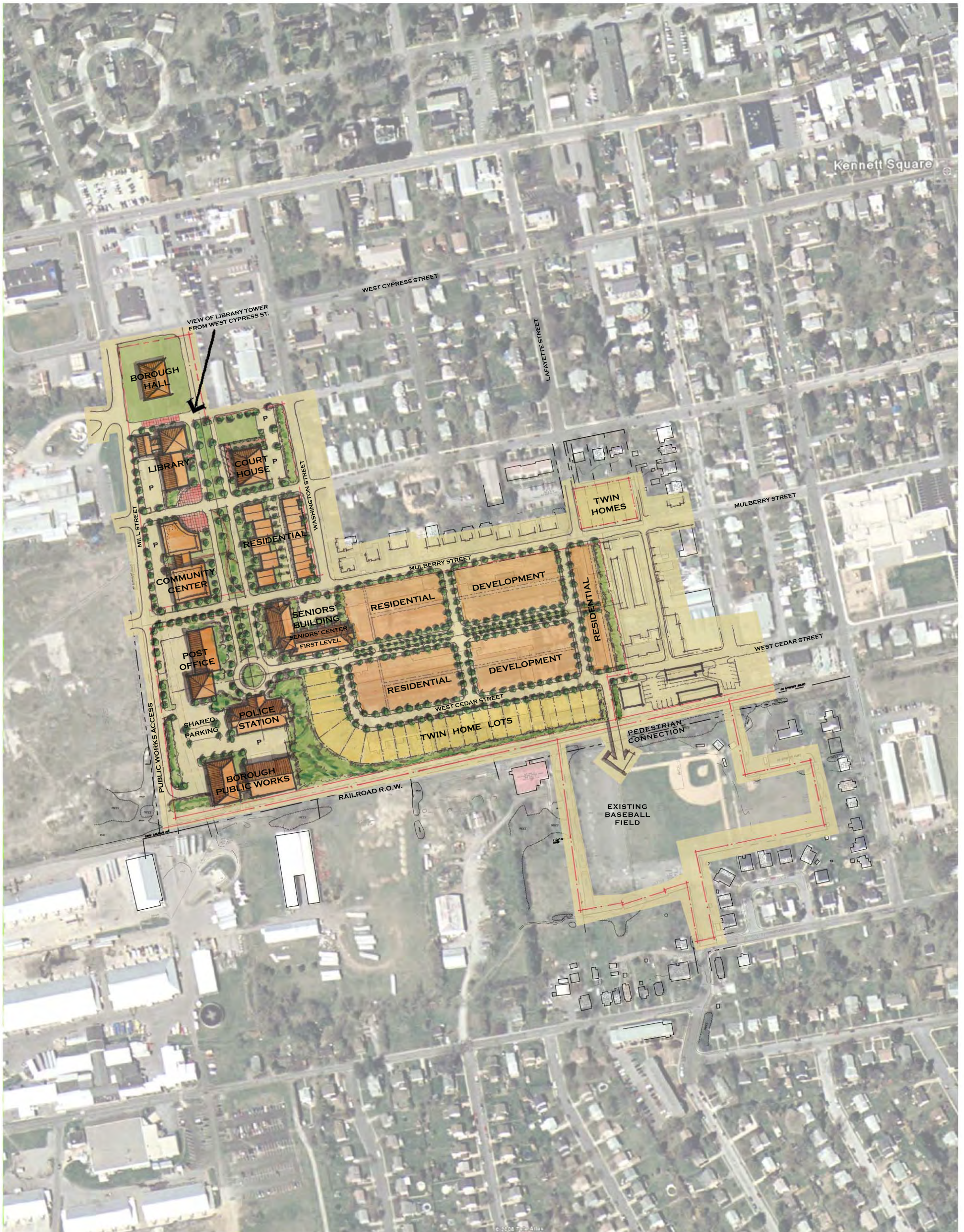
## Appendix II

### Proposed Development Conceptual Plans

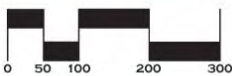


**PROPOSED DEVELOPMENT FRAMEWORK**  
 OPTION 2 - VETERANS' PARK ON WEST CYPRESS STREET





**PROPOSED DEVELOPMENT FRAMEWORK**  
 OPTION 3 - BOROUGH HALL ON WEST CYPRESS STREET



## Appendix III

### Health and Safety Plan

# HEALTH AND SAFETY PLAN

## **Former NVF Kennett Plant**

400 W. Mulberry St.

Kennett Square, PA

### **Prepared By:**

**ENVIRONMENTAL ALLIANCE, INC.**

**660 YORKLYN ROAD**

**HOCKESSIN, DE**

Project Manager: Paul Miller

Field Task Manager: Bob Kondelin

Health and Safety Representative: Matt Geary

**SITE EMERGENCY FORM**

Potential Contaminants of Concern: **PCBs, Solvents, Resins, Arsenic, Lead, PAHs**

Minimum Level of Protection: **Modified Level D**

Do not endanger your life. Survey the situation before taking any action.

Environmental Alliance Office Telephone: 302-234-4400

Site Location Address: 400 W. Mulberry St., Kennett Square, PA

Telephone Located at: Alliance Cell Phone

IN THE EVENT OF ANY EMERGENCY, CONTACT PROJECT  
MANAGER OR HEALTH AND SAFETY REPRESENTATIVE

**EMERGENCY PHONE NUMBERS:**

Ambulance: **911** Alliance Field Task Manager: Bob Kondelin 610-804-7250  
Fire: **911** Alliance Project Manager: Paul Miller 302-893-4179  
Police: **911** Alliance Health and Safety Rep: Matt Geary 610-368-1814  
Environmental Alliance Office, Hockessin, DE 302-234-4400  
Property owner contact: James Lisa Cell 302-373-3881  
George Beer, Rockhopper LLP office (Delaware Valley Development Corp) 302-235-2500

Bill Campbell former NVF VP 302-521-9006

Lloyd May former NVF maintenance manager 610-716-9777

**National Response Center (NRC): 1-800-424-8802**

The NRC should be contacted in the event of significant chemical release. Once notified, the NRC will activate a federal response to the spill. *Please confirm with the client and project manger to determine if spill should be reported.*

**Poison Control Center: 1-800-222-1222:**

The Poison Control Center should be contacted in the event of accidental poisoning. They will provide information on immediate treatment for the poisoning.

Hospital Name: Southern Chester County Medical Center

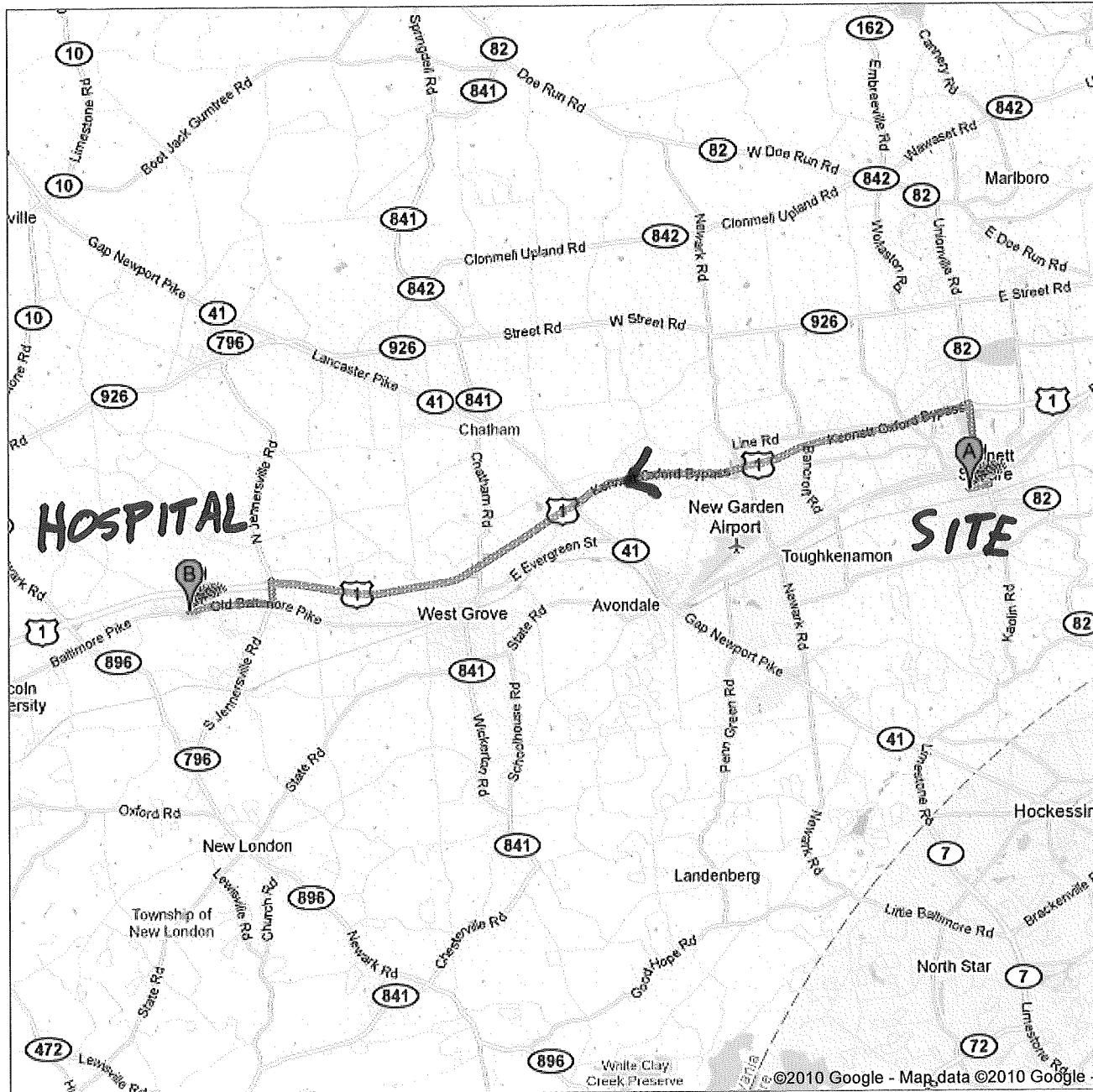

Hospital Phone: (610) 869-1212


Hospital Directions: See attached map and printed directions.






Google maps


Directions to 1011 Baltimore Pike, West Grove, PA 19390  
11.1 mi – about 17 mins

**Save trees. Go green!**  
Download Google Maps on your phone at [google.com/gmm](http://google.com/gmm)



 400 W Mulberry St, Kennett Square, PA 19348

- 
1. Head **east** on **W Mulberry St/S Washington St** toward **Lafayette St**  
Continue to follow W Mulberry St  
About 1 min  
go 0.2 mi  
total 0.2 mi
  -  2. Turn **left** at **PA-82 N/S Union St**  
Continue to follow PA-82 N  
About 4 mins  
go 1.0 mi  
total 1.2 mi
  -  3. Turn **left** to merge onto **US-1 S/Kennett Oxford Bypass**  
About 9 mins  
go 8.5 mi  
total 9.7 mi
  -  4. Take the **PA-796/Jannersville** exit  
go 0.2 mi  
total 9.9 mi
  -  5. Turn **left** at **PA-796 S/N Jennersville Rd**  
About 2 mins  
go 0.3 mi  
total 10.2 mi
  -  6. Slight **right** at **Old Baltimore Pike**  
About 1 min  
go 0.6 mi  
total 10.8 mi
  7. Continue onto **Baltimore Pike**  
Destination will be on the left  
go 0.3 mi  
total 11.1 mi

 1011 Baltimore Pike, West Grove, PA 19390

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2010 Google

Directions weren't right? Please find your route on [maps.google.com](http://maps.google.com) and click "Report a problem" at the bottom left.

## **FIRST AID FOR EMERGENCIES**

**Ingestion:** DO NOT INDUCE VOMITING. Call Poison Control; follow instructions. Administer CPR, if necessary. Seek medical attention.

**Inhalation:** Remove person from contaminated environment. DO NOT ENTER A CONFINED SPACE TO RESCUE SOMEONE WHO HAS BEEN OVERCOME UNLESS PROPERLY EQUIPPED AND A STANDBY PERSON IS PRESENT. Administer CPR if necessary. Seek medical attention.

**Skin Contact:** Brush off dry material, remove wet or contaminated clothing. Flush skin thoroughly with water. Seek medical attention if irritation persists.

**Eye Contact:** Headache, dizziness, nausea, drowsiness, irritation of eyes, nose, throat, breathing difficulties.

**Exposure Symptoms:** Headache, dizziness, nausea, drowsiness, irritation of eyes, nose, throat, breathing difficulties.

**Contingency Plan:** Report incident to Project Manager and Health and Safety Manager after emergency procedures have been implemented.

**EMERGENCY FIRST AID**

1. Survey the situation. Do not endanger your own life. **DO NOT ENTER A CONFINED SPACE TO RESCUE SOMEONE WHO HAS BEEN OVERCOME UNLESS PROPERLY EQUIPPED AND A STANDBY PERSON IS PRESENT.**
2. Call 911 (if available) or the fire department **IMMEDIATELY**. Explain the physical injury, chemical exposure, fire, or release.
3. Decontaminate the victim without delaying life-saving procedures.
4. If the victim's condition appears to be non-critical, but seem to be more severe than minor cuts, he/she should be transported to the nearest hospital by trained Emergency Medical Services (EMS) personnel: Let the doctor assume the responsibility for determining the severity of the injury. If the condition is obviously serious, EMS must transport the victim.
5. Notify the Project Manager and the Health and Safety Manager. Complete the Preliminary Incident Report Form within 24 hours.

<b>EMERGENCY FIRST AID PROCEDURES</b>	
<b>To Stop Bleeding</b>	<b>Cardiopulmonary Resuscitation (CPR)</b>
<ol style="list-style-type: none"> <li>1. Give medical statement only if qualified.</li> <li>2. Assure airway, breathing, circulation.</li> <li>3. Use <b>DIRECT PRESSURE</b> over the wound with clean dressing or your hand (use non-permeable gloves). Direct pressure will control most bleeding.</li> <li>4. Bleeding from an artery or several injury sites may require <b>DIRECT PRESSURE</b> on a <b>PRESSURE POINT</b>. Use pressure points for 30-60 seconds to help control severe bleeding.</li> <li>5. Continue primary care and seek medical aid as needed.</li> </ol>	<ol style="list-style-type: none"> <li>1. Call for help.</li> <li>2. Arousal: Check for consciousness.</li> <li>3. Open airway with chin-lift.</li> <li>4. Look, listen, and feel for breathing.</li> <li>5. If breathing is absent, give 2 slow, full rescue breaths.</li> <li>6. Check the pulse for 5 to 10 seconds.</li> <li>7. If pulse is present, continue rescue breathing: <b>1 breath every 5 seconds.</b></li> <li>8. If pulse is absent, start CPR: 15 compressions, 2 breaths (1 man).</li> </ol>

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## APPENDICES

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- C: Preliminary Incident Report Form
- D: Chemicals of Concern List
  - 1. MSDS Definitions
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## 1.0 INTRODUCTION

Environmental Alliance, Inc. (Alliance) was retained to perform environmental services at the Sauer Dump project site located at 4225 Lynhurst Road, Dundalk Maryland. (Refer to Appendix D for a Site Map)

The Site Safety Plan is written to ensure the well-being of all field personnel and the community surrounding the site. Accordingly, project staff and approved Alliance subcontractors must follow the policies and procedures established in the Site Safety Plan. All personnel assigned to this project must sign the Agreement and Acknowledgment Sheet (Appendix E) to confirm that they understand and agree to abide by the provisions of the plan.

All work will comply with the OSHA Standard, "Hazardous Waste Operations and Emergency Response," (29 CFR 1910.120) and other federal, state and local procedures that require the development and implementation of a Site Safety Plan.

This plan addresses the safety issues associated with environmental services typically involving the following site tasks:

- Field Survey/Walkover
- Well Installation
- Well Monitoring and Maintenance
- Brush Clearing
- Sediment Sampling
- Drilling/Boring/Soil Sampling
- Excavation/Trenching (Test Pits)
- Groundwater Sampling

All activities of this project will be carried out under Modified Level D or Level C Personal Protective Equipment (PPE). This Site Safety Plan must be modified or amended when circumstances or conditions develop that are beyond the scope of routine operations.

Table 1-1 presents an overview of the Alliance health and safety programs in which all field personnel are required to participate. These include the medical surveillance and comprehensive training programs in accordance with OSHA Hazardous and Emergency Response regulation, 29 CFR 1910.120.

**TABLE 1-1  
ENVIRONMENTAL ALLIANCE, INC.  
HEALTH AND SAFETY PROGRAMS**

Activity	Description	Action
<p><b><u>Medical Surveillance</u></b></p>	<ul style="list-style-type: none"> <li>◆ The program tracks the physical condition of the Company's employees in compliance with DOT and OSHA regulations, and other customer requirements.</li> <li>◆ Specific components of the medical surveillance program are described in Environmental Alliance's Health and Safety Procedure Manual.</li> </ul>	<ul style="list-style-type: none"> <li>◆ Medical examinations and consultations are completed for all employees prior to assignment, annually, upon termination, and in the event of injury and/or illness resulting from exposure at the work site.</li> </ul>
<p><b>Training</b></p>	<ul style="list-style-type: none"> <li>◆ Training requirements and programs comply with the OSHA Hazardous Waste Operations and Emergency Response regulation, 29 CFR 1910.120.</li> </ul>	<ul style="list-style-type: none"> <li>◆ Field personnel must complete a minimum of 40 hours of hazardous waste activity instruction.</li> <li>◆ Field personnel must complete a minimum of three days supervised field instruction.</li> <li>◆ Field personnel assigned to the site will also receive eight hours of refresher training each year.</li> <li>◆ On-site managers and supervisors directly responsible for employees engaged in hazardous waste operations receive an additional eight hours of supervisory training.</li> </ul>

## 2.0 HAZARD IDENTIFICATION AND CONTROL

Precautions must be taken to prevent injuries and exposures to the following potential hazards.

