FINAL

Fort Monmouth Main Post and Charles Wood Area

Baseline Ecological Evaluation Work Plan

U. S. Army Garrison Fort Monmouth
Fort Monmouth, New Jersey

Directorate of Public Works



January 2010

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U.S. Army Corps of Engineers, Baltimore District
Contract Number W912DR-04-D-0026
Task Order No. 40

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ACM	Asbestos-Containing Materials
AST	Above-ground Storage Tank
B/N	Base/Neutral
BEE	Baseline Ecological Evaluation
bgs	below ground surface
BRAC	Base Realignment and Closure
CEA	Classification Exception Area
CECOM	U.S. Army Communications and Electronics Command
COC	Chain-of-Custody
COPEC	Contaminant of Potential Ecological Concern
COR	Contracting Officer's Representative
CWA	Charles Wood Area
DER	Declaration of Environmental Restriction
DPW	Directorate of Public Works
ECP	Environmental Condition of Property
EDD	Electronic Data Deliverable
EMI	Electromagnetic Induction
ESC	Ecological Screening Criteria
FID	Flame Ionization Detector
FSPM	Field Sampling Procedures Manual
ft msl	feet above mean sea level
FTMM	Fort Monmouth
GPS	Global Positioning System
GWQC	Groundwater Quality Criteria
HPLC	High Performance Liquid Chromatography
IA	Installation Assessment
IDW	Investigation-Derived Waste
IRP	Installation Restoration Program
LQMP	Laboratory Quality Management Plan
MDL	Method Detection Limit
MP	Main Post
MS	Matrix Spike
MSD	Matrix Spike Duplicate
N.J.A.C.	New Jersey Administrative Code
NAD	North American Datum
NFA	No Further Action

NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PID	Photoionization Detector
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
R&D	Research and Development
RA	Remedial Action
RAM	Radioactive Materials
RI	Remedial Investigation
RPD	Relative Percent Difference
Shaw	Shaw Environmental, Inc.
SI	Site Investigation
SOP	Standard Operating Procedure
SRP	Site Remediation Program
STP	Sewage Treatment Plant
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TBA	Tertiary Butyl Alcohol
TCE	Trichloroethene
TCL	Target Compound List
TPH	Total Petroleum Hydrocarbons
TRSR	Technical Requirements for Site Remediation
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compound
VSI	Visual Site Inspection
WP	Work Plan

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE), Baltimore District, tasked Shaw Environmental, Inc. (Shaw) to perform a Baseline Ecological Evaluation (BEE) at Fort Monmouth (FTMM) to fulfill requirements as set forth in New Jersey Department of Environmental Protection (NJDEP) Technical Requirements for Site Remediation (TRSR) [New Jersey Administrative Code (N.J.A.C.) 7:26E-3.11]. This Work Plan (WP) has been prepared under the Baltimore Architectural and Engineering Services Contract Number W912DR-05-D-0026 (Task Order 40) and is based on the Scope of Work dated June 3, 2008, and information obtained through consultation with FTMM, U.S. Army Environmental Command, ,USACE, and NJDEP personnel.

Fort Monmouth is an Army installation occupying approximately 1,126 acres in Monmouth County in central New Jersey, approximately 40 miles east of Trenton. FTMM is comprised of two operational areas known as the Main Post (MP) and the Charles Wood Area (CWA). The MP encompasses the 673-acre area that is generally bounded by State Highway 35 to the west, Parkers Creek to the north, the New Jersey Transit Railroad to the east, and Main Street and State Highway 71 to the south. The CWA encompasses the 489-acre area bounded by the Garden State Parkway to the west, Tinton Avenue to the north, Maxwell Place and the New Jersey Transit Railroad to the east, and Pine Brook to the south.