<b>TABLE 2-1 POTENTIAL HAZARDS AND CONTROL</b>	
<b>Potential Hazard</b>	<b>Control</b>
Exposure to Contaminants (AP, Inorganics, and VOC's if necessary)	<ol style="list-style-type: none"> <li>1. Stand up-wind of petroleum products whenever possible.</li> <li>2. Minimize contact and contact time with petroleum products.</li> <li>3. Avoid walking through discolored areas, puddles, leaning on drums, or contacting anything that is likely to be contaminated.</li> <li>4. Do not eat, drink, smoke and/or apply cosmetics in the hot or warm zones.</li> <li>5. Wear gloves when in contact with contaminated surfaces.</li> <li>6. Safety glasses must be worn at a minimum.</li> <li>7. Splash goggles must be worn when working with liquids.</li> <li>8. &gt;10 ppm organic vapors in breathing zone requires evaluation by site supervisor to determine how to minimize exposure</li> <li>9. &gt;75 ppm organic vapors in breathing zone requires upgrade to Level C.</li> <li>10. &gt;750 ppm organic vapors in breathing zone requires upgrade from Level C to Level B.</li> <li>11. If unknown materials are encountered, call the HSR.</li> </ol>
Vehicular Traffic	<ol style="list-style-type: none"> <li>1. Wear traffic safety vest when vehicle hazard exists.</li> <li>2. Use cones, flags, barricades, and caution tape to define work area.</li> <li>3. Use vehicle to block work area.</li> <li>4. Engage police detail for high-traffic situations.</li> </ol>
Vault Entry	<ol style="list-style-type: none"> <li>1. Follow confined space entry procedures.</li> <li>2. Obtain confined space entry permit. Post sign.</li> <li>3. Remove vault cover using proper lifting techniques.</li> <li>4. Promote natural ventilation by opening the space to fresh air.</li> <li>5. Conduct remote air monitoring prior to entry.</li> <li>6. Have standby attendant if necessary.</li> <li>7. Enter if safe; conduct continuous air monitoring.</li> </ol>
Inclement Weather	<ol style="list-style-type: none"> <li>1. Stop outdoor work during electrical storms and other extreme weather conditions such as extreme heat or cold temperatures.</li> <li>2. Take cover indoors or in vehicle.</li> <li>3. Listen to local forecasts for warnings about specific weather hazards such as tornadoes, hurricanes and flash floods.</li> </ol>
Noise	<ol style="list-style-type: none"> <li>1. Wear hearing protection when equipment such as a drill rig, jackhammer, cut saw, air compressor, or blower or other heavy equipment is operating on the site.</li> <li>2. Wear hearing protection whenever you need to raise your voice above normal conversational speech due to a loud noise source; this much noise indicates the need for protection.</li> </ol>
Electric Shock	<ol style="list-style-type: none"> <li>1. Maintain appropriate distance from overhead utilities; <b>20-foot minimum clearance from power lines required; 10-foot minimum clearance from shielded power line.</b></li> <li>2. Use ground-fault circuit interrupters as required.</li> <li>3. Perform lockout/tagout procedures.</li> <li>4. Use three-pronged plugs and extension cords.</li> <li>5. Contact your local underground utility-locating service.</li> <li>6. Follow code requirements for electrical installations in hazardous locations.</li> </ol>

**TABLE 2-1  
POTENTIAL HAZARDS AND CONTROL**

<b>Potential Hazard</b>	<b>Control</b>
Physical Injury	<ol style="list-style-type: none"> <li>1. Wear hard hats and safety glasses when on site.</li> <li>2. Maintain visual contact with the equipment operator and wear orange safety vest when heavy equipment is used on site.</li> <li>3. Avoid loose-fitting clothing (driller and driller's helper).</li> <li>4. Prevent slips, trips and falls; keep work area uncluttered.</li> <li>5. Keep your hands away from moving parts (i.e. augers).</li> <li>6. Test the emergency shutoff switch on the drill rig daily.</li> </ol>
Back Injury	<ol style="list-style-type: none"> <li>1. Use a mechanical lifting device or a lifting aid where appropriate.</li> <li>2. If you must lift, plan the lift before doing it.</li> <li>3. Check your route for clearance.</li> <li>4. Bend at the knees and use leg muscles when lifting.</li> <li>5. Use the buddy system when lifting heavy or awkward objects.</li> <li>6. Do not twist your body while lifting.</li> </ol>
Head Stress	<ol style="list-style-type: none"> <li>1. Increase water intake while working.</li> <li>2. Increase number of rest breaks and/or rotate workers in shorter work shifts.</li> <li>3. Watch for signs and symptoms of heat exhaustion and fatigue.</li> <li>4. Plan work for early morning or evening during hot months.</li> <li>5. Use ice vests when necessary.</li> <li>6. Rest in cool, dry areas.</li> <li>7. In the event of heat stroke, bring the victim to a cool environment and initiate first aid procedures.</li> </ol>
Cold Stress	<ol style="list-style-type: none"> <li>1. Take breaks in heated shelters when working in extremely cold temperatures.</li> <li>2. Remove the outer layer of clothing and loosen other layers to promote evaporation of perspiration, upon entering the shelter.</li> <li>3. Drink warm liquids to reduce the susceptibility to cold stress.</li> </ol>
High Crime Areas	<ol style="list-style-type: none"> <li>1. Be aware of surroundings.</li> <li>2. Use the buddy system.</li> <li>3. Request police detail when appropriate.</li> </ol>
Insects	<ol style="list-style-type: none"> <li>1. Tuck pants into socks.</li> <li>2. Wear long sleeves.</li> <li>3. Use insect repellent.</li> </ol>
Poisonous Plants (such as poison ivy, oak or sumac)	<ol style="list-style-type: none"> <li>1. Don't enter areas infested with poisonous plants.</li> <li>2. Immediately wash any areas that come into contact with poisonous plants.</li> </ol>
Ladders	<ol style="list-style-type: none"> <li>1. Make sure ladder rungs are sturdy and free of cracks.</li> <li>2. Use ladders with secure safety feet.</li> <li>3. Pitch ladders at a 4:1 ratio.</li> <li>4. Secure ladders at the top when possible.</li> <li>5. Do not use ladders for access to air stripper towers.</li> <li>6. Use non-conductive ladders near electrical wires.</li> </ol>

**TABLE 2-1  
POTENTIAL HAZARDS AND CONTROL**

<b>Potential Hazard</b>	<b>Control</b>
Fire Control	<ol style="list-style-type: none"> <li>1. Smoke only in designated areas.</li> <li>2. Keep flammable liquids in closed containers.</li> <li>3. Keep site clean; avoid accumulating combustible debris such as paper.</li> <li>4. Follow Hot Work Safety Procedures when welding or performing other activities requiring an open flame.</li> <li>5. Isolate flammable and combustible materials from ignition sources.</li> <li>6. Ensure fire safety integrity of equipment installations according to Hazard Classification Diagram.</li> </ol>
Static Electricity	<ol style="list-style-type: none"> <li>1. Do not create static discharge in flammable atmospheres.</li> <li>2. Electrically bond and ground pumps transfer vessels, tanks, drums, bailers and probes, when moving liquids.</li> <li>3. Electrically bond and ground vacuum trucks and the tanks they are emptying.</li> <li>4. Do not splash fill containers with flammable liquids.</li> </ol>

### 3.0 AIR MONITORING AND CONFINED SPACE ENTRY

#### 3.1 Air Monitoring

Air monitoring must be performed on all sites in accordance with Alliance practices. Organic vapor concentrations are monitored in the field with a flame ionization detector (FID) or photoionization detector (PID). All readings are taken in the workers' breathing zone to determine whether an action level has been met and/or exceeded.

Air monitoring action levels (Table 3-1) have been developed by Alliance health and safety personnel to indicate the chemical concentrations in the breathing zone that require an upgrade in level of personal protective equipment (PPE). The action levels apply to all tasks performed on this site. Guidelines for frequency of air monitoring are presented in Table 3-2.

<b>TABLE 3-1 AIR MONITORING ACTION LEVELS</b>			
Instrument*	Function	Readings	Action
<b>Photoionization Detector (PID) , Flame Ionization Detector (FID)</b>		<b>Measures total organic vapors</b>	
		0-75 ppm	Level D required
		76-750 ppm	Upgrade to Level C
		>750 ppm	Stop work. Contact PM and HSR for guidance.
<b>Oxygen/Combustimeter (O<sub>2</sub>/LEL)</b>		<b>Measures oxygen levels (O<sub>2</sub>) and lower explosive limit (LEL)</b>	
		O <sub>2</sub> 19.5-22%	Acceptable conditions. Continue normal activity.
		O <sub>2</sub> <19.5	Ventilate the space. Notify PM or HSR if unable to achieve acceptable conditions.
		O <sub>2</sub> >22%	<b>Leave area immediately;</b> this atmosphere is extremely flammable. Notify PM or HSR.
		LEL <10%	Acceptable conditions. Continue normal activity.
		LEL >10%	<b>Leave area immediately.</b> Continue PM or HSR for guidance on venting and other safety measures.
*Note: Instruments must be calibrated according to manufacturer's recommendations.			

**TABLE 3-2  
AIR MONITORING FREQUENCY GUIDELINES**

Conduct periodic monitoring when: (1) it is possible that an IDLH condition or a flammable atmosphere has developed or (2) there is an indication that exposures may have risen over permissible exposure limits or published exposure levels since the last monitoring. Look for a possible rise in exposures associated with these situations:

- ◆ **Change in Site Area** - work begins on a different section of the site
- ◆ **Change in Contaminants** – handling contaminants other than those first identified
- ◆ **Change in On-Site Activity** – one operation ends and another begins
- ◆ **Handling Leaking Drums or Containers**
- ◆ **Working with Obvious Liquid Contamination** (e.g. a spill or lagoon)

Conduct air monitoring when the possibility of volatilization exists (such as with a new monitoring well or a well containing known product).

Conduct air monitoring on a well at a site known to have little contamination (documented by experience or laboratory data), **only** if an odor emanates from the well.

### 3.2 Confined Space Entry Procedures and Permit

Site work may require personnel to enter confined spaces. **No Alliance employee or subcontractor shall enter an area identified as a confined space without using the confined space entry procedures described in Table 3-3 and the site specific entry procedures presented in Table 3-4.** The purpose of the confined space entry procedure is to protect employees from potentially hazardous environments and to facilitate immediate rescue in an emergency situation. A Confined Space Entry Permit must be posted at the entrance to each confined space.

**TABLE 3-3  
CONFINED SPACES**

<b>Definition</b>
Any space which is large enough and so configured that an employee can bodily enter and perform site work.
<b>Examples</b>
Excavation pits, trenches, storage tanks, subsurface vaults, basements, silos, manholes, and sewers.
<b>Characteristics</b>
<ul style="list-style-type: none"> <li>◆ Limited or restricted access and egress.</li> <li>◆ Limited natural ventilation.</li> <li>◆ Not designed for continuous human occupancy.</li> </ul>
<b>Protocol for Confined Space Entry</b>
<ul style="list-style-type: none"> <li>◆ Perform the appropriate air monitoring activity at various depths in the space prior to entry. Monitor for: (1) oxygen level, (2) flammable vapors, and (3) toxic vapors.</li> <li>◆ Ventilate the atmosphere in the space so that entry may be made safely without respiratory protection. If this is not feasible, appropriate respiratory protection must be worn by authorized entrants and attendants.</li> <li>◆ Wear respiratory protection when ventilation alone can not achieve acceptable atmospheric levels of oxygen or flammable or toxic vapors.</li> </ul>



## 4.0 CHEMICAL HANDLING PROCEDURES

### 4.1 Chemical Handling Procedures

Personnel must practice the chemical-specific handling procedures outlined below.

TABLE 4-1 CHEMICAL HANDLING PROCEDURES		
Chemical	Description	Procedures
<p><b>Acids and Bases</b></p> <p>Acids: including hydrochloric, nitric and sulfuric acids</p> <p>Bases: including sodium hydroxide</p>	<p>Extremely corrosive materials with a variety of uses.</p>	<ul style="list-style-type: none"> <li>◆ Wear gloves and eye-splash protection while using acid dispensed from a small dropper bottle during water sampling.</li> <li>◆ Wear a full-face, air-purifying respirator equipped with combination cartridges (organic vapor/acid gas) as well as Tyvek coveralls and nitrile and/or NBR gloves for large volume applications.</li> <li>◆ Have an eye wash bottle or portable eye wash station on site.</li> <li>◆ Cap all drums after dispensing chemicals.</li> <li>◆ Do not add anything into a virgin chemical drum, including unused product.</li> <li>◆ Avoid mixing strong acids and bases. Consult HSR for task-specific evaluation. If mixing is absolutely necessary, do it slowly. Avoid vapors or fumes that are generated.</li> <li>◆ When diluting acids, add the acid to water in small quantities and mix cautiously.</li> <li>◆ When diluting bases, add water to the base in small quantities and mix cautiously.</li> </ul>
<p><b>Activated Carbon</b></p>	<p>Granular adsorbent medium used to remove residual hydrocarbons from water and/or air.</p>	<ul style="list-style-type: none"> <li>◆ Use respiratory protection when activated carbon creates a dusty environment.</li> <li>◆ Contact HSR for task-specific evaluation.</li> </ul>

## 4.2 Personal Protective Equipment (PPE)

*Modified Level D is the minimum acceptable level for sites where inorganic metals are the contaminants of concern.*

Level	Requirements
Modified Level D	<ul style="list-style-type: none"> <li>◆ Work uniform</li> <li>◆ Steel-toed boots</li> <li>◆ Approved safety glasses or goggles</li> <li>◆ Hard hat</li> <li>◆ Fluorescent vest, when vehicular traffic is on or adjacent to the site</li> <li>◆ Nitrile gloves for water sampling handling</li> <li>◆ PE-coated Tyvek® suit, NBR outer and nitrile inner gloves if skin contact with contaminants is possible.</li> </ul>
Level C	<ul style="list-style-type: none"> <li>◆ NIOSH-approved full-face respirator with organic vapor/acid gas cartridges</li> <li>◆ Work uniform</li> <li>◆ Steel-toed boots</li> <li>◆ Hard hat</li> <li>◆ PE-coated Tyvek® suit, NBR outer and nitrile inner gloves if skin contact with contaminants is possible.</li> </ul>

## 4.3 Site Control: Work Zones

Work zones will be established in order to: (1) delineate high-traffic location, (2) identify hazardous locations and (3) contain contamination within the smallest area possible. Employees entering the work zone must wear the proper personal protective equipment for that area. Work and support areas will be established based on ambient air data, necessary security measures, and site-specific conditions.

## 4.4 Decontamination Procedures

Operations conducted at this site have the potential to contaminate field equipment and personal protective equipment. To prevent the transfer of contamination to vehicles, administrative offices and personnel, the procedures presented in Table 4-3 must be followed.

**TABLE 4-3  
DECONTAMINATION PROCEDURES**

<b>Item</b>	<b>Example</b>	<b>Procedure</b>
Field Equipment	Bailers, interface probes, hand tools, drill augers and miscellaneous sampling equipment	Decontaminate with a solution of detergent and water; rinse with water prior to leaving the site.  Protect from exposure by covering with disposable covers such as plastic to minimize required decontamination activities.
Disposable PPE	Tyvek® suits, inner latex gloves, respirator cartridges	Dispose of according to the requirements of the client and state and federal agencies.
Nondisposable PPE	Respirators	Wipe out respirator with disinfecting pad prior to donning.  Decontaminate on site at the close of each day with a solution of an approved sanitizing powder and water.

#### 4.5 Chemicals of Concern

Site chemicals of concern are listed in Appendix D. MSDS sheets for chemicals of concern are included in Appendix D-2.

## **5.0 ADDITIONAL INFORMATION**

Additional health and safety reference materials for this site are located within Appendix H.

**APPENDIX A: AGREEMENT AND ACKNOWLEDGEMENT SHEET**

Environmental Alliance personnel have the authority to stop field activities at this site if any activity is not performed in accordance with the requirements of the Site Safety Plan. All Environmental Alliance project personnel, subcontractor personnel and visitors are required to sign the Agreement and Acknowledgement Sheet **prior** to conducting field activities at this site.

**APPENDIX A-2  
AGREEMENT AND ACKNOWLEDGEMENT SHEET**

1. I have been made aware of the contents of and fully understand the SSP and my responsibilities.
2. I agree to abide by the provisions of the SSP.

Name \_\_\_\_\_ Signature \_\_\_\_\_  
Company \_\_\_\_\_ Date \_\_\_\_\_

Name \_\_\_\_\_ Signature \_\_\_\_\_  
Company \_\_\_\_\_ Date \_\_\_\_\_

Name \_\_\_\_\_ Signature \_\_\_\_\_  
Company \_\_\_\_\_ Date \_\_\_\_\_

Name \_\_\_\_\_ Signature \_\_\_\_\_  
Company \_\_\_\_\_ Date \_\_\_\_\_

Name \_\_\_\_\_ Signature \_\_\_\_\_  
Company \_\_\_\_\_ Date \_\_\_\_\_

Name \_\_\_\_\_ Signature \_\_\_\_\_  
Company \_\_\_\_\_ Date \_\_\_\_\_

Name \_\_\_\_\_ Signature \_\_\_\_\_  
Company \_\_\_\_\_ Date \_\_\_\_\_

## **APPENDIX B: VISITOR/TRAINEE GUIDELINES**

Environmental Alliance, Inc. is committed to providing a safe environment on all work sites for visitors, trainees, employees and/or passersby. In order to accomplish this, the following guidelines must be followed.

### **1. VISITORS**

Any person not actively participating in the work at the site is regarded as a "visitor" and must follow Environmental Alliance's visitor/trainee guidelines. Visitors must be accompanied by a representative while on site.

Sites must be marked with signs, placards, and/or barricades to designate hazardous boundaries. Visitors will not be allowed on any site that is not adequately marked.

### **2. TRAINEES**

Trainees are employees of Environmental Alliance who have not yet completed the required safety training program (CRF 1910.120(e)). New hires and in-house company transfers will be considered trainees until safety training requirements are met.

Trainees will be informed of restrictions by their supervisor and must abide by them before visiting active sites.

Trainees will be permitted to visit Environmental Alliance sites as observers as long as the following conditions are met:

- Trainees are supervised at all times while observing on site.
- Trainees do not perform work functions of any type while on site.
- Trainees do not handle any equipment, tools and/or supplies while on site.
- Trainees do not enter any hazardous or hot zone or confined space areas while on site.

Supervisors will be responsible for informing trainees of the above conditions and for ensuring that the conditions are met. Supervisors will also ensure that trainees will not be asked to violate the conditions listed above.

A Trainee/Observer Agreement Form must be signed by both the trainee and the supervisor and placed on file in the Human Resources department.

**Infractions of the above agreement will be viewed as extremely serious and will be subject to discipline up to and including termination for either the trainee and/or supervisor.**

## TRAINEE/OBSERVER AGREEMENT FORM

Environmental Alliance is committed to providing a safe working environment for all employees. In addition, Environmental Alliance will comply with OSHA requirements for employee safety training prior to working on any hazardous site.

*The following section is to be filled out by trainee.*

Agreement between:

\_\_\_\_\_ and Environmental Alliance.  
Name (print/type) SS#

Because we have your safety in mind, you will be considered a trainee until all training criteria are met. This means you must complete all training requirements prior to performing work activities on site. As a requirement of the training program, you will be asked to visit Environmental Alliance sites as an observer. You must be supervised on all of these site visits.

As an on-site observer trainee, your signature below indicates your agreement to these restrictions.

**You may not:**

1. Perform work functions of any type.
2. Handle any equipment/tools and/or supplies of any type.
3. Enter any hazardous or hot zone areas.

I agree to adhere to the above conditions in all instances while on site as a trainee/observer.

\_\_\_\_\_  
Signature Date

*This section is to be filled out by supervisor.*

As supervisor to the above trainee, I agree to the above restrictions and agree not to request him/her to perform activities contrary to those restrictions.

\_\_\_\_\_  
Signature Date

**APPENDIX C: PRELIMINARY INCIDENT REPORT FORM**

**ENVIRONMENTAL ALLIANCE, INC.**

Person Completing Report:

Phone:

Today's Date:

Incident Date:

Time:            am / pm

Location:

Dept. #:

Type of Incident:

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Personal Injury/Illness | <input type="checkbox"/> Fire/Explosion   | <input type="checkbox"/> Chemical Exposure |
| <input type="checkbox"/> Unsafe Condition/Action | <input type="checkbox"/> Equipment Damage | <input type="checkbox"/> Customer Incident |
| <input type="checkbox"/> Property Damage         | <input type="checkbox"/> Spill/Release    | <input type="checkbox"/> Near Miss         |
| <input type="checkbox"/> Permit/Code Compliance  | <input type="checkbox"/> Newspaper/Radio/ | <input type="checkbox"/> Motor Vehicle     |
|  | <input type="checkbox"/> Television       |  |

Other \_\_\_\_\_

**Personal Injury**    Yes    No (If no, go to next section)

- First Aid Only    Hospitalization    Medical Treatment  
 Possible Injury, Not Confirmed

Person Injured:         GTI Employee         Subcontractor         Customer/Public/Other

Injured Name:

Telephone:

Office/Address:

Nature of Injury, Illness or Exposure:

Describe nature of incident, how it occurred, who was involved, witnesses and possible causal factors:

Describe actions taken and persons notified:

Manager Responsible for Follow-up:

Telephone:

Distributed To:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## INCIDENT REPORTING GUIDE

Incident Class	Class I: A minor incident that is dealt with at the local level.	Class II: A serious incident that requires notification within 24 hours	Class III: A highly significant incident requiring immediate notification and assistance
Examples of Incidents	<ul style="list-style-type: none"> <li>· First Aid injury</li> <li>· Minor damage to property (less than \$200)</li> <li>· Non-reportable quantity spill</li> <li>· Near miss incident</li> <li>· Unsafe condition or action</li> </ul> <p><b>Note: If there is a question as to Class I or II, follow Class II notification actions.</b></p>	<ul style="list-style-type: none"> <li>· Personal injury (more than first aid to employee, sub- contractor or public)</li> <li>· Vehicle accident involving injury or damage to vehicle or property</li> <li>· Damage to property greater than \$200 but less than \$10,000</li> <li>· Near miss incident that could have been very serious</li> <li>· Fire/Explosion</li> <li>· Non-emergency notification of regulatory agency is required</li> <li>· Served with subpoena (DO NOT ACCEPT)</li> </ul>	<ul style="list-style-type: none"> <li>· Hospitalization (of one or more persons)</li> <li>· Unprotected chemical exposure Death</li> <li>· Damage to property greater than \$10,000</li> <li>· Regulatory agency response to incident site</li> <li>· Multiple injury of employees, sub-contractors or public</li> <li>· Emergency notification of regulatory agency</li> <li>· Site visit from regulatory agency</li> <li>· Contact or appearance of news or public media</li> </ul>
Notification Actions	<ol style="list-style-type: none"> <li>1. On-scene person notifies Manager immediately by phone</li> <li>2. Provide PIR form to Manager within 24 hours</li> <li>3. Manager investigates and follows up</li> </ol>	<ol style="list-style-type: none"> <li>1. On-scene person notifies Manager immediately by phone</li> <li>2. Manager investigates</li> <li>3. Manager notifies supervisor and H&amp;S Manager with PIR form within 24 hours of the incident</li> <li>4. Manager provides a detailed final investigation report within 30 days to supervisor and H&amp;S Manager</li> </ol>	<ol style="list-style-type: none"> <li>1. On-scene person notifies Manager immediately by phone</li> <li>2. Manager immediately notifies supervisor and H&amp;S Manager by phone. PIR form is provided by fax immediately</li> <li>3. Incident management team conferences by phone and formulates an action plan</li> </ol>

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## **APPENDIX D: CHEMICALS OF CONCERN**

No. 6 Fuel Oil

Arsenic

Benzo(a)pyrene

Lead

Methyl Ethyl Ketone

PCBs

Phenolic Resin

Tetrachloroethylene (PCE)

Trichloroethylene (TCE)

Miscellaneous or unknown

## APPENDIX D-1: MSDS DEFINITIONS

**(TLV-TWA)** *Threshold Limit Value - Time Weighted Average.* The time-weighted average concentration for a normal 8-hour work day and a 40-hour work week, to which nearly all workers may be repeatedly exposed without adverse effect.

**(PEL)** Time-weighted average concentrations similar to (and in many cases derived from) the Threshold Limit Values.

**(REL)** *Recommended Exposure Limit* as defined by NIOSH similar to the Threshold Limit Values.

**(IDLH)** *Immediately dangerous to life or health* - Any atmospheric condition that poses an immediate threat to life, or which is likely to result in acute or immediate severe health effects. Oxygen deficiency is **IDLH**.

**(LEL)** *Lower Explosive Limit* - The minimum concentration of vapor in air below which propagation of a flame will not occur in the presence of an ignition source.

**(UEL)** *Upper Explosive Limit* - The maximum concentration of vapor in air above which propagation of a flame will not occur in the presence of an ignition source.

**Flash Point (F.P.)** The lowest temperature at which the vapor of a combustible liquid can be made to ignite momentarily in air.

**Vapor Pressure (V.P.)** The pressure characteristic at any given temperature of a vapor in equilibrium with its liquid or solid form, often expressed in millimeters of mercury (mm Hg).

**Odor Threshold** A property displayed by a particular compound. Low detection indicates a physiological sensation due to molecular contact with the olfactory nervous system (based on 50% of the population).

**Ionization Potential (I.P.)** The amount of ionization characteristic a particular chemical compound displays.

CONTAMINANTS PROFILE			
Chemical	Exposure Route	Symptoms of Overexposure	Incompatibilities
Gasoline	Inhalation	<input type="checkbox"/> Intense burning of mucous membranes, throat, and respiratory tract, flushing of face, staggering gait, slurred speech, mental confusion.	Oxidizing agents such as hydrogen peroxide, nitric acid.
	Ingestion	<input type="checkbox"/> Inebriation, drowsiness, blurred vision, dizziness, confusion, vomiting, cyanosis.	
	Skin Contact	<input type="checkbox"/> Prolonged skin contact may cause dermatitis	
Diesel Fuel Jet Fuel Fuel Oils	Inhalation and/or Ingestion	<input type="checkbox"/> Irritation to respiratory passages, headache, dizziness and nausea, vomiting, loss of coordination <input type="checkbox"/> Chemical pneumonitis (when oil is aspirated in the lungs)	Oxidizing agents such as hydrogen peroxide, nitric acid.
	Skin Contact	<input type="checkbox"/> Irritation, rash of acne pimples and spots	

## **APPENDIX D-2: MATERIAL SAFETY DATA SHEETS (MSDS)**

The following MSDS are for hazardous materials that will be encountered at this site. Contact your Health and Safety Representative if you need additional information on these materials.



# No. 6 Fuel Oil

## Material Safety Data Sheet

CITGO Petroleum Corporation  
P.O. Box 4689  
Houston, TX 77210

MSDS No. 17100  
Revision Date 2/16/2006

**IMPORTANT:** This MSDS is prepared in accordance with 29 CFR 1910.1200. Read this MSDS before transporting, handling, storing or disposing of this product and forward this information to employees, customers and users of this product.

Hazard Rankings		
	HMIS	NFPA
Health Hazard	* 2	2
Fire Hazard	1	1
Reactivity	0	0

\* = Chronic Health Hazard

### Emergency Overview

**Physical State** Liquid.  
**Color** Brown to black.      **Odor** Rotten eggs. (Hydrogen sulfide odor).

**WARNING:**  
Hydrogen Sulfide Gas can accumulate during long-term heated storage of this material.  
Hot product can cause burns.  
If burned by hot product, cool affected area immediately with cool water.  
Suspect cancer hazard.  
Mist or vapor can irritate the respiratory tract.  
Liquid contact can cause eye or skin irritation.  
Overexposure can cause central nervous system (CNS) depression and/or other target organ effects.  
Spills may create a slipping hazard.

### Protective Equipment

Minimum Recommended  
See Section 8 for Details



## SECTION 1. PRODUCT IDENTIFICATION

<b>Trade Name</b>	No. 6 Fuel Oil	<b>Technical Contact</b>	(800) 248-4684
<b>Product Number</b>	17100	<b>Medical Emergency</b>	(832) 486-4700
<b>CAS Number</b>	68476-33-5	<b>CHEMTREC Emergency (United States Only)</b>	(800) 424-9300
<b>Product Family</b>	Fuel.		
<b>Synonyms</b>	Delayed Coker Unit Feedstock; Residual Fuel Oil; Utility Fuel Oil; Long Resid; Cut Resid; Coker Unit Feed; No. 6 Grade Fuel Oil; Heavy Fuel Oil; Bunker Fuel; Bunker C		

## SECTION 2. COMPOSITION

This product may be composed, in whole or in part, of any of the following refinery streams:

- Clarified oils, petroleum, catalytic cracked [CAS No.: 64741-62-4]
- Hydrosulfurized middle distillate (petroleum) [CAS No.: 64742-80-9]
- Distillates, petroleum, hydrosulfurized light catalytic cracked [CAS No.: 68333-25-5]
- Straight-run middle distillate (petroleum) [CAS No.: 64741-44-2]
- Distillates, petroleum, light catalytic cracked [CAS No.: 64741-59-9]
- Residues, petroleum, atmospheric [CAS No.: 64741-45-3]
- Residues, petroleum, vacuum [CAS No.: 64741-56-6]

This product contains the following chemicals as components of the refinery streams listed above:

Component Name(s)	CAS Registry No.	Concentration (%)
-------------------	------------------	-------------------

## No. 6 Fuel Oil

Polynuclear Aromatic Hydrocarbons (4- to 6- member condensed rings)	Mixture	>5
Hydrogen sulfide	7783-06-4	<0.1

### SECTION 3. HAZARDS IDENTIFICATION

Also see Emergency Overview and Hazard Ratings on the top of Page 1 of this MSDS.

**Major Route(s) of Entry** Skin contact. Inhalation.

#### Signs and Symptoms of Acute Exposure

<b>Inhalation</b>	Hydrogen sulfide gas can evolve when this product is stored or handled at elevated temperatures. H <sub>2</sub> S can cause irritation and/or systemic effects. Mist or vapor can irritate the throat and lungs. Breathing this material may cause central nervous system depression with symptoms including nausea, headache, dizziness, fatigue, drowsiness, or unconsciousness.
<b>Eye Contact</b>	Hot material can cause burns to the eye. This material can cause eye irritation with tearing, redness, or a stinging or burning feeling. Effects may become more serious with repeated or prolonged contact.
<b>Skin Contact</b>	Hot material can cause burns to the skin. May cause skin irritation with redness, an itching or burning feeling, and swelling of the skin. Effects may become more serious with repeated or prolonged contact. Skin contact may cause harmful effects in other parts of the body.
<b>Ingestion</b>	Swallowing large amounts of this material may cause stomach or intestinal upset with pain, nausea, vomiting, and/or diarrhea. Swallowing this material may cause effects similar to those described in the inhalation section (see "inhalation" above).

**Chronic Health Effects Summary** This material, or a component of this material is a suspect cancer hazard and may cause cancer in humans. This material (or a component) may cause harm to the fetus including birth defects based on tests with laboratory animals. This material (or a component) is a mammalian somatic cell mutagen. See Toxicological Information (Section 11)

**Conditions Aggravated by Exposure** Disorders of the following organs or organ systems that may be aggravated by significant exposure to this material or its components include: Skin, Respiratory System

**Target Organs** May cause damage to the following organs: blood, kidneys, liver, spleen, upper respiratory tract, immune system, skin, central nervous system (CNS), eye, lens or cornea.  
Contains material which may cause damage to the following organs: lungs, mucous membranes, bladder

**Carcinogenic Potential** IARC has determined that residual (heavy) fuel oils are possibly carcinogenic to humans (Group 2B).

**OSHA Hazard Classification is indicated by an "X" in the box adjacent to the hazard title. If no "X" is present, the product does not exhibit the hazard as defined in the OSHA Hazard Communication Standard (29 CFR 1910.1200).**

OSHA Health Hazard Classification				OSHA Physical Hazard Classification			
Irritant	<input checked="" type="checkbox"/>	Sensitizer	<input type="checkbox"/>	Combustible	<input type="checkbox"/>	Explosive	<input type="checkbox"/>
Toxic	<input type="checkbox"/>	Highly Toxic	<input type="checkbox"/>	Flammable	<input type="checkbox"/>	Oxidizer	<input type="checkbox"/>
Corrosive	<input type="checkbox"/>	Carcinogenic	<input checked="" type="checkbox"/>	Compressed Gas	<input type="checkbox"/>	Organic Peroxide	<input type="checkbox"/>
						Pyrophoric	<input type="checkbox"/>
						Water-reactive	<input type="checkbox"/>
						Unstable	<input type="checkbox"/>

## No. 6 Fuel Oil

### SECTION 4. FIRST AID MEASURES

Take proper precautions to ensure your own health and safety before attempting rescue or providing first aid. For more specific information, refer to Exposure Controls and Personal Protection in Section 8 of this MSDS.

<b>Inhalation</b>	Move victim to fresh air. If victim is not breathing, immediately begin rescue breathing. If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately. Keep the affected individual warm and at rest.
<b>Eye Contact</b>	Check for and remove contact lenses. Flush eyes with cool, clean, low-pressure water while occasionally lifting and lowering eyelids. Seek medical attention if excessive tearing, redness, or pain persists.
<b>Skin Contact</b>	Remove contaminated shoes and clothing. Flush affected area with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. Do not use ointments. If skin surface is not damaged, clean affected area thoroughly with mild soap and water. Seek medical attention if tissue appears damaged or if pain or irritation persists.
<b>Ingestion</b>	Do not induce vomiting. If spontaneous vomiting is about to occur, place victim's head below knees. If victim is drowsy or unconscious, place on the left side with head down. Never give anything by mouth to a person who is not fully conscious. Do not leave victim unattended. Seek medical attention immediately.
<b>Notes to Physician</b>	INHALATION: Inhalation overexposure can produce toxic effects. Treat intoxications as hydrogen sulfide exposures. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis. Administer supplemental oxygen with assisted ventilation, as required.  Treat symptomatically.

### SECTION 5. FIRE FIGHTING MEASURES

<b>NFPA Flammability Classification</b>	NFPA Class-IIIB combustible material.		
<b>Flash Point</b>	Closed cup: >94°C (>200°F). (Estimated)		
<b>Lower Flammable Limit</b>	No data.	<b>Upper Flammable Limit</b>	No data.
<b>Autoignition Temperature</b>	Not determined.		
<b>Hazardous Combustion Products</b>	Carbon dioxide, carbon monoxide, smoke, fumes, unburned hydrocarbons and oxides of sulfur and/or nitrogen.		
<b>Special Properties</b>	This material will release vapors when heated above the flash point temperature that can ignite when exposed to a source of ignition. In enclosed spaces, vapors can ignite with explosive force. Mists or sprays may burn at temperatures below the flash point.		
<b>Extinguishing Media</b>	SMALL FIRE: Use dry chemicals, carbon dioxide, foam, or inert gas (nitrogen). Carbon dioxide and inert gas can displace oxygen. Use caution when applying carbon dioxide or inert gas in confined spaces. LARGE FIRE: Use foam, water fog, or water spray. Water fog and spray are effective in cooling containers and adjacent structures. However, water can cause frothing and/or may not extinguish the fire. Water can be used to cool the external walls of vessels to prevent excessive pressure, autoignition or explosion. DO NOT use a solid stream of water directly on the fire as the water may spread the fire to a larger area.		
<b>Protection of Fire Fighters</b>	Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.		

## No. 6 Fuel Oil

### SECTION 6. ACCIDENTAL RELEASE MEASURES

Take proper precautions to ensure your own health and safety before attempting spill control or clean-up. For more specific information, refer to the Emergency Overview on Page 1, Exposure Controls and Personal Protection in Section 8 and Disposal Considerations in Section 13 of this MSDS.

Do not touch damaged containers or spilled material unless wearing appropriate protective equipment. Slipping hazard; do not walk through spilled material. Stop leak if you can do so without risk. For small spills, absorb or cover with dry earth, sand, or other inert non-combustible absorbent material and place into waste containers for later disposal. Contain large spills to maximize product recovery or disposal. Prevent entry into waterways or sewers. In urban area, cleanup spill as soon as possible. In natural environments, seek cleanup advice from specialists to minimize physical habitat damage. This material will float on water. Absorbent pads and similar materials can be used. Comply with all laws and regulations.

### SECTION 7. HANDLING AND STORAGE

#### Handling

Avoid contact with oxidizing agents. Avoid repeated or prolonged skin contact or inhalation. Use only with adequate ventilation and personal protection. Wash thoroughly after handling. Prevent contact with food or tobacco products. Do not take internally. Empty containers may contain product residues that can ignite with explosive force. Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to flames, sparks, heat or other potential ignition sources. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers and/or waste residues of this product.

#### Storage

Keep container closed. Store in a cool, dry, well-ventilated area. Do not store with strong oxidizing agents. Do not store at elevated temperatures. Avoid storing product in direct sunlight for extended periods of time. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers or waste residues of this product.

### SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

#### Engineering Controls

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of mists and/or vapors below the recommended exposure limits (see below). An eye wash station and safety shower should be located near the work-station.

#### Personal Protective Equipment

Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations. The following pictograms represent the minimum requirements for personal protective equipment. For certain operations, additional PPE may be required.



#### Eye Protection

Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Chemical goggles should be worn during transfer operations or when there is a likelihood of misting, splashing, or spraying of this material. A suitable emergency eye wash water and safety shower should be located near the work station.

#### Hand Protection

Use gloves constructed of chemical resistant materials such as heavy nitrile rubber. Use heat-protective gloves when handling product at elevated temperatures.

## No. 6 Fuel Oil

- Body Protection** Use clean, chemical-resistant, full-body protective clothing. If significant contact occurs, remove oil-contaminated clothing immediately and promptly shower. Wash skin thoroughly with soap and water to remove hydrocarbon residues. Launder contaminated clothing before reuse or discard. Discard contaminated leather goods and boots. Wear heat protective boots and protective clothing when handling material at elevated temperatures.
- Respiratory Protection** For known vapor concentrations above the occupational exposure guidelines (see below), use a NIOSH-approved organic vapor respirator if adequate protection is provided. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134). For airborne vapor concentrations that exceed the recommended protection factors for organic vapor respirators, use a full-face, positive-pressure, supplied air respirator. Due to fire and explosion hazards, do not enter atmospheres containing concentrations greater than 10% of the lower flammable limit of this product.
- General Comments** Warning! Use of this material in spaces without adequate ventilation may result in generation of hazardous levels of combustion products and/or inadequate oxygen levels for breathing. Odor is an inadequate warning for hazardous conditions.

### Occupational Exposure Guidelines

Substance	Applicable Workplace Exposure Levels
Oil Mist, Mineral	<b>ACGIH (United States).</b> TWA: 5 mg/m <sup>3</sup> 8 hour(s). STEL: 10 mg/m <sup>3</sup> 15 minute(s). <b>OSHA (United States).</b> TWA: 5 mg/m <sup>3</sup> 8 hour(s).
Hydrogen sulfide	<b>ACGIH TLV (United States).</b> TWA: 10 ppm 8 hour(s). STEL: 15 ppm 15 minute(s). <b>OSHA (United States).</b> CEIL: 20 ppm 8 hour(s). STEL: 50 ppm 15 minute(s). Form: *10 minute peak; once per 8 hour shift

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES (TYPICAL)

<b>Physical State</b>	Liquid.	<b>Color</b>	Brown to black.	<b>Odor</b>	Rotten eggs. (Hydrogen sulfide odor).
<b>Specific Gravity</b>	0.95 to 1.03 (Water = 1) (Estimated.)	<b>pH</b>	Not applicable.	<b>Vapor Density</b>	>1 (Air = 1)
<b>Boiling Range</b>	260 to 590°C (500 to 1094°F)	<b>Melting/Freezing Point</b>	Not determined.		
<b>Vapor Pressure</b>	Not determined.	<b>Volatility</b>	Negligible volatility.		
<b>Solubility in Water</b>	Very slightly soluble in cold water. (<0.1 % w/w)	<b>Viscosity (cSt @ 40°C)</b>	Not determined.		
<b>Flash Point</b>	Closed cup: >94°C (>200°F). (Estimated)				
<b>Additional Properties</b>	No additional information.				