The primary mission of FTMM is to provide command, administrative, and logistical support for Headquarters, U.S. Army Communications and Electronics Command. The support provided by the Garrison is used by tenants in the performance of research, development, procurement, and production of prototype communications and electronics equipment for use by the U.S. Armed Forces. The MP provides supporting administrative, training, and housing functions, as well as many of the community and industrial facilities for FTMM. These facilities are distributed across the property, with no distinct clustering of functions. The CWA is used primarily for research and development, testing, housing, and recreation. The CWA research, development, and testing facilities occupy the southwest corner of CWA. The northwest corner formerly consisted of residential units but is currently undeveloped. Residential units currently occupy the southeastern boundary, and the golf course occupies the northeast corner. In 2005, FTMM was identified as a facility to be closed as part of the Defense Base Realignment and Closure Act of 1990 (BRAC), Public Law 101-510 as amended. As part of this process, it is necessary for the Army to identify and document the environmental liabilities associated with installations where the BRAC action will involve the disposal of property. The environmental condition of property (ECP) process is the mechanism to provide a summary of the current environmental condition of a property.

A Phase I ECP Assessment was conducted in 2006 and 2007. The final Phase I ECP Report for FTMM was completed on January 29, 2007 (Shaw, 2007). The Phase I ECP evaluated the existing environmental conditions, and the property was characterized into parcels according to their environmental condition based on Department of Defense guidelines. Using the results of the Phase I ECP Report, site investigation (SI) sampling recommendations were developed for 21 specific parcels and two areas of concern where no existing data or insufficient data were present to fully evaluate the environmental condition of the property. The SI was conducted in 2007 and 2008 and the final SI Report for FTMM was completed on July 21, 2008 (Shaw, 2008). Eight parcels identified through the FTMM SI were deemed to require further evaluation through the BEE process to fully evaluate the environmental condition of the property. NJDEP concurred with the determination that a BEE is required for these eight ECP sites in correspondence dated October 28, 2008.

Within the FTMM MP and CWA are 27 active/open Installation Restoration Program (IRP) Sites. The NJDEP has indicated to the Army that BEEs pursuant to N.J.A.C. 7:26E-3.11 are required at open/active IRP sites prior to considering No Further Action (NFA) determinations. Of these 27 IRP Sites, 14 are considered to require further evaluation through the BEE process. In addition to these IRP Sites, it was determined that a BEE should also be conducted related to FTMM-20, which had been listed as Response Complete in the 2007 Installation Action Plan for FTMM (Fort Monmouth, 2007).

The NJDEP describes the purpose of conducting a BEE as follows (NJDEP, 2009a):

A critical part of every site investigation is the baseline ecological evaluation required in N.J.A.C 7:26E-3.11. The Technical Requirements for Site Remediation require each person conducting the remediation of a contaminated site or area of concern to conduct a baseline ecological

evaluation as part of the process to ensure that the resulting remedy is protective of the environment. The Department uses the information that the person is already required to collect in the baseline ecological evaluation as the first step in determining whether or not natural resource injuries potentially exist as a result of a discharge at a site. In the baseline ecological evaluation, the person responsible for conducting the remediation must determine whether or not any natural resources may have been injured by a discharge.

The BEE is Tier I of the ecological evaluation and ecological risk assessment process as developed by the Site Remediation Program (SRP), and is defined in the TRSR and Site Remediation News (NJDEP, 1997). The BEE was developed to be an efficient and cost-effective screening process. As such, the results of the BEE will be a conclusion as to whether potential ecological impacts are negligible or whether more site-specific ecological evaluation is warranted.

The objective of the BEE at FTMM is to examine each of the 23 identified sites (8 ECP parcels and 15 IRP sites) and the sample results from sediment, surface water, soil, and groundwater at these sites for the co-occurrence of 1) contaminants of potential ecological concern (COPECs), 2) environmentally sensitive natural resources, and 3) a chemical migration pathway to these sensitive natural resources. The objective will be reached by completing these tasks: a data and literature review; a field investigation, including field sampling as applicable; and data analysis and ecological hazard characterization. An additional objective of the field sampling is to provide information regarding the general background characteristics of surface water and sediment in the FTMM area through the collection of several upgradient samples to assist risk managers in the decision-making process.

The occurrence of COPECs is typically determined through a comparison of existing site data with ecological screening levels. The occurrence of environmentally sensitive natural resources and of potential chemical migration pathways will be determined from existing literature for the site, a qualitative site visit, and other available information such as the NJDEP Natural Heritage database. Reviews of the NJDEP tidal and freshwater wetland maps, the U.S. Geological Survey topographic maps, and the U.S. Department of Agriculture Soil Conservation Service soil survey map will be performed to provide an overview of the habitat expected to occur at or in the vicinity of the site. The qualitative site visit is conducted for the purpose of verifying information gathered previously and to identify existing ecology communities and species, environmentally sensitive natural resources, and potential contaminant pathways.

If it is determined through the BEE process that there are COPECs present, that there are environmentally sensitive natural resources at or near the sites, and that there are potential pathways from the contamination to the environmentally sensitive natural resources, than further ecological investigation or risk assessments may be required. The nature of these investigations or Tier II and Tier III assessments would be determined based on the findings of the BEE and conducted in accordance with U.S. Environmental Protection Agency (USEPA, 1989) and other applicable guidance.

Though a BEE WP is not required by N.J.A.C. 7:26E, this WP was prepared to document the sites at FTMM that would be addressed through the BEE process, the existing data that would be used in performance of the BEEs, and the need for samples from some environmental media, particularly sediment, that would be collected prior to conducting the BEEs.

Prior to preparing this WP, several data needs were identified without which potential ecological contaminant exposure pathways could not be addressed. This WP includes brief descriptions and summaries of the previous investigations that have been completed at various sites at FTMM, descriptions of methodologies and procedures that will be followed during the course of the BEE, and descriptions of the field activities and sampling rationale for completing the additional sampling (collection of a total of 4 surface soil samples, 97 sediment samples, and 50 surface water samples) to be performed prior to conducting the BEE.

This investigation will be used by the Army to determine if any future needs or actions are necessary in order to obtain an NFA Letter from the NJDEP. The NJDEP SRP, as well as the Office of Natural Resources Restoration, will determine whether ecological injuries may have occurred and whether further investigations are required.

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Baltimore District, tasked Shaw Environmental, Inc. (Shaw) to perform a Baseline Ecological Evaluation (BEE) at Fort Monmouth (FTMM) to fulfill requirements as set forth in New Jersey Department of Environmental Protection (NJDEP) Technical Requirements for Site Remediation (TRSR) [New Jersey Administrative Code (N.J.A.C.) 7:26E-3.11]. This Work Plan (WP) has been prepared under the Baltimore Architectural and Engineering Services Contract Number W912DR-05-D-0026 (Task Order 40) and is based on the Scope of Work dated June 3, 2008, and information obtained through consultation with FTMM, U.S. Army Environmental Command, USACE, and NJDEP personnel.

FTMM is located in the central-eastern portion of New Jersey in Monmouth County (**Figure 1-1**). The installation includes Main Post (MP), Charles Wood Area (CWA), and the Evans Area. This WP only addresses the MP (**Figure 1-2**) and the CWA (**Figure 1-3**). The MP encompasses an area of approximately 637 acres and is bounded by State Highway 35 to the west, Parkers Creek and Lafetra Creek to the north, the New Jersey Transit Railroad to the east, and a residential neighborhood to the south. The CWA encompasses an area of approximately 489 acres and is located 1 mile west of MP. The CWA is bounded by Tinton Avenue to the north, residential development and Pine Brook Road to the south, Maxwell Place and New Jersey Transit Railroad to the east, and the Garden State Parkway to the west. The MP and CWA were selected in 2005 for closure under the Defense Base Closure and Realignment Act of 1990 (BRAC), Public Law 101-510, as amended.