## No. 6 Fuel Oil

### SECTION 10. STABILITY AND REACTIVITY

<b>Chemical Stability</b>	Stable.	<b>Hazardous Polymerization</b>	Not expected to occur.
<b>Conditions to Avoid</b>	Keep away from heat, sparks and flame.		
<b>Materials Incompatibility</b>	Strong oxidizers.		
<b>Hazardous Decomposition Products</b>	Combustion gases may contain CO, CO <sub>2</sub> , oxides of sulfur and, depending upon the conditions, hydrogen sulfide.		

### SECTION 11. TOXICOLOGICAL INFORMATION

For other health-related information, refer to the Emergency Overview on Page 1 and the Hazards Identification in Section 3 of this MSDS.

<b>Toxicity Data</b>	<b>Polynuclear Aromatic Hydrocarbons (4- to 6- member condensed rings)</b>	
	ORAL (LD50):	Acute: >5000 mg/kg [Rat].
	DERMAL (LD50):	Acute: >2000 mg/kg [Rabbit].

Cancer is the most significant toxicity endpoint for PNAs. Certain PNA compounds are weak carcinogens which only become potent carcinogens after undergoing metabolism. Chronic or repeated exposure increases the likelihood of tumor initiation as well as the potential for metabolism of a PNA procarcinogen into a carcinogen. Increased incidence of tumors of the skin, bladder, lung and gastrointestinal tract have been described in individuals exposed to elevated concentrations of certain PNAs.

PNA compounds have been associated with photosensitivity and eye irritation. Inhalation exposures to PNA compounds have been associated with respiratory tract irritation, cough and bronchitis. Dermal exposures may cause precancerous lesions, erythema, dermal burns, photosensitivity, acneiform lesions and irritation. Oral exposure to some PNAs have been associated with precancerous growths of the mouth (leukoplakia). Also, mild nephrotoxicity, indicated by increased kidney size, congestion and renal cortical hemorrhages, plus elevated liver function tests and histopathologic abnormalities have occurred in rats following chronic ingestion.

#### **Hydrogen sulfide**

INHALATION (LC50): Acute: 444 ppm 1 hour(s) [Rat]. 673 ppm 1 hour(s) [Mouse]. Hydrogen Sulfide (H<sub>2</sub>S) has an unpleasant odor that diminishes with increased concentrations. Eye irritation can occur at concentrations above four ppm. Olfactory fatigue occurs rapidly at concentrations above 50. Accordingly, odor is not a reliable warning property. Symptoms increase with exposures above 50 ppm. Respiratory effects including irritation with possible pulmonary edema can occur with exposure above 50 ppm. At concentrations above 500 ppm, an immediate loss of consciousness, depressed respiration and death can occur. NIOSH has determined that H<sub>2</sub>S concentrations above 100 ppm are immediately dangerous to life and health.

#### **Gas Oil:**

Oils similar to this material have been shown to cause adverse effects in the liver and kidneys of laboratory rodents, and an increase in the incidence of fetal resorptions in pregnant laboratory rodents following prolonged and repeated exposure. Long-term repeated (lifetime) skin exposure to similar materials has been reported to result in an increase in skin tumors in laboratory rodents. The International Agency for Research on Cancer (IARC) has concluded that this category of untreated and mildly-treated oils are carcinogenic to humans.(Group 1).

## No. 6 Fuel Oil

### SECTION 12. ECOLOGICAL INFORMATION

<b>Ecotoxicity</b>	Extensive ecological toxicity study has been conducted for this product. The resultant water-accomodated fraction (WAF) is approximately 5 ppm under normal atmospheric conditions. The product is not readily toxic to algae, crustaceans, or fish.
<b>Environmental Fate</b>	This product is estimated to have a slow to moderate rate of biodegradation. Polynuclear aromatic hydrocarbons similar to certain components of this product can bioaccumulate in tissues of various aquatic organisms.


### SECTION 13. DISPOSAL CONSIDERATIONS

Hazard characteristic and regulatory waste stream classification can change with product use. Accordingly, it is the responsibility of the user to determine the proper storage, transportation, treatment and/or disposal methodologies for spent materials and residues at the time of disposition.

Maximize material recovery for reuse or recycling. If spill is introduced into a wastewater treatment system, chemical and biological oxygen demand will likely increase slowly. Spill material is biodegradable if gradually exposed to microorganisms, preferably in an aerobic environment with plenty of agitation. Potential treatment and disposal methods include land farming and incineration. Conditions of use may cause this material to become a "hazardous waste", as defined by federal or state regulations. It is the responsibility of the user to determine if the material is a "hazardous waste" at the time of disposal. Transportation, treatment, storage, and disposal of waste material must be conducted in accordance with RCRA regulations (see 40 CFR 260 through 40 CFR 271). State and/or local regulations may be more restrictive. Contact your regional US EPA office for guidance concerning case specific disposal issues.

### SECTION 14. TRANSPORT INFORMATION

The shipping description below may not represent requirements for all modes of transportation, shipping methods or locations outside of the United States.

<b>US DOT Status</b>	Not a DOT controlled material (United States).		
<b>Proper Shipping Name</b>	Not applicable.		
<b>Hazard Class</b>	Not applicable	<b>Packing Group</b>	Not applicable.
		<b>UN/NA Number</b>	Not available.
<b>Reportable Quantity</b>	A Reportable Quantity (RQ) has not been established for this material.		
<b>Placard(s)</b>		<b>Emergency Response Guide No.</b>	Not applicable.
		<b>MARPOL III Status</b>	Not a DOT "Marine Pollutant" per 49 CFR 171.8.

## No. 6 Fuel Oil

### SECTION 15. REGULATORY INFORMATION

<b>TSCA Inventory</b>	This product and/or its components are listed on the Toxic Substances Control Act (TSCA) inventory.
<b>SARA 302/304 Emergency Planning and Notification</b>	The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to Subparts 302 and 304 to submit emergency planning and notification information based on Threshold Planning Quantities (TPQs) and Reportable Quantities (RQs) for "Extremely Hazardous Substances" listed in 40 CFR 302.4 and 40 CFR 355. No components were identified.
<b>SARA 311/312 Hazard Identification</b>	The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to this subpart to submit aggregate information on chemicals by "Hazard Category" as defined in 40 CFR 370.2. This material would be classified under the following hazard categories: Acute (Immediate) Health Hazard, Chronic (Delayed) Health Hazard
<b>SARA 313 Toxic Chemical Notification and Release Reporting</b>	This product contains the following components in concentrations above <i>de minimis</i> levels that are listed as toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA: Polynuclear Aromatic Hydrocarbons (4- to 6- member condensed rings) [CAS No.: 68487-58-6] Concentration: 5%
<b>CERCLA</b>	The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center concerning release of quantities of "hazardous substances" equal to or greater than the reportable quantities (RQ's) listed in 40 CFR 302.4. As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically designated in 40 CFR 302.4. Chemical substances present in this product or refinery stream that may be subject to this statute are: Hydrogen sulfide [CAS No.: 7783-06-4] RQ = 100 lbs. (45.36 kg) Concentration: <0.1%
<b>Clean Water Act (CWA)</b>	This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.
<b>California Proposition 65</b>	This material may contain the following components which are known to the State of California to cause cancer, birth defects or other reproductive harm, and may be subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5): Polynuclear Aromatic Hydrocarbons (4- to 6- member condensed rings): >5%
<b>New Jersey Right-to-Know Label</b>	For New Jersey R-T-K labeling requirements, refer to components listed in Section 2.
<b>Additional Remarks</b>	No additional regulatory remarks.

### SECTION 16. OTHER INFORMATION

Refer to the top of Page 1 for the HMIS and NFPA Hazard Ratings for this product.

#### REVISION INFORMATION

Version Number 2.0  
Revision Date 2/16/2006

#### ABBREVIATIONS

AP: Approximately EQ: Equal >: Greater Than <: Less Than  
ACGIH: American Conference of Governmental Industrial Hygienist

NA: Not Applicable ND: No Data NE: Not Established  
AIHA: American Industrial Hygiene Association

## No. 6 Fuel Oil

IARC: International Agency for Research on Cancer  
NIOSH: National Institute of Occupational Safety and Health  
NPCA: National Paint and Coating Manufacturers Association  
NFPA: National Fire Protection Association

NTP: National Toxicology Program  
OSHA: Occupational Safety and Health Administration  
HMIS: Hazardous Materials Information System  
EPA: US Environmental Protection Agency

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**Eco-USA: Toxics: Chemicals: Arsenic**

## Arsenic

### Disclaimer

### Introduction

**Arsenic** is a naturally occurring element that is widely distributed in the Earth's crust. Arsenic is classified chemically as a metalloid, having both properties of a metal and a nonmetal; however, it is frequently referred to as a metal. Elemental arsenic (sometimes referred to as metallic arsenic) is a steel grey solid material. However, arsenic is usually found in the environment combined with other elements such as oxygen, chlorine, and sulfur. Arsenic combined with these elements is called inorganic arsenic. Arsenic combined with carbon and hydrogen is referred to as organic arsenic.

Most inorganic and organic arsenic compounds are white or colorless powders that do not evaporate. They have no smell, and most have no special taste. Thus, you usually cannot tell if arsenic is present in your food, water, or air.

Inorganic arsenic occurs naturally in soil and in many kinds of rock, especially in minerals and ores that contain copper or lead. When these ores are heated in smelters, most of the arsenic goes up the stack and enters the air as a fine dust. Smelters may collect this dust and take out the arsenic as a compound called arsenic trioxide (As<sub>2</sub>O<sub>3</sub>). However, arsenic is no longer produced in the United States; all of the arsenic used in the United States is imported.

Presently, about 90% of all arsenic produced is used as a preservative for wood to make it resistant to rotting and decay. The preservative is copper chromated arsenate (CCA) and the treated wood is referred to as "pressure-treated." In 2003, U.S. manufacturers of wood preservatives containing arsenic began a voluntary transition from CCA to other wood preservatives that do not contain arsenic in wood products for certain residential uses, such as play structures, picnic tables, decks, fencing, and boardwalks. This phase out was completed on December 31, 2003; however, wood treated prior to this date could still be used and existing structures made with CCA-treated wood would not be affected. CCA-treated wood products continue to be used in industrial applications. It is not known whether, or to what extent, CCA-treated wood products may contribute to exposure of people to arsenic.

In the past, inorganic arsenic compounds were predominantly used as pesticides, primarily on cotton fields and in orchards. Inorganic arsenic compounds can no longer be used in agriculture. However, organic arsenic compounds, namely cacodylic acid, disodium methylarsenate (DSMA), and monosodium methylarsenate (MSMA), are still used as pesticides, principally on cotton. Some organic arsenic compounds are used as additives in animal feed. Small quantities of elemental arsenic are added to other metals to form metal mixtures or alloys with improved properties. The greatest use of arsenic in alloys is in lead-acid batteries for automobiles. Another important use of arsenic compounds is in semiconductors and light-emitting diodes.

### Fate and Transport

Arsenic occurs naturally in soil and minerals and it therefore may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching. Volcanic eruptions are another source of arsenic. Arsenic is associated with ores containing metals, such as copper and lead. Arsenic may enter the environment during the mining and smelting of these ores. Small amounts of arsenic also may be released into the atmosphere from coal-fired power plants and incinerators because coal and waste products often contain some arsenic.

Arsenic cannot be destroyed in the environment. It can only change its form, or become attached to or separated from particles. It may change its form by reacting with oxygen or other molecules present in air, water, or soil, or by the action of bacteria that live in soil or sediment. Arsenic released from power plants and other combustion processes is usually attached to very small particles. Arsenic contained in wind-borne soil is generally found in larger particles. These particles settle to the ground or are washed out of the air by rain. Arsenic that is attached to very small particles may stay in the air for many days and travel

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## Arsenic

long distances. Many common arsenic compounds can dissolve in water. Thus, arsenic can get into lakes, rivers, or underground water by dissolving in rain or snow or through the discharge of industrial wastes. Some of the arsenic will stick to particles in the water or sediment on the bottom of lakes or rivers, and some will be carried along by the water. Ultimately, most arsenic ends up in the soil or sediment. Although some fish and shellfish take in arsenic, which may build up in tissues, most of this arsenic is in an organic form called arsenobetaine (commonly called "fish arsenic") that is much less harmful.

### Exposure Pathways

Since arsenic is found naturally in the environment, you will be exposed to some arsenic by eating food, drinking water, or breathing air. Children may also be exposed to arsenic by eating soil. Analytical methods used by scientists to determine the levels of arsenic in the environment generally do not determine the specific form of arsenic present. Therefore, we do not always know the form of arsenic a person may be exposed to. Similarly, we often do not know what forms of arsenic are present at hazardous waste sites. Some forms of arsenic may be so tightly attached to particles or embedded in minerals that they are not taken up by plants and animals.

The concentration of arsenic in soil varies widely, generally ranging from about 1 to 40 parts of arsenic to a million parts of soil (ppm) with an average level of 3–4 ppm. However, soils in the vicinity of arsenic-rich geological deposits, some mining and smelting sites, or agricultural areas where arsenic pesticides had been applied in the past may contain much higher levels of arsenic. The concentration of arsenic in natural surface and groundwater is generally about 1 part in a billion parts of water (1 ppb), but may exceed 1,000 ppb in contaminated areas or where arsenic levels in soil are high. Groundwater is far more likely to contain high levels of arsenic than surface water. Surveys of U.S. drinking water indicate that about 80% of water supplies have less than 2 ppb of arsenic, but 2% of supplies exceed 20 ppb of arsenic. Levels of arsenic in food range from about 20 to 140 ppb. However, levels of inorganic arsenic, the form of most concern, are far lower. Levels of arsenic in the air generally range from less than 1 to about 2,000 nanograms (1 nanogram equals a billionth of a gram) of arsenic per cubic meter of air (less than 1–2,000 ng/m<sup>3</sup>), depending on location, weather conditions, and the level of industrial activity in the area. However, urban areas generally have mean arsenic levels in air ranging from 20 to 30 ng/m<sup>3</sup>.

You normally take in small amounts of arsenic in the air you breathe, the water you drink, and the food you eat. Of these, food is usually the largest source of arsenic. The predominant dietary source of arsenic is seafood, followed by rice/rice cereal, mushrooms, and poultry. While seafood contains the greatest amounts of arsenic, for fish and shellfish, this is mostly in an organic form of arsenic called arsenobetaine that is much less harmful. Some seaweeds may contain arsenic in inorganic forms that may be more harmful. Children are likely to eat small amounts of dust or soil each day, so this is another way they may be exposed to arsenic. The total amount of arsenic you take in from these sources is generally about 50 micrograms (1 microgram equals one-millionth of a gram) each day. The level of inorganic arsenic (the form of most concern) you take in from these sources is generally about 3.5 microgram/day. Children may be exposed to small amounts of arsenic from hand-to-mouth activities from playing on play structures or decks constructed out of CCA-treated wood. The potential exposure that children may receive from playing in play structures constructed from CCA-treated wood is generally smaller than that they would receive from food and water.

In addition to the normal levels of arsenic in air, water, soil, and food, you could be exposed to higher levels in several ways, such as the following:

- Some areas of the United States contain unusually high natural levels of arsenic in rock, and this can lead to unusually high levels of arsenic in soil or water. If you live in an area like this, you could take in elevated amounts of arsenic in drinking water. Children may be taking in higher amounts of arsenic because of hand-to-mouth contact or eating soil in areas with higher than usual arsenic concentrations.
- Some hazardous waste sites contain large quantities of arsenic. If the material is not properly disposed of, it can get into surrounding water, air, or soil. If you live near such a site, you could be exposed to elevated levels of arsenic from these media.
- If you work in an occupation that involves arsenic production or use (for example, copper or lead smelting, wood treating, or pesticide application), you could be exposed to elevated levels of arsenic during your work.
- If you saw or sand arsenic-treated wood, you could inhale some of the sawdust into your nose or throat. Similarly, if you burn arsenic-treated wood, you could inhale arsenic in the smoke.
- If you live in a former agricultural area where arsenic was used on crops, the soil could contain high levels of arsenic.
- In the past, several kinds of products used in the home (rat poison, ant poison, weed killer, some types of medicines) had arsenic in them. However, most of these uses of

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arsenic have ended, so you are not likely to be exposed from home products any longer.

### Metabolism

If you swallow arsenic in water, soil, or food, most of the arsenic may quickly enter into your body. The amount that enters your body will depend on how much you swallow and the kind of arsenic that you swallow. This is the most likely way for you to be exposed near a waste site. If you breathe air that contains arsenic dusts, many of the dust particles settle onto the lining of the lungs. Most of the arsenic in these particles is then taken up from the lungs into the body. You might be exposed in this way near waste sites where arsenic-contaminated soils are allowed to blow into the air, or if you work with arsenic-containing soil or products. If you get arsenic-contaminated soil or water on your skin, only a small amount will go through your skin into your body, so this is usually not of concern.

Both inorganic and organic forms leave your body in your urine. Most of the inorganic arsenic will be gone within several days, although some will remain in your body for several months or even longer. If you are exposed to organic arsenic, most of it will leave your body within several days.

### Health Effects

Inorganic arsenic has been recognized as a human poison since ancient times, and large oral doses (above 60,000 ppb in water which is 10,000 times higher than 80% of U.S. drinking water arsenic levels) can result in death. If you swallow lower levels of inorganic arsenic (ranging from about 300 to 30,000 ppb in water; 100–10,000 times higher than most U.S. drinking water levels), you may experience irritation of your stomach and intestines, with symptoms such as stomachache, nausea, vomiting, and diarrhea. Other effects you might experience from swallowing inorganic arsenic include decreased production of red and white blood cells, which may cause fatigue, abnormal heart rhythm, blood-vessel damage resulting in bruising, and impaired nerve function causing a "pins and needles" sensation in your hands and feet.

Perhaps the single-most characteristic effect of long-term oral exposure to inorganic arsenic is a pattern of skin changes. These include patches of darkened skin and the appearance of small "corns" or "warts" on the palms, soles, and torso, and are often associated with changes in the blood vessels of the skin. Skin cancer may also develop. Swallowing arsenic has also been reported to increase the risk of cancer in the liver, bladder, and lungs. The Department of Health and Human Services (DHHS) has determined that inorganic arsenic is known to be a human carcinogen (a chemical that causes cancer). The International Agency for Research on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans. EPA also has classified inorganic arsenic as a known human carcinogen.

If you breathe high levels of inorganic arsenic, then you are likely to experience a sore throat and irritated lungs. You may also develop some of the skin effects mentioned above. The exposure level that produces these effects is uncertain, but it is probably above 100 micrograms of arsenic per cubic meter ( $\mu\text{g}/\text{m}^3$ ) for a brief exposure. Longer exposure at lower concentrations can lead to skin effects, and also to circulatory and peripheral nervous disorders. There are some data suggesting that inhalation of inorganic arsenic may also interfere with normal fetal development, although this is not certain. An important concern is the ability of inhaled inorganic arsenic to increase the risk of lung cancer. This has been seen mostly in workers exposed to arsenic at smelters, mines, and chemical factories, but also in residents living near smelters and arsenical chemical factories. People who live near waste sites with arsenic may have an increased risk of lung cancer as well.