The primary mission of FTMM is to provide command, administrative, and logistical support for Headquarters, U.S. Army Communications and Electronics Command. The support provided by the Garrison is used by tenants in the performance of research, development, procurement, and production of prototype communications and electronics equipment for use by the U.S. Armed Forces. The MP provides supporting administrative, training, and housing functions, as well as many of the community and industrial facilities for FTMM. These facilities are distributed across the property, with no distinct clustering of functions. The CWA is used primarily for research and development (R&D), testing, housing, and recreation. The CWA research, development, and testing facilities occupy the southwest corner of CWA. The northwest corner formerly consisted of residential units but is currently undeveloped. Residential units currently occupy the southeastern boundary, and the golf course occupies the northeast corner. Fort Monmouth was identified as a facility to be closed as part of BRAC 2005. As part of this process, it is necessary for the Army to identify and document the environmental liabilities associated with installations where the BRAC action will involve the disposal of property. The environmental condition of property (ECP) process is the mechanism to provide a summary of the current environmental condition of a property.

A Phase I ECP Assessment was conducted in 2006 and 2007. The final Phase I ECP Report for FTMM was completed on January 29, 2007 (Shaw, 2007). The Phase I ECP evaluated the existing environmental conditions, and the property was characterized into parcels according to their environmental condition based on Department of Defense guidelines. Using the results of the Phase I ECP Report, site investigation (SI) sampling recommendations were developed for 21 specific parcels and two areas of concern where no existing data or insufficient data were present to fully evaluate the environmental condition of the property. The SI was conducted in 2007 and 2008 and the final SI Report for FTMM was completed on July 21, 2008 (Shaw, 2008). Eight parcels identified through the FTMM SI were deemed to require further evaluation through the BEE process to fully evaluate the environmental condition of the property. NJDEP concurred with the determination that a BEE is required for these eight ECP sites in correspondence dated October 28, 2008.

Within the FTMM MP and CWA are 27 active/open Installation Restoration Program (IRP) Sites. The NJDEP has indicated to the Army that BEEs pursuant to the TRSR (N.J.A.C. 7:26E-3.11; NJDEP, 2008) are required at open/active IRP sites prior to considering No Further Action (NFA) determinations. The NJDEP determination was documented in correspondence pertaining to IRP Sites M-12 and M-14 Landfills (dated July 25, 2007), IRP Site M-18 Landfill (dated August 14, 2007), and Building 283 (dated October 24, 2007). Of the 27 IRP Sites, 14 (FTMM-2, 3, 4, 5, 8, 12, 14, 15, 16, 18, 25, 28, 59, and 61) are considered to require further evaluation through the BEE process. In addition to these IRP Sites, it was determined that a BEE should also be conducted related to FTMM-20, which had been listed as

Response Complete in the 2007 Installation Action Plan for FTMM (Fort Monmouth, 2007). **Section 3.0** of this WP describes each of the IRP and ECP sites that were selected for inclusion in the BEE process, summarizes the previous findings, and describes the rationale for inclusion.

Though a BEE WP is not required by N.J.A.C. 7:26E, this WP was prepared to document the sites at FTMM that would be addressed through the BEE process, the existing data that would be used in performance of the BEEs, and the need for samples from some environmental media, particularly sediment, that would be collected prior to conducting the BEEs.

1.1 PURPOSE AND OBJECTIVES

The BEE is Tier I of the ecological evaluation and ecological risk assessment process as developed by the Site Remediation Program (SRP), and is defined in the TRSR and Site Remediation News (NJDEP, 1997). The BEE was developed to be an efficient and cost-effective screening process. As such, the results of the BEE will be a conclusion as to whether potential ecological impacts are negligible or whether more site-specific ecological evaluation is warranted.