If you have direct skin contact with high concentrations of inorganic arsenic compounds, your skin may become irritated, with some redness and swelling. However, it does not appear that skin contact is likely to lead to any serious internal effects.

Almost no information is available on the effects of organic arsenic compounds in humans. Studies in animals show that most simple organic arsenic compounds (such as methyl and dimethyl compounds) are less toxic than the inorganic forms. In animals, ingestion of methyl compounds can result in diarrhea, and lifetime exposure can damage the kidneys. Lifetime exposure to dimethyl compounds can damage the urinary bladder and the kidneys.

### Effects on Children

Children are exposed to arsenic in many of the same ways that adults are. Since arsenic is found in the soil, water, food, and air, children may take in arsenic in the air

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they breathe, the water they drink, and the food they eat. Since children tend to eat or drink less of a variety of foods and beverages than do adults, ingestion of contaminated food or juice or infant formula made with arsenic-contaminated water may represent a significant source of exposure. In addition, since children often play in the soil and put their hands in their mouths and sometimes intentionally eat soil, ingestion of contaminated soil may be a more important source of arsenic exposure for children than for adults. In areas of the United States where natural levels of arsenic in the soil and water are high, or in areas in and around contaminated waste sites, exposure of children to arsenic through ingestion of soil and water may be significant. In addition, contact with adults who are wearing clothes contaminated with arsenic (e.g., with dust from copper- or lead-smelting factories, from wood-treating or pesticide application, or from arsenic-treated wood) could be a source of exposure. Because of the tendency of children to taste things that they find, accidental poisoning from ingestion of pesticides is also a possibility. Thus, although most of the exposure pathways for children are the same as those for adults, children may be at a higher risk of exposure because of normal hand-to-mouth activity.

Children who are exposed to inorganic arsenic may have many of the same effects as adults, including irritation of the stomach and intestines, blood vessel damage, skin changes, and reduced nerve function. Thus, all health effects observed in adults are of potential concern in children. There is also some evidence that suggests that long-term exposure to inorganic arsenic in children may result in lower IQ scores. We do not know if absorption of inorganic arsenic from the gut in children differs from adults.

There is some evidence that exposure to arsenic in early life (including gestation and early childhood) may increase mortality in young adults.

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

In animals, exposure to organic arsenic compounds can cause low birth weight, fetal malformations, and fetal deaths. The dose levels that cause these effects also result in effects in the mothers.

### Exposure Reduction

If your doctor finds that you have been exposed to substantial amounts of arsenic, ask whether your children might also have been exposed. Your doctor might need to ask your state health department to investigate.

Many communities may have high levels of arsenic in their drinking water, particularly from private wells, because of contamination or as a result of the geology of the area. The north central region and the western region of the United States have the highest arsenic levels in surface water and groundwater sources, respectively. Wells used to provide water for drinking and cooking should be tested for arsenic. As of January 2006, EPA's Maximum Contaminant Level (MCL) for arsenic in drinking water is 10 ppb. If you have arsenic in your drinking water at levels higher than the EPA's MCL, an alternative source of water should be used for drinking and cooking should be considered.

If you use arsenic-treated wood in home projects, personal protection from exposure to arsenic-containing sawdust may be helpful in limiting exposure of family members. These measures may include dust masks, gloves, and protective clothing. Arsenic-treated wood should never be burned in open fires, or in stoves, residential boilers, or fire places, and should not be composted or used as mulch. EPA's Consumer Awareness Program (CAP) for CCA is a voluntary program established by the manufacturers of CCA products to inform consumers about the proper handling, use, and disposal of CCA-treated wood. You can find more information about this program in Section 6.5. Hand washing can reduce the potential exposure of children to arsenic after playing on play structures constructed with CCA-treated wood, since most of the arsenic on the children's hands was removed with water.

If you live in an area with a high level of arsenic in the water or soil, substituting cleaner sources of water and limiting contact with soil (for example, through use of a dense groundcover or thick lawn) would reduce family exposure to arsenic. By paying careful attention to dust and soil control in the home (air filters, frequent cleaning), you can reduce family exposure to contaminated soil. Some children eat a lot of soil. You should prevent your children from eating soil. You should discourage your children from putting objects in their mouths. Make sure they wash their hands frequently and before eating. Discourage your children from putting their hands in

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their mouths or engaging in other hand-to-mouth activities. Since arsenic may be found in the home as a pesticide, household chemicals containing arsenic should be stored out of reach of young children to prevent accidental poisonings. Always store household chemicals in their original labeled containers; never store household chemicals in containers that children would find attractive to eat or drink from, such as old soda bottles. Keep your Poison Control Center's number by the phone.

It is sometimes possible to carry arsenic from work on your clothing, skin, hair, tools, or other objects removed from the workplace. This is particularly likely if you work in the fertilizer, pesticide, glass, or copper/lead smelting industries. You may contaminate your car, home, or other locations outside work where children might be exposed to arsenic. You should know about this possibility if you work with arsenic.

Your occupational health and safety officer at work can and should tell you whether chemicals you work with are dangerous and likely to be carried home on your clothes, body, or tools and whether you should be showering and changing clothes before you leave work, storing your street clothes in a separate area of the workplace, or laundering your work clothes at home separately from other clothes. Material safety data sheets (MSDS) for many chemicals used should be found at your place of work, as required by the Occupational Safety and Health Administration (OSHA) in the U.S. Department of Labor. MSDS information should include chemical names and hazardous ingredients, and important properties, such as fire and explosion data, potential health effects, how you get the chemical(s) in your body, how to properly handle the materials, and what to do in the case of emergencies. Your employer is legally responsible for providing a safe workplace and should freely answer your questions about hazardous chemicals. Your state OSHA-approved occupational safety and health program or OSHA can answer any further questions and help your employer identify and correct problems with hazardous substances. Your state OSHA-approved occupational safety and health program or OSHA will listen to your formal complaints about workplace health hazards and inspect your workplace when necessary. Employees have a right to seek safety and health on the job without fear of punishment.

### Medical Tests

Several sensitive and specific tests can measure arsenic in your blood, urine, hair, or fingernails, and these tests are often helpful in determining if you have been exposed to above-average levels of arsenic in the past. These tests are not usually performed in a doctor's office. They require sending the sample to a testing laboratory.

Measurement of arsenic in your urine is the most reliable means of detecting arsenic exposures that you experienced within the last several days. Most tests measure the total amount of arsenic present in your urine. This can sometimes be misleading, because the nonharmful forms of arsenic in fish and shellfish can give a high reading even if you have not been exposed to a toxic form of arsenic. For this reason, laboratories sometimes use a more complicated test to separate "fish arsenic" from other forms. Because most arsenic leaves your body within a few days, analysis of your urine cannot detect if you were exposed to arsenic in the past. Tests of your hair or fingernails can tell if you were exposed to high levels over the past 6-12 months, but these tests are not very useful in detecting low-level exposures. If high levels of arsenic are detected, this shows that you have been exposed, but unless more is known about when you were exposed and for how long, it is usually not possible to predict whether you will have any harmful health effects.

Information excerpted from

*Toxicological Profile for Arsenic August 2007*  
Agency for Toxic Substances and Disease Registry

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# Material Safety Data Sheet

## Benzo[a]pyrene, 98%

ACC# 37175

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** Benzo[a]pyrene, 98%  
**Catalog Numbers:** AC105600000, AC105600010, AC105601000, AC377200000, AC377200010, AC377201000 AC377201000

**Synonyms:** 3,4-Benzopyrene; 3,4-Benzpyrene; Benzo[def]chrysene.

**Company Identification:**

Acros Organics N.V.  
 One Reagent Lane  
 Fair Lawn, NJ 07410

**For information in North America, call:** 800-ACROS-01  
**For emergencies in the US, call CHEMTREC:** 800-424-9300

### Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
50-32-8	Benzo[a]pyrene	>96	200-028-5

### Section 3 - Hazards Identification

#### EMERGENCY OVERVIEW

Appearance: yellow to brown powder.

**Danger!** May cause harm to the unborn child. May impair fertility. May cause eye, skin, and respiratory tract irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Cancer hazard. May cause allergic skin reaction. May cause heritable genetic damage.

**Target Organs:** Reproductive system, skin.

#### Potential Health Effects

**Eye:** May cause eye irritation.

**Skin:** May cause skin irritation. May be harmful if absorbed through the skin. May cause an allergic reaction in certain individuals.

**Ingestion:** May cause irritation of the digestive tract. The toxicological properties of this substance have not been fully investigated. May be harmful if swallowed.

**Inhalation:** May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. May be harmful if inhaled.

**Chronic:** May cause cancer in humans. May cause reproductive and fetal effects. Laboratory experiments have resulted in mutagenic effects.

### Section 4 - First Aid Measures

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

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

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

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

**Notes to Physician:** Treat symptomatically and supportively.

**Section 5 - Fire Fighting Measures**

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**Flash Point:** Not available.

**Autoignition Temperature:** Not available.

**Explosion Limits, Lower:** Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 0

**Section 6 - Accidental Release Measures**

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

**Spills/Leaks:** Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

**Section 7 - Handling and Storage**

**Handling:** Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**Section 8 - Exposure Controls, Personal Protection**

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits			
Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
		0.1 mg/m <sup>3</sup> TWA	

Benzo[a]pyrene	0.2 mg/m <sup>3</sup> TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	(cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m <sup>3</sup> IDLH (listed under Coal tar pitches).	0.2 mg/m <sup>3</sup> TWA (as benzene soluble fraction) (listed under Coal tar pitches).
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**OSHA Vacated PELs:** Benzo[a]pyrene: No OSHA Vacated PELs are listed for this chemical.

#### Personal Protective Equipment

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

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

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

## Section 9 - Physical and Chemical Properties

**Physical State:** Powder

**Appearance:** yellow to brown

**Odor:** faint aromatic odor

**pH:** Not available.

**Vapor Pressure:** Not available.

**Vapor Density:** Not available.

**Evaporation Rate:** Not available.

**Viscosity:** Not available.

**Boiling Point:** 495 deg C @ 760 mm Hg

**Freezing/Melting Point:** 175 - 179 deg C

**Decomposition Temperature:** Not available.

**Solubility:** 1.60x10<sup>-3</sup> mg/l @25°C

**Specific Gravity/Density:** Not available.

**Molecular Formula:** C<sub>20</sub>H<sub>12</sub>

**Molecular Weight:** 252.31

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** Dust generation.

**Incompatibilities with Other Materials:** Strong oxidizing agents.

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

**Hazardous Polymerization:** Has not been reported.

## Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 50-32-8: DJ3675000

**LD50/LC50:**

Not available.

**Carcinogenicity:**

CAS# 50-32-8:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

**Epidemiology:** No information found

**Teratogenicity:** No information found

**Reproductive Effects:** Adverse reproductive effects have occurred in experimental animals.

**Mutagenicity:** Mutagenic effects have occurred in humans. Mutagenic effects have occurred in experimental animals.

**Neurotoxicity:** No information found

**Other Studies:**

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:**

CAS# 50-32-8: waste number U022.

Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	NOT REGULATED FOR DOMESTIC TRANSPORT	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOL (Benzo{a} pyrene)
<b>Hazard Class:</b>		9
<b>UN Number:</b>		UN3077
<b>Packing Group:</b>		III

Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**

CAS# 50-32-8 is listed on the TSCA inventory.

### **Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

### **Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

### **Section 12b**

None of the chemicals are listed under TSCA Section 12b.

### **TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

### **CERCLA Hazardous Substances and corresponding RQs**

CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ

### **SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

### **SARA Codes**

CAS # 50-32-8: immediate, delayed.

### **Section 313**

This material contains Benzo[a]pyrene (CAS# 50-32-8, >96%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

### **Clean Air Act:**

This material does not contain any hazardous air pollutants.  
This material does not contain any Class 1 Ozone depletors.  
This material does not contain any Class 2 Ozone depletors.

### **Clean Water Act:**

None of the chemicals in this product are listed as Hazardous Substances under the CWA.  
CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act.  
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

### **OSHA:**

None of the chemicals in this product are considered highly hazardous by OSHA.

### **STATE**

CAS# 50-32-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

### **California Prop 65**

**The following statement(s) is(are) made in order to comply with the California Safe**

### **Drinking Water Act:**

WARNING: This product contains Benzo[a]pyrene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 50-32-8: 0.06 æg/day NSRL

### **European/International Regulations**

### **European Labeling in Accordance with EC Directives**

### **Hazard Symbols:**

T N

### **Risk Phrases:**

R 43 May cause sensitization by skin contact.  
R 45 May cause cancer.  
R 46 May cause heritable genetic damage.  
R 60 May impair fertility.  
R 61 May cause harm to the unborn child.  
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

### **Safety Phrases:**

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).  
S 53 Avoid exposure - obtain special instructions before use.

S 60 This material and its container must be disposed of as hazardous waste.  
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

**WGK (Water Danger/Protection)**

CAS# 50-32-8: No information available.

**Canada - DSL/NDSL**

CAS# 50-32-8 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of D2A.

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

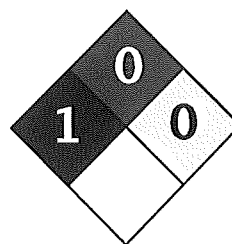
**Canadian Ingredient Disclosure List**

CAS# 50-32-8 is listed on the Canadian Ingredient Disclosure List.

**Section 16 - Additional Information**

**MSDS Creation Date:** 9/02/1997  
**Revision #7 Date:** 6/30/2006

*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 Fisher 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 Fisher has been advised of the possibility of such damages.*



Health	1
Fire	0
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet Lead MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Lead

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

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

**RTECS:** OF7525000

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

**CI#:** Not available.

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

**Chemical Name:** Lead

**Chemical Formula:** Pb

**Contact Information:**

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

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

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

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
Lead	7439-92-1	100

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

### Section 3: Hazards Identification

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

**Potential Chronic Health Effects:**

Slightly hazardous in case of skin contact (permeator).

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

**MUTAGENIC EFFECTS:** Not available.

**TERATOGENIC EFFECTS:** Not available.

**DEVELOPMENTAL TOXICITY:** Not available.

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

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

## Section 4: First Aid Measures

### Eye Contact:

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

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

**Serious Skin Contact:** Not available.

### Inhalation:

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

**Serious Inhalation:** Not available.

### Ingestion:

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

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

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

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

**Flash Points:** Not available.

**Flammable Limits:** Not available.

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

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

### Explosion Hazards in Presence of Various Substances:

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

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

### Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

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

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

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

## Section 6: Accidental Release Measures

### Small Spill:

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

### Large Spill:

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

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

## Section 7: Handling and Storage

### Precautions:

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

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

## Section 8: Exposure Controls/Personal Protection

### Engineering Controls:

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

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

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

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

### Exposure Limits:

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

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

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

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

## Section 9: Physical and Chemical Properties

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

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 207.21 g/mole

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

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

**Boiling Point:** 1740°C (3164°F)

**Melting Point:** 327.43°C (621.4°F)

**Critical Temperature:** Not available.

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

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

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

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

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

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

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

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

**Special Remarks on Reactivity:**

Can react vigorously with oxidizing materials.

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

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

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

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

**Toxicity to Animals:**

LD50: Not available.

LC50: Not available.

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC.  
May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

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

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

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

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

Acute Potential:

Skin:

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

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

Eyes:

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

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

**Inhalation:**

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

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

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

**Ingestion:**

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

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

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

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

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

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

## Section 13: Disposal Considerations

**Waste Disposal:**

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

## Section 14: Transport Information

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

**Identification:** Not applicable.

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

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

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

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

California prop. 65: This product contains the following ingredients for which the State of California has found to

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

**Other Regulations:**

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

**Other Classifications:**

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

**DSCL (EEC):**

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

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

**Health Hazard:** 1

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** E

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

**Health:** 1

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

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

Safety glasses.

## Section 16: Other Information

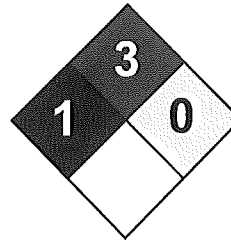
**References:** Not available.

**Other Special Considerations:** Not available.

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

**Last Updated:** 11/06/2008 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet Methyl ethyl ketone MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Methyl ethyl ketone

**Catalog Codes:** SLM2626, SLM3232

**CAS#:** 78-93-3

**RTECS:** EL6475000

**TSCA:** TSCA 8(b) inventory: Methyl ethyl ketone

**CI#:** Not applicable.

**Synonym:** 2-Butanone

**Chemical Name:** Methyl Ethyl Ketone

**Chemical Formula:** C4H8O

**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
Methyl ethyl ketone	78-93-3	100

**Toxicological Data on Ingredients:** Methyl ethyl ketone: ORAL (LD50): Acute: 2737 mg/kg [Rat]. 4050 mg/kg [Mouse]. DERMAL (LD50): Acute: 6480 mg/kg [Rabbit]. VAPOR (LC50): Acute: 23500 mg/m 8 hours [Rat].

### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation (lung irritant).

**Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to gastrointestinal tract, upper respiratory tract, skin, eyes, 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. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. 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. Cold water may be used. 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:**

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.

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## Section 5: Fire and Explosion Data

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**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 404°C (759.2°F)

**Flash Points:** CLOSED CUP: -9°C (15.8°F). OPEN CUP: -5.5556°C (22°F) (Tag).

**Flammable Limits:** LOWER: 1.8% UPPER: 10%

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

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

**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:**

Ignition on contact with potassium t-butoxide. Vapor may cause a flash fire

**Special Remarks on Explosion Hazards:**

Reaction with Hydrogen Peroxide + nitric acid forms heat and shock-sensitive explosive product. Mixture with 2-propanol will produce explosive peroxides during storage.

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## Section 6: Accidental Release Measures

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**Small Spill:**

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

**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.

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## Section 7: Handling and Storage

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### 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. 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, metals, acids, alkalis.

### 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).

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## Section 8: Exposure Controls/Personal Protection

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### 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: 300 (ppm) from ACGIH (TLV) [United States] [1999] TWA: 150 STEL: 300 (ppm) [Australia] TWA: 590 STEL: 885 (mg/m<sup>3</sup>) from NIOSH TWA: 200 STEL: 300 (ppm) from NIOSH TWA: 590 STEL: 885 (mg/m<sup>3</sup>) [Canada] TWA: 200 STEL: 300 (ppm) from OSHA (PEL) [United States] TWA: 590 STEL: 885 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

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## Section 9: Physical and Chemical Properties

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**Physical state and appearance:** Liquid.

### Odor:

Acetone-like Pleasant. Pungent. Sweetish. (Strong.)

**Taste:** Not available.

**Molecular Weight:** 72.12g/mole

**Color:** Clear Colorless.

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

**Boiling Point:** 79.6 (175.3°F)

**Melting Point:** -86°C (-122.8°F)

**Critical Temperature:** 262.5°C (504.5°F)

**Specific Gravity:** 0.805(Water = 1)

**Vapor Pressure:** 10.3 kPa (@ 20°C)

**Vapor Density:** 2.41 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.25 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil;  $\log(\text{oil/water}) = 0.3$

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

**Dispersion Properties:** See solubility in water, diethyl ether, acetone.

**Solubility:** Soluble in cold water, diethyl ether, acetone.

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## Section 10: Stability and Reactivity Data

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**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources, mechanical shock, incompatible materials.

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

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

**Special Remarks on Reactivity:**

Incompatible with chloroform, copper, hydrogen peroxide, nitric acid, potassium t-butoxide, 2-propanol, chlorosulfonic acid, strong oxidizers, amines, ammonia, inorganic acids, isocyanates, caustics, pyridines. Vigorous reaction with chloroform +alkali.

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

**Polymerization:** Will not occur.

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## Section 11: Toxicological Information

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**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): 2737 mg/kg [Rat]. Acute dermal toxicity (LD50): 6480 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 32000 mg/m<sup>3</sup> 4 hours [Mouse].

**Chronic Effects on Humans:**

MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. May cause damage to the following organs: gastrointestinal tract, upper respiratory tract, skin, eyes, central nervous system (CNS).

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

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

**Special Remarks on Chronic Effects on Humans:** May cause birth defects based on animal data. Embryotoxic and/or foetotoxic in animal.

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

Acute Potential Health Effects: Skin: Causes skin irritation. May be absorbed through the skin. Eyes: Causes eye irritation. Inhalation: Inhalation of high concentrations may cause central nervous effects characterized by headache, dizziness, unconsciousness, and coma. Causes respiratory tract irritation and affects the sense organs. May affect the liver and urinary system. Ingestion: Causes gastrointestinal tract irritation with nausea, vomiting and diarrhea. May affect the liver. Chronic Potential Health Effects: Chronic inhalation may cause effects similar to those of acute inhalation. Prolonged or repeated skin contact may cause defatting and dermatitis.

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## Section 12: Ecological Information

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**Ecotoxicity:** Ecotoxicity in water (LC50): 3220 mg/l 96 hours [Fathead Minnow]. 1690 mg/l 96 hours [Bluegill].

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

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

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

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

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## Section 13: Disposal Considerations

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**Waste Disposal:**

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

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## Section 14: Transport Information

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

**Identification :** Ethyl methyl ketone UNNA: 1193 PG: II

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

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## Section 15: Other Regulatory Information

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**Federal and State Regulations:**

New York release reporting list: Methyl ethyl ketone Rhode Island RTK hazardous substances: Methyl ethyl ketone Pennsylvania RTK: Methyl ethyl ketone Minnesota: Methyl ethyl ketone Massachusetts RTK: Methyl ethyl ketone New Jersey: Methyl ethyl ketone California Director's list of Hazardous Substances: Methyl ethyl ketone TSCA 8(b) inventory: Methyl ethyl ketone TSCA 8(d) H and S data reporting: Methyl ethyl ketone: Effective: 10/4/82; Sunset: 10/4/92 SARA 313 toxic chemical notification and release reporting: Methyl ethyl ketone CERCLA: Hazardous substances.: Methyl ethyl ketone: 5000 lbs. (2268 kg)

**Other Regulations:**

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

**Other Classifications:**

**WHMIS (Canada):**

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. R36/37- Irritating to eyes and respiratory system. S9- Keep container in a well-ventilated place. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. 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:** 1

**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.

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**Section 16: Other Information**

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**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:39 PM

**Last Updated:** 11/06/2008 12:00 PM

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# PCB

**DISPOSAL**

## MATERIAL SAFETY DATA SHEET

### (POLYCHLORINATED BIPHENYLS)

#### COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients Name: polychlorinated biphenyls (PCBs)

#### HAZARD IDENTIFICATION

Reports of Carcinogenicity: YES

#### HEALTH HAZARDS ACUTE AND CHRONIC

- **Eyes**: Moderately irritating to eye tissues.
- **Skin**: Can be absorbed through intact skin, may cause de-fatting, potential for chloracne.
- **Inhalation**: Possible liver injury.
- **Ingestion**: Slightly toxic; reasonably anticipated to be carcinogenic.

#### EFFECTS OF OVER-EXPOSURE

Can cause dermatological symptoms; however, these are reversible upon removal of exposure source.

#### FIRST AID MEASURES

- **Eyes**: Irrigate immediately with copious quantities of running water for at least 15 minutes if liquid or solid PCBs get into them.
- **Skin**: Contaminated clothing should be removed and the skin washed thoroughly with soap and water. Hot PCBs may cause thermal burns.
- **Inhalation**: Remove to fresh air; if skin rash or respiratory irritation persists, consult a physician (if electrical equipment arcs over, PCBs may decompose to produce hydrochloric acid).
- **Ingestion**: Consult a physician. Do not induce vomiting or give any oily laxatives. (If large amounts are ingested, gastric lavage is suggested).

**FIRE FIGHTING MEASURES**: Flash Point: >141 °C (285.8 °F)

**EXTINGUISHING MEDIA**: PCBs are fire-resistant compounds.

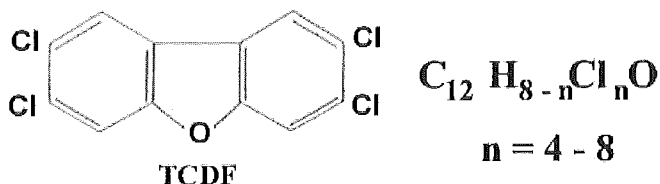
## FIRE-FIGHTING PROCEDURES

Standard fire-fighting wearing apparel and self-contained breathing apparatus should be worn when fighting fires that involve possible exposure to chemical combustion products. Fire fighting equipment should be thoroughly cleaned and decontaminated after use.

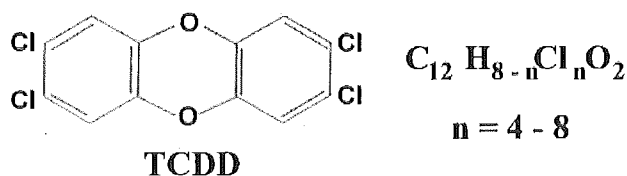
## UNUSUAL FIRE/EXPLOSION HAZARD

If a PCB transformer is involved in a fire-related incident, the owner of the transformer is required to report the incident. Consult and follow appropriate federal, provincial and local regulations.

*Note: When askarel liquid becomes involved in a fire, toxic by-products of combustion are typically produced including polychlorinated dibenzofurans and polychlorinated dibenzodioxins, both known carcinogens. The structures of these chemical species are as follows:*



**2,3,7,8-tetrachlorodibenzofuran**



**2,3,7,8-tetrachloro-dibenzo-p-dioxin**

*Note: 2,3,7,8-tetrachloro-dibenzo-p-dioxin is one of the most potent teratogenic, mutagenic and carcinogenic agents known to man.*

## SPILL RELEASE PROCEDURES

Cleanup & disposal of liquid PCBs are strictly regulated by the federal government. Ventilate area. Contain spill/leak. Remove spill by means of absorptive material. Spill clean-up personnel should use proper protective clothing. All wastes and residues containing PCBs should be collected, containerized, marked and disposed of in the manner prescribed by applicable federal, provincial and local laws.

## HANDLING AND STORAGE PRECAUTIONS

Care should be taken to prevent entry into the environment through spills, leakage, use, vaporization, or disposal of liquid. Avoid prolonged breathing of vapours or mists. Avoid contact with eyes or prolonged contact with skin. Comply with all federal, provincial and local regulations.

### **OTHER PRECAUTIONS**

Federal regulations require PCBs, PCB items, storage areas, transformer vaults, and transport vehicles to be appropriately labelled.

### **RESPIRATORY PROTECTION**

Use OSHA approved equipment when airborne exposure limits are exceeded. Full facepiece equipment is recommended and, if used, replaces need for face shield and/or chemical splash goggles. The respirator use limitations specified by the manufacturer must be observed.

### **VENTILATION**

Provide natural or mechanical ventilation to control exposure levels below airborne exposure levels.

**PROTECTIVE GLOVES:** Wear appropriate chemical resistant gloves to prevent skin contact.

**EYE PROTECTION:** Wear chemical splash goggles and have eye baths available.

### **OTHER PROTECTIVE EQUIPMENT**

Wear appropriate protective clothing. Provide a safety shower at any location where skin contact can occur.

### **WORK HYGIENIC PRACTICES**

Wash thoroughly after handling. Supplemental safety and health : none

### **PHYSICAL/CHEMICAL PROPERTIES**

- **Vapour pressure:** (mm Hg @100 °F) 0.005 - 0.00006
- **Viscosity:** (CENTISTOKES) 3.6 - 540
- **Stability indicator/materials to avoid:** Yes
- **Stability Condition to Avoid:** PCBs are very stable, fire-resistant compounds.

### **HAZARDOUS DECOMPOSITION PRODUCTS**

Carbon monoxide, carbon dioxide, hydrogen chloride, phenolics, aldehydes, furans, dioxins

### **WASTE DISPOSAL METHODS**

Consult the applicable PCB regulations prior to any disposal of PCBs or PCB-contaminated items.

File No: NA/352

Date: April 1996

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**PHENOLIC RESIN PN 630**

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act 1989*, and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Health and Family Services.

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

For Enquiries please contact the Administration Coordinator at:

*Street Address:* 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA

*Postal Address:* GPO Box 58, Sydney 2001, AUSTRALIA

*Telephone:* (61) (02) 565-9466 **FAX (61) (02) 565-9465**

Director  
Chemicals Notification and Assessment

## FULL PUBLIC REPORT

### PHENOLIC RESIN PN 630

#### 1. APPLICANT

BASF Australia Ltd of 500 Princes Hwy NOBLE PARK VICTORIA 3174 and Hoechst Australia Ltd of 606 St Kilda Rd MELBOURNE VICTORIA 3004 have submitted a limited notification statement accompanying their application for an assessment certificate for Phenolic Resin PN 630.

#### 2. IDENTITY OF THE CHEMICAL

Phenolic Resin PN 630 is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, exact import volume and exact formulation details have been exempted from publication in the Full Public Report and the Summary Report.

Phenolic Resin PN 630 contains a monomer which is a known skin sensitiser, is present at levels which would result in the notified polymer being classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (1) and should, therefore, be identified in public reports. However, for commercial reasons, the identity of the hazardous monomer has been granted exemption from publication in the Full Public Report and the Summary Report. The conditions of this being permitted are:

- A descriptive generic name be used to identify the substance in public reports and MSDS where its concentration exceeds 1% under any circumstances,
- The relevant employee unions shall be informed of the conditions of use of the polymer if monomer levels exceed 1% in dispersions containing the polymer,
- The full chemical name shall be provided to any health professionals in the case of a legitimate need where exposure to the chemical may involve a health risk,
- The full chemical name shall be provided to those on site who are using the chemical and to those who are involved in planning for safe use, etc. in the case of a legitimate need,
- The Director of NICNAS will release the full chemical name etc in the case of a request from a medical practitioner,
- Confidentiality will expire after a 3 year period,
- The chemical be identified as a sensitiser in the Health Effects section, and that reference to assessment by NICNAS be made on MSDS under circumstances where the level of the monomer exceeds 1%,
- These conditions shall be published in the Chemical Gazette.

**Trade name:** Phenolic resin PN 630 (the notified polymer comprises < 20% of the aqueous dispersion to be imported which is also called Polyurethane Elastomer Dispersion for labelling purposes)

**Number-average molecular weight:** 1371

**Weight-average molecular weight:** 14429

**Maximum percentage of low molecular weight species (molecular weight < 1000):** 20%

**Method of detection and determination:** IR spectroscopy

### 3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported as a component of an aqueous dispersion and is never isolated. The properties listed below are those of either the dispersion or the notified polymer as indicated.

**Appearance at 20°C and 101.3 kPa:** light, cream-coloured liquid (dispersion)

**Odour:** slight acetone odour (dispersion)

**Melting Point:** 100-110°C (polymer)

**Density:** 1270 kg/m<sup>3</sup> (polymer)  
1060 kg/m<sup>3</sup> (dispersion)

**Vapour Pressure:** expected to be negligible (polymer). The dispersion is expected to have vapour pressure similar to water.

**Water Solubility:** insoluble (polymer)

**Autoignition Temperature:** based on similar aqueous dispersions expected to be > 200°C

**Reactivity/Stability:** the aqueous dispersion is expected to be stable at ambient temperature and pressure and is not expected to burn - however, if the water evaporates and conditions for combustion prevail, the notified polymer is expected to burn with a smoky flame producing oxides of carbon, water vapour and incompletely burned hydrocarbons with the possibility of forming hazardous by-products.

## Comments on physico-chemical properties

It is expected that fractions of higher molecular weight/larger molecular size will be less water soluble than the low molecular weight portion of the notified polymer. The solubility of the low molecular weight portion of the polymer (MW < 500) in water was found to be below 0.15%. However, the overall water solubility of the notified polymer in water is expected to be low due to its high molecular weight and structure. The dispersion is miscible with water.

Hydrolysis of the notified polymer will be limited as it is expected to have low solubility in water and it contains no hydrolysable groups.

The partition coefficient, adsorption/desorption and the dissociation constant are difficult to measure due to the limited water solubility and surface active properties. The partition coefficient is expected to be high; therefore, strong adsorption and limited desorption is expected. The weakly acidic phenol groups are expected to have a typical dissociation constant. At more alkaline conditions the water solubility of the polymer could be enhanced.

### 4. PURITY OF THE CHEMICAL

Degree of purity: 92.8%

Toxic or hazardous impurities:

<i>Chemical Name</i>	<i>Relevant Toxic Properties</i>	<i>Wt %</i>
Substituted phenol	moderately toxic by ingestion and dermal contact; severe eye irritant; skin irritant; human skin sensitiser.	4.8%
Impurity 2	mildly toxic by ingestion or inhalation; experimental teratogen; experimental reproductive effects	2%
Impurity 3	poison by ingestion; moderate dermal toxicity; experimental tumourigen; corrosive irritant to skin, eyes and mucous membranes; can cause pulmonary oedema	0.2%

Non-toxic impurities (> 1% by weight): None

Additives/Adjuvants: None

### 5. USE, VOLUME AND FORMULATION

The notified polymer is a component of a water-based contact adhesive. It will be imported as a component (at a level of < 20%) of an aqueous dispersion in 120 L

open head polyethylene drums at a rate of < 10 tonnes per year for the first five years.

## **6. OCCUPATIONAL EXPOSURE**

The notified chemical will be transported by road to the notifier's warehouse in a shipping container. As required the individual drums will be transported to a single customer. Up to 12 drivers and 6 storepersons would be involved and exposure is unlikely except in the event of an accident.

In the manufacture of the adhesive, the polymer dispersion is pumped from the drums into a weighing vessel. Once the correct weight has been achieved the dispersion is automatically pumped into the mixing vessel where it is mixed with an acrylic emulsion, wetting agent and thickener. The final concentration of the notified polymer in the finished adhesive is < 10%. The mixing vessel has a batch size of approximately 1000 kg and is fitted with local exhaust ventilation. When mixing is complete, the adhesive is drummed off into 200 kg open head steel or plastic drums.

A maximum of 6 blenders/process operators and 4 laboratory personnel would be potentially exposed to the adhesive during production. The duration of exposure is expected to vary from a few minutes to 8 hours on one day per week.

Exposure to the polymer dispersion is possible through incidental splashing during the weighing out and drumming off stages of the process. Some minor exposure may occur during testing samples for quality control and during maintenance of equipment.

A single customer will use the adhesive to fix foil-faced insulation onto powder-coated galvanised steel air conditioning cabinets. This involves 12 operators spraying the adhesive onto the pre-cut insulation and into the cabinet in spray booths fitted with local exhaust ventilation. The spray gun is attached to the drum of adhesive by a line connected to a drum spear.

The main exposure potential for the notified polymer during use of the adhesive containing it would appear to be from residue on the drum spear. The duration of exposure during spraying of the adhesive is calculated at 23 minutes per day.

## **7. PUBLIC EXPOSURE**

The chemical will be used only at one formulation plant and one end-user facility where procedures to minimise public exposure to solvent-based chemicals are well established. The potential for minor public exposure to the chemical exists during transport and disposal of process wastes and clean-up wastes if the chemical is accidentally spilt. There would appear to be no likely public exposure from the end-use application of the chemical in a water-based contact adhesive in one manufacturing plant.

## 8. ENVIRONMENTAL EXPOSURE

### Release

Releases containing the notified polymer will be mainly limited to washings from the formulation and application processes of the adhesive. It is expected that much less than 1% of the notified polymer will be discharged to waste water streams during its formulation. Waste water from the formulation plant is collected and discharged to an onsite trade waste treatment plant. Effluent from this process is then treated.

Information regarding waste waters from the end-use site is not included in the notification; however, the amount of the notified polymer released is expected to be small and the potential for loss low. It is assumed that the effluent will be sent for treatment at a municipal waste water treatment plant.

Emptied drums at the adhesive formulation plant are rinsed out with water and recycled. The wash water from such cleanings will become part of the effluent of the plant and be sent for treatment. Emptied drums and waste cabinets from the end-use site are crushed and included with other industrial waste for pick up and disposal by contractor to an approved landfill. This amount of waste has been estimated by the applicant to be a maximum of 1% of the usage.

As the polymer should not become airborne during formulation processes, filters from the exhaust ventilation systems will contain only limited amounts of the polymer. These filters will either be disposed of to landfill or cleaned, where waste waters will become part of the effluent of the plant.

Exposure during transportation will result only in the event of accidental spill or mishandling.

### Fate

The fate of the polymer is either to be bound to articles or disposed of by landfill/incineration.

The majority of the notified chemical will be part of the adhesive that is applied to articles used in the manufacture of air conditioning cabinets. In its final form the polymer will be a part of a cross-linked hardened adhesive. Articles that have had the adhesive applied would eventually be disposed of to landfill or recycled by metal smelting. The expected insoluble nature of the cured polymer will ensure any hydrolysis or breakdown to occur at an extremely low rate, if at all.

Disposal of the polymer to the sewer is expected to see the polymer partition to the sludge and be trapped in the solids at the sewage treatment works. The solids are disposed of by landfill or incineration.

Disposal of the notified polymer to landfill is unlikely to result in contamination of surface and ground waters. Its low water solubility and expected high  $\log P_{ow}$  indicates it is unlikely to leach. Incineration of the substance in excess air will result in oxides of carbon, and water vapour.

Fully flushed containers are likely to be treated as industrial waste and may possibly be recycled.

## 9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data are not required for polymers of number-average molecular weight (NAMW) > 1000 according to the *Industrial Chemicals (Notification and Assessment) Act, 1989* (the Act) and no data were submitted for the notified polymer.

## 10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The notifier has not presented any ecotoxicity results for the polymer. Ecotoxicity tests are not required for a polymer with NAMW > 1000 according to the Act.

However it is noted that in the MSDS for the polymer dispersion a 96hr LC<sub>50</sub> of 2200 mg /L for the fish species *Golden orfe* is quoted. This indicates that the polymer dispersion is practically non-toxic to fish. The data probably reflect the physical effects of the dispersion rather than any toxic effects as the polymer has a large molecular size and is not expected to cross biological membranes.

The polymer is not expected to show ecotoxicity effects as it should not cross membranes and belongs to a class of polymers recognised as being of low concern (2).

## 11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notified polymer will be formulated into an adhesive product by one company. The adhesive will then only be used by one company in their manufacture of air conditioning cabinets. Release of the polymer to the environment as a result of this proposed use is considered to be minimal.

The waste water discharged during formulation of the adhesive is expected to contain much less than 1% of the notified polymer. After treatment involving 250 ML/day, the resulting concentration of the notified polymer in the effluent will be approximately 1 ppb. This assumes no adsorption of the polymer to the sludge (strong adsorption to sludge is expected) and does not take into account the mixing of the effluent in receiving waters. Consequently the concentration of the polymer in receiving waters will be significantly less.