The objective of the BEE at FTMM is to assess whether the presence of constituents of concern in sediments, surface water, soil, and groundwater on MP and CWA has the potential for adverse effects to biological receptors. This assessment will be made through the examination of information on each of the 23 identified sites (8 ECP parcels and 15 IRP sites) and the sample results from sediment, surface water, soil, and groundwater at the sites for the co-occurrence of 1) contaminants of potential ecological concern (COPECs), 2) environmentally sensitive natural resources, and 3) a chemical migration pathway to these sensitive natural resources. The objective will be reached by completing these tasks: a data and literature review, a qualitative site visit, field sampling, and data analysis and ecological hazard characterization. An additional objective of the field sampling is to provide information regarding the general background characteristics of surface water and sediment in the FTMM area through the collection of several upgradient samples to assist risk managers in the decision-making process.

The occurrence of COPECs is typically determined through a comparison of existing site data with ecological screening levels. The occurrence of environmentally sensitive natural resources and of potential chemical migration pathways will be determined from existing literature for the site, a qualitative site visit, and other available information such as the NJDEP Natural Heritage database. Reviews of the NJDEP tidal and freshwater wetland maps, the U.S. Geological Survey (USGS) topographic maps, and the U.S. Department of Agriculture (USDA) Soil Conservation Service soil survey map will be performed to provide an overview of the habitat expected to occur at or in the vicinity of the site. The qualitative site visit is conducted for the purpose of verifying information gathered previously and to identify existing ecology communities and species, environmentally sensitive natural resources, and potential contaminant pathways.

If it is determined through the BEE process that there are COPECs present, that there are environmentally sensitive natural resources at or near the sites, and that there are potential pathways from the contamination to the environmentally sensitive natural resources, than further ecological investigation or risk assessments may be required. The nature of these investigations or Tier II and Tier III assessments would be determined based on the findings of the BEE and conducted in accordance with U.S. Environmental Protection Agency (USEPA, 1989) and other applicable guidance.

This investigation will be used by the Army to determine if any future needs or actions are necessary in order to obtain an NFA Letter from NJDEP. The NJDEP SRP, as well as the Office of Natural Resources Restoration, will determine whether ecological injuries may have occurred and whether further investigations are required.

1.2 PROPOSED SCOPE OF WORK

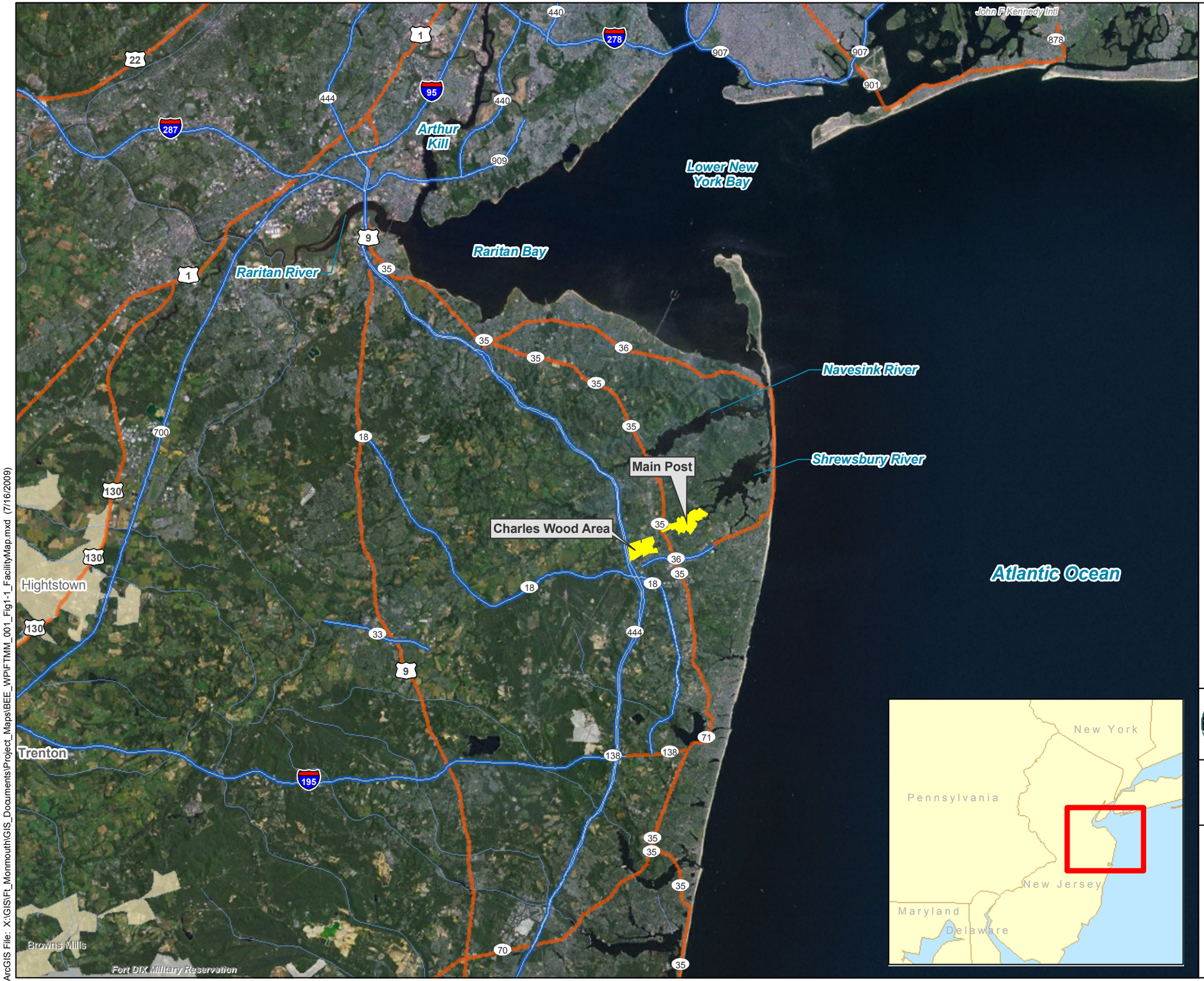
The following activities will be completed for the BEE at MP and the CWA:

- Complete a surface water and sediment investigation of Lafetra Creek, Parkers Creek, Mill Creek, Oceanport Creek, and Husky Brook in the vicinity of designated IRP and ECP sites on MP and the CWA through the collection of 97 sediment and 50 surface water samples.

- Obtain surface soil samples as necessary (a total of four samples from one site) to assist in completion of the BEE for select IRP sites.
- Conduct a qualitative site visit in order to identify habitat types and environmentally sensitive natural resources as well as potential contamination migration pathways to those environmentally sensitive natural resources. Information available through the NJDEP's Geographical Information System and existing site reports will also be reviewed as part of this task.
- Compare the existing surface water, sediment, surface soil, and groundwater data, along with the data from surface water, sediment, and soil sampling, with NJDEP ecological screening criteria (ESC) to identify COPECs.
- Prepare a BEE report providing conclusions regarding whether the sites present no ecological risk or whether additional information is needed and whether or not any natural resources may have been injured by a discharge.

1.3 WORK PLAN ORGANIZATION

Section 2.0 describes the location of the sites, provides site background information, and summarizes the environmental setting. **Section 3.0** identifies and describes individual sites that are to be addressed through the BEE. **Section 4.0** describes the objectives and approach to be followed for the BEE. **Section 5.0** describes the methodologies and procedures that will be followed to complete the field operations. **Section 6.0** describes the Quality Assurance (QA)/Quality Control (QC) procedures that will be employed during the course of the remedial activities. **Section 7.0** provides a list of references used in developing the WP. **Appendix A** contains the applicable NJDEP ESC and **Appendix B** is the Site-Specific Health and Safety Plan.



LEGEND

Ft Monmouth Installation Area

Note: Aerial photography (1-meter resolution) was obtained from ESRIArcOnline World Imagery Map Services.