It is expected that waste water from the end-use site will be treated by a municipal waste water treatment plant. As the expected amount of polymer waste sent for treatment is expected to be similar to that of above, ie < 1% of the notified polymer, its concentration in receiving waters is expected to be of similar order of magnitude as calculated above. The solids from waste treatment processes are disposed of by landfill or incineration.

As the chemical waste trapped in the exhaust ventilation filters is expected to dry out and cure before disposal, the hazard from this material is expected to be

negligible when it is landfilled or incinerated. Any droplets not trapped by the exhaust ventilation filters will dry out and polymerise to an inert particle.

As the polymer is expected to be insoluble in water, the polymer waste consigned to landfill is unlikely to leach and will remain in the landfill. It is unlikely that the polymer could hydrolyse due to the low solubility in water and the lack of hydrolysable groups. The environmental hazard from the disposal of waste containing the polymer is rated as low.

Complete incineration of the polymer will generate oxides of carbon, and water vapour. The environmental hazard can be rated as negligible.

The overall environmental hazard from the use of the chemical is rated as low.

## **12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS**

The notified polymer has a NAMW greater than 1000 and should not be able to be absorbed across biological membranes to cause systemic effects. The levels of low molecular weight species (20% with NAMW < 1000) and residual monomers would render the polymer hazardous according to the criteria of Worksafe Australia (1) because of the potential for skin sensitisation. However, if the low molecular weight species and residual monomers became evenly dispersed by leaching throughout the imported formulation the resultant concentrations would not render the polymer dispersion hazardous according to Worksafe criteria.

During formulation of the adhesive containing the notified polymer, exposure to the aqueous dispersion containing the polymer is possible during its addition to a mixing vessel and during drumming off of the finished adhesive. Exposure is possible from incidental splashing and cleaning up of spills. Such exposure is limited to a certain extent by the fact that adhesive is prepared on one day per week and also by the relatively low concentration of the notified polymer in the aqueous dispersion (< 20%). Exposure during maintenance and quality control is expected to be low.

During use of the adhesive to bond insulation to air conditioning cabinets, exposure is expected to be low through the use of ventilated spray booths. Spraying of the adhesive should result in minimal exposure to the notified polymer. In addition the duration of exposure is calculated at 23 minutes per day. Exposure to the adhesive is possible from drips and spills caused by inserting and removing a drum spear attached to the spray gun. Such exposure could be long term if adhesive bonds to the skin.

The risk of adverse health effects arising from exposure to the notified polymer is expected to be low given its low hazard and low concentration in the aqueous dispersion to be imported together with limited opportunity for exposure. However, there may be a risk of skin sensitisation in some individuals from exposure to low molecular weight species (NAMW < 500) in the polymer.

### **13. RECOMMENDATIONS**

To minimise occupational exposure to Phenolic Resin PN 630 the following guidelines and precautions should be observed:

If engineering controls and work practices are insufficient to reduce exposure to a safe level, then the following personal protective devices should be worn:

- eye protection should be selected and fitted in accordance to AS 1336 (3) and meet the requirements of AS/NZS 1337 (4);
- impermeable gloves should conform to AS 2161 (5);
- protective clothing should conform to AS 2919 (6);
- protective footwear should conform to AS/NZS 2210 (7).

Good work practices should be implemented to avoid spillages and splashing;

Good housekeeping and maintenance should be practised. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal in accordance with Local or State government regulations;

Good personal hygiene should be observed; and

A copy of the relevant Material Safety Data Sheet(s) (MSDS) should be easily accessible to employees.

### **14. MATERIAL SAFETY DATA SHEET**

The MSDS for Phenolic Resin PN 630 and the aqueous dispersion containing it were provided in accordance with Worksafe Australia's *National Code of Practice for the Preparation of Material Safety Data Sheets* (8).

These MSDS were provided by the applicants as part of their notification statement. They are reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicants.



### **15. REQUIREMENTS FOR SECONDARY NOTIFICATION**

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Phenolic Resin PN 630 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

## 16. REFERENCES

1. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]*, Australia Government Publishing Service, Canberra, Australia.
2. Nabholz J V, Miller P and Zeeman M 'Environmental Risk Assessment of New Chemicals Under the Toxic Substances Control Act TSCA Section Five', in *Environmental Toxicology and Risk Assessment*, W G Landis, J S Hughes and M A Lewis (Eds), pp 40-55.
3. Standards Australia, 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, Australia.
4. Standards Australia, Standards New Zealand 1992, *Australian/ New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.
5. Standards Australia 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, Australia.
6. Standards Australia, 1987, *Australian Standard 2919 - 1987 Industrial Clothing*, Standards Association of Australia Publ., Sydney, Australia.
7. Standards Australia, Standards New Zealand 1994, *Australian/ New Zealand Standard 2210 - 1994 Occupational Protective Footwear, Part 1: Guide to Selection, Care and Use. Part 2: Specifications*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.
8. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]*, AGPS, Canberra, Australia.

MSDS Number: T0767 \* \* \* \* \* Effective Date: 05/19/08 \* \* \* \* \* Supersedes: 08/16/05

	24 Hour Emergency Telephone: 800-859-2151 CHEMTREC: 1-800-424-9300
	National Response in Canada CANUTEC: 613-945-6669
From: Mallinckrodt Baker, Inc. 222 Red School Lane Phillipsburg, NJ 08865	Outside U.S. and Canada Chemtrec: 703-527-3887
	NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, i.e., exposure or accident involving chemicals.
All non-emergency questions should be directed to Customer Service (1-800-562-2637) for assistance.	

# TETRACHLOROETHYLENE

## 1. Product Identification

**Synonyms:** ethylene tetrachloride; tetrachloroethene; perchloroethylene; carbon bichloride; carbon dichloride  
**CAS No.:** 127-18-4  
**Molecular Weight:** 165.83  
**Chemical Formula:** Cl<sub>2</sub>C:CCl<sub>2</sub>  
**Product Codes:**  
 J.T. Baker: 9218, 9360, 9453, 9465, 9469  
 Mallinckrodt: 1933, 8058

## 2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Tetrachloroethylene	127-18-4	99 - 100%	Yes

## 3. Hazards Identification

### Emergency Overview

**WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER.** Risk of cancer depends on level and duration of exposure.

SAF-T-DATA<sup>(tm)</sup> Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Poison)  
 Flammability Rating: 0 - None  
 Reactivity Rating: 1 - Slight  
 Contact Rating: 2 - Moderate (Life)  
 Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES  
 Storage Color Code: Blue (Health)

### Potential Health Effects

#### Inhalation:

Irritating to the upper respiratory tract. Giddiness, headache, intoxication, nausea and vomiting may follow the inhalation of large amounts while massive amounts can cause breathing arrest, liver and kidney damage, and death. Concentrations of 600 ppm and more can affect the central nervous system after a few minutes.

#### Ingestion:

Not highly toxic by this route because of low water solubility. Used as an oral dosage for hookworm (1 to 4 ml). Causes abdominal pain, nausea, diarrhea, headache, and dizziness.

#### Skin Contact:

Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.

#### Eye Contact:

Causes irritation, redness, and pain.

#### Chronic Exposure:

May cause liver, kidney or central nervous system damage after repeated or prolonged exposures. Suspected cancer risk from animal studies.

#### Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance. The use of alcoholic beverages enhances the toxic effects.

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## 4. First Aid Measures

**Inhalation:**

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

**Ingestion:**

Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

**Skin Contact:**

Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

**Eye Contact:**

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

**Note to Physician:**

Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

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## 5. Fire Fighting Measures

**Fire:**

Not considered to be a fire hazard but becomes hazardous in a fire situation because of vapor generation and possible degradation to phosgene (highly toxic) and hydrogen chloride (corrosive). Vapors are heavier than air and collect in low-lying areas.

**Explosion:**

Not considered to be an explosion hazard. Containers may explode when involved in a fire.

**Fire Extinguishing Media:**

Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool.

**Special Information:**

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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## 6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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## 7. Handling and Storage

Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from flammable materials. Protect from direct sunlight. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

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## 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:**

-OSHA Permissible Exposure Limit (PEL):

100 ppm (TWA), 200 ppm (ceiling),

300 ppm/5min/3-hour (max)

-ACGIH Threshold Limit Value (TLV):

25 ppm (TWA), 100 ppm (STEL); listed as A3, animal carcinogen

**Ventilation System:**

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

**Personal Respirators (NIOSH Approved):**

If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airtight hood, or full-facepiece self-contained breathing apparatus.

**Skin Protection:**

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

**Eye Protection:**

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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## 9. Physical and Chemical Properties

**Appearance:**

Clear, colorless liquid.

**Odor:**

Ethereal odor.

**Solubility:**

0.015 g in 100 g of water.

**Specific Gravity:**

1.62 @ 20C/4C

**pH:**

No information found.

**% Volatiles by volume @ 21C (70F):**

100

**Boiling Point:**

121C (250F)

**Melting Point:**

-19C (-2F)

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

5.7

**Vapor Pressure (mm Hg):**

18 @ 25C (77F)

**Evaporation Rate (BuAc=1):**

0.33 (trichloroethylene = 1)

## 10. Stability and Reactivity

**Stability:**

Stable under ordinary conditions of use and storage. Slowly decomposed by light. Deteriorates rapidly in warm, moist climates.

**Hazardous Decomposition Products:**

Carbon dioxide and carbon monoxide may form when heated to decomposition. Hydrogen chloride gas and phosgene gas may be formed upon heating.

Decomposes with moisture to yield trichloroacetic acid and hydrochloric acid.

**Hazardous Polymerization:**

Will not occur.

**Incompatibilities:**

Strong acids, strong oxidizers, strong alkalis, especially NaOH, KOH; finely divided metals, especially zinc, barium, lithium. Slowly corrodes aluminum, iron and zinc.

**Conditions to Avoid:**

Moisture, light, heat and incompatibles.

## 11. Toxicological Information

Oral rat LD50: 2629 mg/kg; inhalation rat LC50: 4100 ppm/6H; investigated as a tumorigen, mutagen, reproductive effector.

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Tetrachloroethylene (127-18-4)	No	Yes	2A

## 12. Ecological Information

**Environmental Fate:**

When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.

**Environmental Toxicity:**

The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be toxic to aquatic life.

## 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

## 14. Transport Information

**Domestic (Land, D.O.T.)**

**Proper Shipping Name:** TETRACHLOROETHYLENE

**Hazard Class:** 6.1

**UN/NA:** UN1897

**Packing Group:** III

Information reported for product/size: 4L

**International (Water, I.M.O.)**

-----  
**Proper Shipping Name:** TETRACHLOROETHYLENE  
**Hazard Class:** 6.1  
**UN/NA:** UN1897  
**Packing Group:** III  
**Information reported for product/size:** 4L

**International (Air, I.C.A.O.)**

-----  
**Proper Shipping Name:** TETRACHLOROETHYLENE  
**Hazard Class:** 6.1  
**UN/NA:** UN1897  
**Packing Group:** III  
**Information reported for product/size:** 4L

## 15. Regulatory Information

-----\Chemical Inventory Status - Part 1\  
 -----  

Ingredient	TSCA	EC	Japan	Australia
Tetrachloroethylene (127-18-4)	Yes	Yes	Yes	Yes

 -----

-----\Chemical Inventory Status - Part 2\  
 -----  

Ingredient	Korea	--Canada--		
		DSL	NDSL	Phil.
Tetrachloroethylene (127-18-4)	Yes	Yes	No	Yes

 -----

-----\Federal, State & International Regulations - Part 1\  
 -----  

Ingredient	-SARA 302-		-SARA 313-	
	RQ	TPQ	List	Chemical Catg.
Tetrachloroethylene (127-18-4)	No	No	Yes	No

 -----

-----\Federal, State & International Regulations - Part 2\  
 -----  

Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8 (d)
Tetrachloroethylene (127-18-4)	100	U210	No

 -----

Chemical Weapons Convention: No      TSCA 12(b): No      CDTA: No  
 SARA 311/312: Acute: Yes      Chronic: Yes      Fire: No      Pressure: No  
 Reactivity: No      (Pure / Liquid)

**WARNING:**

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

**Australian Hazchem Code:** 2[Z]

**Poison Schedule:** None allocated.

**WHMIS:**

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

## 16. Other Information

**NFPA Ratings:** Health: 2 Flammability: 0 Reactivity: 0

**Label Hazard Warning:**

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

**Label Precautions:**

Do not get in eyes, on skin, or on clothing.  
 Do not breathe vapor or mist.  
 Keep container closed.  
 Use only with adequate ventilation.  
 Wash thoroughly after handling.

**Label First Aid:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

**Product Use:**

Laboratory Reagent.

**Revision Information:**

No Changes.

**Disclaimer:**

\*\*\*\*\*

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy.

This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product.

Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose.

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\*\*\*\*\*

Prepared by: Environmental Health & Safety  
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: T4940 \* \* \* \* \* Effective Date: 09/16/09 \* \* \* \* \* Supercedes: 12/06/07

<b>MSDS</b>	<b>Material Safety Data Sheet</b>	24 Hour Emergency Telephone: 800-859-2161 CHEMTREC: 1-800-424-9300
		National Response In Canada CANUTEC: 613-998-6666
From: Mallinckrodt Baker, Inc. 222 Red School Lane Phillipsburg, NJ 08865		Outside U.S. and Canada Chemtrec: 703-527-5887
Mallinckrodt CHEMICALS		NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.
J.T. Baker		
All non emergency questions should be directed to Customer Service (1-800-552-2637) for assistance.		

# TRICHLOROETHYLENE

## 1. Product Identification

Synonyms: Trichloroethene; TCE; acetylene trichloride; Ethinyl trichloride  
 CAS No.: 79-01-6  
 Molecular Weight: 131.39  
 Chemical Formula: C<sub>2</sub>HCl<sub>3</sub>  
 Product Codes:  
 J.T. Baker: 5376, 9454, 9458, 9464, 9473  
 Mallinckrodt: 8600, 8633

## 2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Trichloroethylene	79-01-6	100%	Yes

## 3. Hazards Identification

### Emergency Overview

**WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER.** Risk of cancer depends on level and duration of exposure.

SAF-T-DATA<sup>(tm)</sup> Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Poison)  
 Flammability Rating: 1 - Slight  
 Reactivity Rating: 1 - Slight  
 Contact Rating: 3 - Severe  
 Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES  
 Storage Color Code: Blue (Health)

### Potential Health Effects

#### Inhalation:

Vapors can irritate the respiratory tract. Causes depression of the central nervous system with symptoms of visual disturbances and mental confusion, incoordination, headache, nausea, euphoria, and dizziness. Inhalation of high concentrations could cause unconsciousness, heart effects, liver effects, kidney effects, and death.

#### Ingestion:

Cases irritation to gastrointestinal tract. May also cause effects similar to inhalation. May cause coughing, abdominal pain, diarrhea, dizziness, pulmonary edema, unconsciousness. Kidney failure can result in severe cases. Estimated fatal dose is 3-5 ml/kg.

#### Skin Contact:

Cause irritation, redness and pain. Can cause blistering. Continued skin contact has a defatting action and can produce rough, dry, red skin resulting in secondary infection.

#### Eye Contact:

Vapors may cause severe irritation with redness and pain. Splashes may cause eye damage.

#### Chronic Exposure:

Chronic exposures may cause liver, kidney, central nervous system, and peripheral nervous system effects. Workers chronically exposed may exhibit central nervous system depression, intolerance to alcohol, and increased cardiac output. This material is linked to mutagenic effects in humans. This material is also a suspect carcinogen.

#### Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, cardiovascular disorders, impaired liver or kidney or respiratory function, or central or peripheral nervous system disorders may be more susceptible to the effects of the substance.

---

#### 4. First Aid Measures

**Inhalation:**

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

**Ingestion:**

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

**Skin Contact:**

Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Eye Contact:**

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

**Note to Physician:**

Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

---

#### 5. Fire Fighting Measures

**Fire:**

Autoignition temperature: 420C (788F)

Flammable limits in air % by volume:

lcl: 8; ucl: 12.5

**Explosion:**

A strong ignition source, e. g., a welding torch, can produce ignition. Sealed containers may rupture when heated.

**Fire Extinguishing Media:**

Use water spray to keep fire exposed containers cool. If substance does ignite, use CO<sub>2</sub>, dry chemical or foam.

**Special Information:**

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

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#### 6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

#### 7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

#### 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:**

Trichloroethylene:

-OSHA Permissible Exposure Limit (PEL):

100 ppm (TWA), 200 ppm (Ceiling),

300 ppm/5min/2hr (Max)

-ACGIH Threshold Limit Value (TLV):

10 ppm (TWA) 25 ppm (STEL); A2 Suspected Human Carcinogen.

**Ventilation System:**

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

**Personal Respirators (NIOSH Approved):**

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airtight hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

**Skin Protection:**

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment.

**Eye Protection:**

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

## 9. Physical and Chemical Properties

**Appearance:**  
Clear, colorless liquid.

**Odor:**  
Chloroform-like odor.

**Solubility:**  
Practically insoluble in water. Readily miscible in organic solvents.

**Specific Gravity:**  
1.47 @ 20C/4C

**pH:**  
No information found.

**% Volatiles by volume @ 21C (70F):**  
100

**Boiling Point:**  
87C (189F)

**Melting Point:**  
-73C (-99F)

**Vapor Density (Air=1):**  
4.5

**Vapor Pressure (mm Hg):**  
57.8 @ 20C (68F)

**Evaporation Rate (BuAc=1):**  
No information found.

## 10. Stability and Reactivity

**Stability:**  
Stable under ordinary conditions of use and storage. Will slowly decompose to hydrochloric acid when exposed to light and moisture.

**Hazardous Decomposition Products:**  
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

**Hazardous Polymerization:**  
Will not occur.

**Incompatibilities:**  
Strong caustics and alkalis, strong oxidizers, chemically active metals, such as barium, lithium, sodium, magnesium, titanium and beryllium, liquid oxygen.

**Conditions to Avoid:**  
Heat, flame, ignition sources, light, moisture, incompatibles

## 11. Toxicological Information

**Toxicological Data:**  
Trichloroethylene: Oral rat LD50: 5650 mg/kg; investigated as a tumorigen, mutagen, reproductive effector.

**Reproductive Toxicity:**  
This material has been linked to mutagenic effects in humans.

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Trichloroethylene (79-01-6)	No	Yes	2A

## 12. Ecological Information

**Environmental Fate:**  
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

**Environmental Toxicity:**  
The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

## 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

## 14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TRICHLOROETHYLENE  
 Hazard Class: 6.1  
 UN/NA: UN1710  
 Packing Group: III  
 Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: TRICHLOROETHYLENE  
 Hazard Class: 6.1  
 UN/NA: UN1710  
 Packing Group: III  
 Information reported for product/size: 4L

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
Trichloroethylene (79-01-6)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----

Ingredient	Korea	--Canada--		Phil.
		DSL	NDSL	
Trichloroethylene (79-01-6)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-SARA 313-	
	RQ	TPQ	List	Chemical Catg.
Trichloroethylene (79-01-6)	No	No	Yes	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA-		-TSCA-
		261.33	U228	8 (d)
Trichloroethylene (79-01-6)	100	U228	No	

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No  
 SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No  
 Reactivity: No (Pure / Liquid)

**WARNING:**

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: None allocated.

Poison Schedule: S6

**WHMIS:**

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 1 Reactivity: 0

**Label Hazard Warning:**

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

**Label Precautions:**

- Do not get in eyes, on skin, or on clothing.
- Do not breathe vapor.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.
- Keep away from heat and flame.

**Label First Aid:**

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician. Note to physician: Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

**Product Use:**

Laboratory Reagent.

**Revision Information:**

No Changes.

**Disclaimer:**

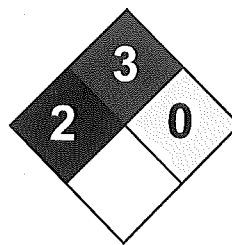
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\*\*\*\*\*

Prepared by: Environmental Health & Safety  
Phone Number: (314) 654-1600 (U.S.A.)



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:** C<sub>6</sub>H<sub>5</sub>-CH<sub>3</sub> or C<sub>7</sub>H<sub>8</sub>

**Contact Information:**

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

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

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

Order Online: ScienceLab.com

**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.

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## Section 5: Fire and Explosion Data

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**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, CO<sub>2</sub>).

**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; N<sub>2</sub>O<sub>4</sub>; AgClO<sub>4</sub>; BrF<sub>3</sub>; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

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## Section 6: Accidental Release Measures

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**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.

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**Section 7: Handling and Storage**

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**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).

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**Section 8: Exposure Controls/Personal Protection**

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**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/m<sup>3</sup>) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

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**Section 9: Physical and Chemical Properties**

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**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.

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## Section 10: Stability and Reactivity Data

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**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.

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## Section 11: Toxicological Information

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**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: Causes mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abrasions. 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.

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## Section 12: Ecological Information

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### 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.

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## Section 13: Disposal Considerations

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### Waste Disposal:

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

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## Section 14: Transport Information

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

**Identification:** : Toluene UNNA: 1294 PG: II

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

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## Section 15: Other Regulatory Information

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### 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.

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## Section 16: Other Information

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**References:** Not available.

**Other Special Considerations:** Not available.

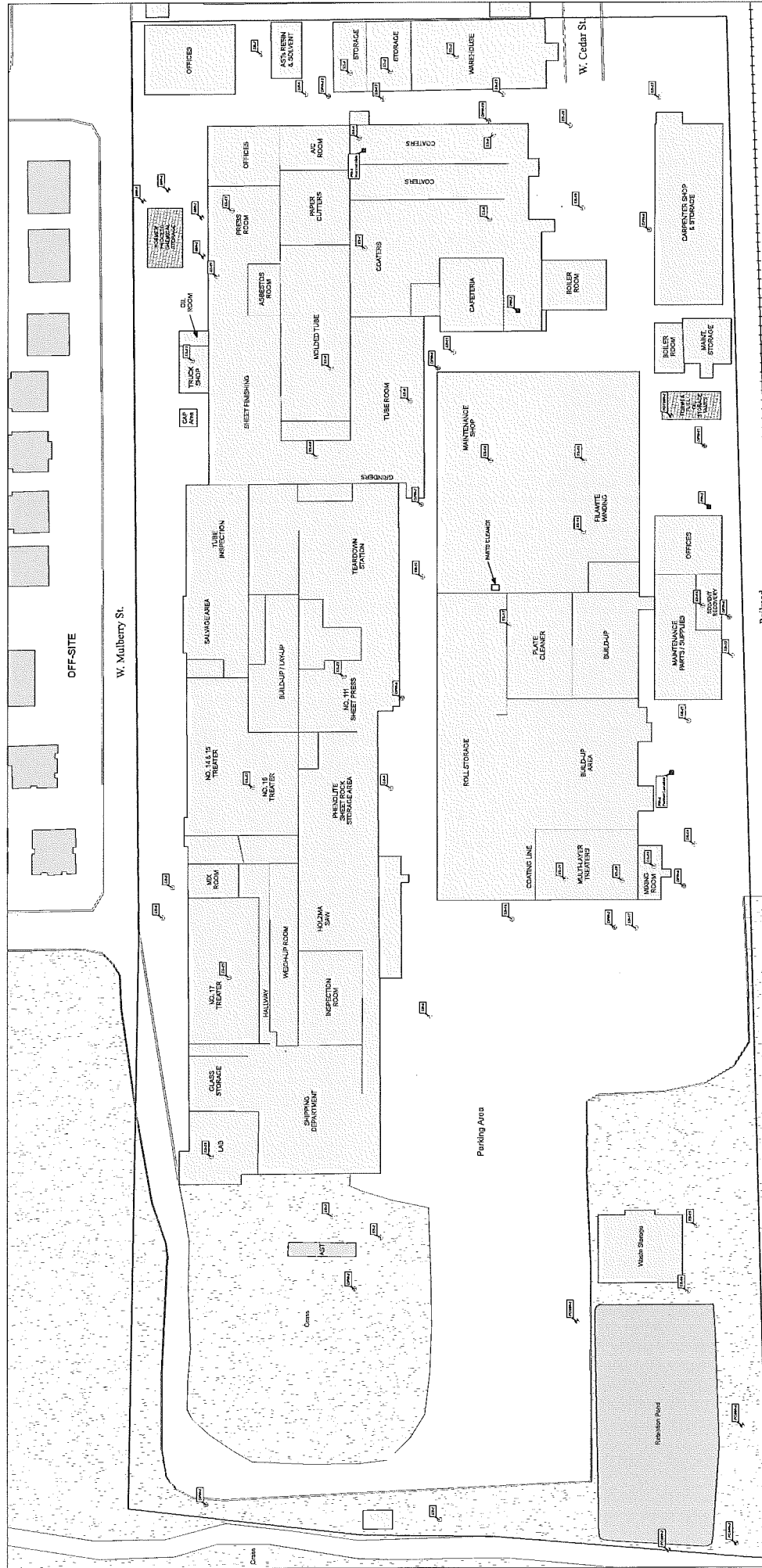
**Created:** 10/10/2005 08:30 PM

**Last Updated:** 11/06/2008 12:00 PM

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**APPENDIX E: SITE MAP**

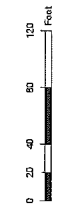


**DRAFT**

<b>NVF Facility</b>		<b>SITE BASE-MAP</b>	
<b>Kennett Square, PA</b>			
DRAWN BY:	DATE:	PROJECT NO.:	SCALE:
APPROVED BY:	DATE:	PROJECT NO.:	SCALE:
			1



**Environmental Alliance, Inc.**  
 1813 Newport Gap Pike - Wilmington, DE 19808  
 Phone: (302) 395-7544 - Fax: (302) 395-6941



Drawn by: Environmental Alliance, Inc.  
 Scale of 1/8" = 1'-0" (ASME Y14.2M)  
 Map Projection: NAD 83, UTM Zone 18N



Legend	<ul style="list-style-type: none"> <li>Bedrock Well</li> <li>Existing Monitoring Well</li> <li>Monitoring Well / Soil Boring (June 2007)</li> <li>Soil Boring (Feb. 2006)</li> <li>Soil Boring (May 2007)</li> <li>Retention Pond</li> <li>Vegetation</li> <li>Edge of Pavement</li> <li>Offsite Facility</li> <li>Dirt Road</li> <li>Interior Wall</li> <li>Approx. Site Boundary</li> <li>Railroad</li> <li>AST</li> <li>Former Storage</li> <li>NVF Building</li> <li>Retention Pond</li> <li>Vegetation</li> <li>Offsite Facility</li> </ul>
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**APPENDIX F-1  
ENVIRONMENTAL ALLIANCE, INC.  
VAPOR MONITORING FORM**

**Project Name:**  
**Project Number:**  
**Contaminants:**

Date	Time	Ionization Detector Reading		Explosimeter Reading		Ozone Monitor Reading	Location	Purpose	Initials
		FID	PID	%LEL	%O <sub>2</sub>				

**APPENDIX F-2: LOCKOUT/TAGOUT PROCEDURES**

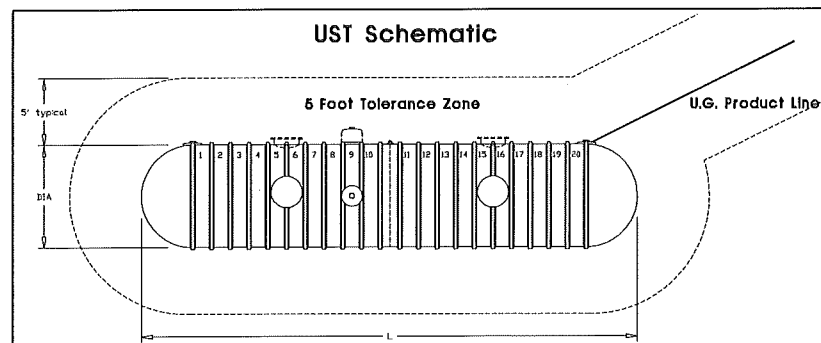
<b>APPENDIX F-2 SITE-SPECIFIC LOCKOUT/TAGOUT PROCEDURES</b>		
<b>Equipment</b>	<b>Operation</b>	<b>Lockout Method/Location</b>

### APPENDIX F-3: EXCAVATION/TRENCHING

<b>APPENDIX F-3 EXCAVATION/TRENCHING SAFETY PROCEDURES</b>	
<b>Egress: Excavation areas four feet or more deep</b>	
◆	Ladders must be spaced no more than 25 feet apart so that a person in the trench is always within 25 feet of a ladder for egress.
<b>Shoring: Excavation areas five feet or more deep</b>	
◆	Excavations must be sloped or shored if personnel will be entering the excavation.
◆	Soil classification may be done only by a competent person using both a visual and manual test.
WARNING: One soil classification may not be enough. Outside disturbances during excavation may change even the best classification. <b>Inspect the soil after any condition change.</b>	
<b>Storage: All excavations</b>	
◆	Spoils and heavy equipment must be stored a minimum of two feet from the edge of the excavation.
◆	Store spoils on the downhill side.

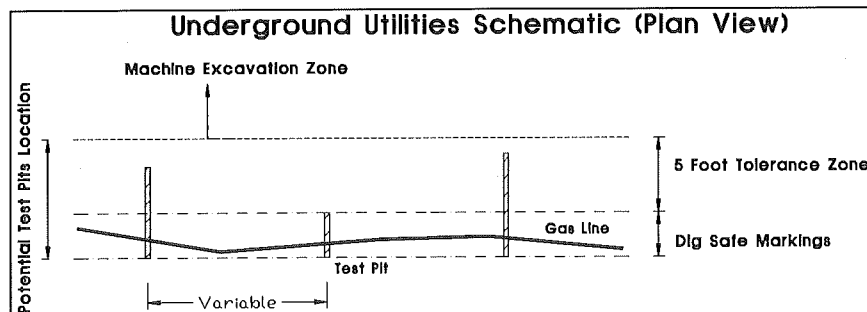
## APPENDIX F-3: EXCAVATION/TRENCHING - UNDERGROUND STORAGE TANKS

APPENDIX F-3 EXCAVATION/TRENCHING - UNDERGROUND STORAGE TANKS	
<b>Documentation:</b>	
◆	Refer to existing UST plans for potential location
◆	Contact property owners for potential location
◆	Contact local Fire or Building Department for information
<b>Physical Location Characteristics: Cross-check to existing documentation, if available</b>	
◆	Determine tank capacity (from tank chart, owner, delivery records)
◆	Determine tank opening locations and spacing
◆	Determine tank diameter (from tank chart, inventory records or gauge stick)
◆	Determine if tank is fiberglass or steel; single walled or double walled
◆	Refer to available UST vendor info charts on standard underground storage tanks for dimensions and tank opening locations
<b>Safety Procedures:</b>	
◆	Empty tank of flammable liquids prior to drilling. Purge tank of flammable vapors and eliminate ignition sources (if practical).
◆	Drill no closer than five feet from suspected tank location or other nearby underground utilities.
<b>General Notes:</b>	
◆	Concrete pad on top of the UST's is sized to overhang the footprint of the tanks by 1'-2' in each direction. Beware of exceptions.
◆	When possible, have the owner/client mark the locations for drilling and accept responsibility for potential mishaps in writing.
◆	Redundant information cross-checking to reduce oversight errors.
◆	Visual inspection of augered or excavated materials for pre-gravel, etc., indicative of UST backfill/bedding.



## APPENDIX F-3: EXCAVATION/TRENCHING - UNDERGROUND UTILITIES

APPENDIX F-3 EXCAVATION/TRENCHING - UNDERGROUND UTILITIES	
<b>Documentation:</b>	
◆	Contact the local utility service (Digsafe, Misutility...), and document Permit No.
◆	Accompany utility representative in questionable areas, elaborate trenching projects tight/tricky areas or whenever drilling adjacent to a building or structure.
◆	Contact the property owner and/or town building department for plans.
<b>Physical Location:</b>	
◆	Use a metal detector to aid in the identification of obstructions.
◆	Observe utility markers, vent pipes, catch basins, newly paved areas, etc.
<b>Safety Procedures:</b>	
◆	Machine excavate five feet from any underground utility, tank, or utility marker.
◆	Hand dig in utility "five-foot tolerance zone" until the service is exposed.
◆	Utilize test pits to establish and QC markers for sensitive utility locations.
<b>General Notes:</b>	
◆	Comply with local and state codes and regulations.
◆	Utilize experienced and trained equipment operators.
◆	Use appropriate subcontractors and applicable insurance riders.
◆	Hand dig per customer mandate.



### APPENDIX F-3: UNDERGROUND STORAGE TANK REMOVALS

APPENDIX F-3 UNDERGROUND STORAGE TANK REMOVALS*		
Minimum Action	Site Set-Up	Precautions
<ol style="list-style-type: none"> <li>1. Ignition sources must be eliminated.</li> <li>2. Designate a <b>no smoking</b> area.</li> <li>3. Use pneumatic/nonsparking tools when appropriate.</li> <li>4. Define the work area with barricades and hazard tape.</li> <li>5. Contact local underground utility locating service: Check location of all utilities including water and sewer.</li> <li>6. Wear modified Level D PPE: hard hat, safety glasses, steel-toed and shank boots, and traffic vest. This applies to all on-site personnel including subcontractors.</li> <li>7. Perform air monitoring with an oxygen/combustimeter and an organic vapor analyzer at frequent intervals.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ground vacuum truck.</li> <li>2. Park vacuum truck downwind of excavation.</li> <li>3. Vent vacuum truck vapors at least 12 feet from the ground surface; refer to the API recommendations for greater clearance requirements.</li> <li>4. Inert the tank with dry ice (1.5 lbs. dry ice per 100 gallons tank capacity) or nitrogen.</li> <li>5. Wear Level B PPE when cleaning tank interiors when indicated by HSR.</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify tank inerting has been accomplished by measuring oxygen to be less than 8%.</li> <li>2. Monitor LEL and organic vapors frequently in areas around tanks during removal process. Note: LEL measurements taken in oxygen deficient atmospheres (e.g., in inerted tanks) will not be accurate.</li> <li>3. Check local/state requirements for tank removal/disposal regulations.</li> <li>4. Assist subcontractor in performing tasks according to the SSP.</li> <li>5. Notify the Project Manager <b>immediately</b> when a sub-contractor will not follow site specific safety protocols. The Project Manager must inform the client.</li> </ol>
<p>* Refer to Environmental Alliance's Standard Operating Safety Procedure (SOSP) for detailed information.</p>		

## ENVIRONMENTAL ALLIANCE CONFINED SPACE ENTRY PERMIT (TO BE POSTED AT ENTRANCE)

Project Name:  
 Address:  
 Job #:  
 Reason for Entry:  
 Permit is valid from:  
 \_\_\_\_\_ AM/PM

To:  
 \_\_\_\_\_ AM/PM

Day    Date    Time    Day    Date    Time

Hazards

- |  |   |   |  |
|--|---|---|--|
| <input type="checkbox"/> Toxic Vapors  | <input type="checkbox"/> Soil Excavation                | <input type="checkbox"/> Drilling             | <input type="checkbox"/> Heavy Lifting                       |
| <input type="checkbox"/> Corr. Liquids | <input type="checkbox"/> Tank Excavation                | <input type="checkbox"/> Steam cleaning       | <input type="checkbox"/> Live electrical circuits            |
| <input type="checkbox"/> Flammability: | <input type="checkbox"/> Trenching                      | <input type="checkbox"/> Sand blasting        | <input type="checkbox"/> Lightning/rain/snow                 |
| <input type="checkbox"/> Asphyziants   | <input type="checkbox"/> Underground/overhead utilities | <input type="checkbox"/> Welding and cutting  | <input type="checkbox"/> Welding on vessel or enclosed space |
| <input type="checkbox"/> Extreme cold  | <input type="checkbox"/> Tank testing                   | <input type="checkbox"/> Drains/sumps checked | <input type="checkbox"/> Compressed gas                      |
| <input type="checkbox"/> Heat Stress   | <input type="checkbox"/> Tightness joints               | <input type="checkbox"/> Asbestos             | <input type="checkbox"/> under pressure                      |

Personal Safety

- |  |   |  |   |
|--|---|--|---|
| <input type="checkbox"/> Hard hats       | <input type="checkbox"/> Protective coveralls   | <input type="checkbox"/> Continuous ventilation  | <input type="checkbox"/> Properly shored trench     |
| <input type="checkbox"/> Steel toe boots | <input type="checkbox"/> Flame retardant suit   | <input type="checkbox"/> APR respirator          | <input type="checkbox"/> Properly sloped excavation |
| <input type="checkbox"/> Safety glasses  | <input type="checkbox"/> Inner glove            | <input type="checkbox"/> SAR respirator w/escape | <input type="checkbox"/> Escape ladder              |
| <input type="checkbox"/> Safety goggles  | <input type="checkbox"/> Outer glove            | <input type="checkbox"/> SCBA                    | <input type="checkbox"/> Tripod                     |
| <input type="checkbox"/> Face shield     | <input type="checkbox"/> Outer boots            | <input type="checkbox"/> Standby person          | <input type="checkbox"/> Harnes/lifeline            |
| <input type="checkbox"/> Traffic vest    | <input type="checkbox"/> First aid kit          | <input type="checkbox"/> Excavation plan         | <input type="checkbox"/> Communications             |
| <input type="checkbox"/> Ear protection  | <input type="checkbox"/> Safety shower/eye wash | <input type="checkbox"/> Decontamination         |   |

General Safety

- |  |  |   |   |
|--|--|---|---|
| <input type="checkbox"/> Fire alarm in area      | <input type="checkbox"/> Lockout & tagout          | <input type="checkbox"/> Two-wheeler                  | <input type="checkbox"/> Water hose running |
| <input type="checkbox"/> Smoking area designated | <input type="checkbox"/> Equip. grounded & bonded  | <input type="checkbox"/> Fire Blanket                 | <input type="checkbox"/> Area kept wet      |
| <input type="checkbox"/> Exclusion area          | <input type="checkbox"/> Explosion proof equipment | <input type="checkbox"/> CO <sub>2</sub> extinguisher | <input type="checkbox"/>                    |
| <input type="checkbox"/> Post warning signs      | <input type="checkbox"/> Ground fault interrupter  | <input type="checkbox"/> Dry powder extinguisher      | <input type="checkbox"/>                    |
| <input type="checkbox"/> Dig safe #              | <input type="checkbox"/> Non-metal ladders         | <input type="checkbox"/> Traffic cones                | <input type="checkbox"/>                    |
| <input type="checkbox"/> Disconnect & blank      | <input type="checkbox"/> Non-sparking tools        | <input type="checkbox"/> Flashing barricades          | <input type="checkbox"/>                    |

Employee Name	Responsibility	Time in	Time out	Time in	Time out
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Air Monitoring	Area/Comments	Time	%L.E.L.	%O <sub>2</sub>	Toxic
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Project Manager Signature: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 H&S Representative: \_\_\_\_\_  
 Date: \_\_\_\_\_