N

Scale:

0 2 4 8 Miles

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 1-1

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION WORKPLAN

FACILITY LOCATION MAP

FORT MONMOUTH
NEW JERSEY

ArcGIS File: X:\GIS\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_WP\FTMM_001_Fig1-1_FacilityMap.mxd (7/16/2009)



LEGEND

- Road Centerline
- Water Feature
- Building
- Installation Boundary

Note: Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.

N

Scale:

0 450 900 1,800 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

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FIGURE 1-2

FORT MONMOUTH BASELINE ECOLOGICAL EVALUATION WORKPLAN

MAIN POST SITE MAP

FORT MONMOUTH
NEW JERSEY

ArcGIS File: N:\GIS\FR_Monmouth\GIS_Documents\Project_Maps\BEE_WP\FTMM_002_Fig1-2_MP_SiteMap_BEE_WP.mxd (4/7/2009)



LEGEND

- Road Centerline
- Water Feature
- Building
- Installation Boundary

Note: Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.

N

Scale:

0 290 580 1,160 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

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FIGURE 1-3

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION WORKPLAN

CHARLES WOOD AREA
SITE MAP

FORT MONMOUTH
NEW JERSEY

ArcGIS File: N:\GIS\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_WP\FTMM_003_Fig1-3_CWA_SiteMap_BEE_WP.mxd (4/7/2009)

2.0 SITE BACKGROUND AND ENVIRONMENTAL SETTING

The following sections summarize the site background and environmental setting of the geographical area surrounding the FTMM MP and CWA. Included is a description of the site location, site background and current conditions, and environmental setting, including regional and local geology, hydrogeology, topography, surface drainage, and ecology.

2.1 SITE LOCATION AND DESCRIPTION

FTMM is located in the central-eastern portion of New Jersey in Monmouth County, approximately 45 miles south of New York City, 70 miles northeast of Philadelphia, and 40 miles north of Trenton. The Atlantic Ocean is approximately 3 miles to the east. FTMM falls within the boroughs of Eatontown, Oceanport, and Tinton Falls. The areas surrounding FTMM are characterized by a mixture of residential, commercial, and light industrial uses. A review of the land use plans for the surrounding municipalities shows that land uses are compatible with those along the inside perimeter of FTMM. FTMM occupies approximately 1,126 acres and is currently comprised of two operational areas: the MP and the CWA. The two areas are located about 2 miles from one another.

The primary mission of FTMM is to provide command, administrative, and logistical support for the U.S. Army Communications and Electronics Command (CECOM) Headquarters. The Installation performs research, development, procurement, and production of prototype communications and electronics equipment for use by the U.S. Armed Forces.

2.1.1 MAIN POST

The MP provides supporting administrative, training, and housing functions, as well as many of the community and industrial facilities for FTMM. These facilities are distributed across the property, with no distinct clustering of functions. The MP encompasses approximately 637 acres and contains a total of 397 buildings and structures. The MP is bounded by State Highway 35 to the west, Parkers Creek to the north, the New Jersey Transit Railroad to the east, and Main Street and State Highway 71 to the south. Universal Transverse Mercator (UTM) coordinate locations [North American Datum (NAD) 83, Zone 18, meters] for the MP include:

- Northeast Corner: 582178.33995, 4463977.92694
- Southeast Corner: 582755.27789, 4463525.90188
- Northwest Corner: 579532.14255, 4462789.29460
- Southwest Corner: 579689.14842, 4462269.63793

2.1.2 CHARLES WOOD AREA

The CWA is used primarily for R&D, testing, housing, and recreation. The CWA R&D and testing facilities occupy the southwest corner of the subpost. Residential areas are located along the southeastern boundary and were formerly located in the northwest corner; the golf course occupies the northeast corner. The CWA, located 2 miles west of the MP, is composed of approximately 489 acres and contains a total of 241 buildings and structures. The CWA is bounded by the Garden State Parkway to the west, Tinton Avenue to the north, Maxwell Place and the New Jersey Transit Railroad to the east, and Pine Brook Road to the south. UTM coordinate locations for the CWA (NAD83, Zone 18, meters) include:

- Northeast Corner: 578997.83200, 4462033.09195
- Southeast Corner: 579386.98486, 4460899.58327
- Northwest Corner: 577293.44846, 4461472.84017
- Southwest Corner: 577466.30241, 4460271.56946

2.2 HISTORIC LAND USE

Historical Army uses of the FTMM MP and CWA property are well documented in “A Concise History of the U.S. Army Communications-Electronics Life Cycle Management Command and Fort Monmouth, New Jersey” (U.S. Army Communications-Electronics Life Cycle Management Command, 2005) and “Fort Monmouth: Landmarks and Place Names” (Kozlowski, 2004). The following sections provide a brief summary of the historical uses of the sites.

2.2.1 MAIN POST

The original FTMM Army camp, established for signal troop training in 1917, was located at Little Silver, New Jersey. The historic land use of the area included a 1-mile horse racing track, Monmouth Park, established in 1870. The track was located in the vicinity of Patterson Army Health Clinic near the intersection of Broad Street and Park Avenue. Monmouth Park operated for 20 years. A larger Monmouth Park was reconstructed and opened on July 4, 1890. The oval track was centered on present day Greeley Field. The entire facility encompassed 640 acres (almost all of the MP area). Grandstands and a luxury hotel along Parkers Creek were part of the associated land uses. The Monmouth Park Race Track closed in 1893. Vacated buildings and structures fell into ruin and the hotel burned to the ground in 1915. The land was owned by Redacted - Privacy Act when it was evaluated for use by Camp Little Silver. The Army leased 468 acres from Mr. Redacted - Privacy Act on May 16, 1917. Prior to the Army's lease, the land had been farmed, producing a potato crop for approximately 4 years. The leased area was bounded on the north by the Shrewsbury River (currently referred to as Parkers' Creek), on the west and south by a stone road from Eatontown, and on the east by Oceanport-Little Silver Road. The condition of the land was reported as overgrown and overrun with poison ivy. The land was purchased by the government in 1919.

2.2.2 CHARLES WOOD AREA

The CWA was acquired by the Army in 1941. The CWA tract included the former Monmouth County Country Club (originally Sun Eagles Country Club), Olmstead Gardens, and areas currently occupied by the golf course and Myer Center. FTMM personnel indicated an orchard was located in the golf course area prior to Army acquisition. The Sun Eagles Country Club was constructed in the 1920s and included a clubhouse (currently Gibbs Hall), an 18-hole golf course, a polo field, and an airfield. A 7,000-troop cantonment area was immediately built on the land, including barracks, mess halls, a school building, an office building, a recreation hall, a Post Exchange, an infirmary, and a chapel.

2.3 FACILITY HISTORY

The MP of FTMM was established on June 17, 1917, as Camp Little Silver. The name of the Camp was changed after 3 months to Camp Alfred Vail. The initial mission of the Camp was to train Signal Corps operators for service in World War I. In the first 19 months of the Camp's existence, 129 semi-permanent structures were built, a tent camp established on the site of a former swamp, and a parade ground established on the site of a former marsh. A radio laboratory and an airfield were constructed in 1918. After the war, Camp Vail was designated as the site of the Signal Corps School, the only training area for Signal Corpsmen in the country. All but four World War I structures were demolished by 1924.

In 1925, the facility became a permanent post, and its name was changed to Fort Monmouth. The primary mission of FTMM continued to be Signal Corps training and electronics research. In 1934, laboratory operations were consolidated in a new facility, Squier Laboratory (Building 283). Research on radios and radar continued here until the early 1950s. During World War II, the pace of training increased tremendously at FTMM. The expanded laboratory effort was accomplished by starting new laboratories at other post facilities. Squier Laboratory continued to be the principal laboratory on the MP until 1954. In 1955 and 1956, 72 World War II wooden structures were demolished to make room for permanent structures. These new buildings were used for residential, administrative, commercial, and recreational purposes. A small number of additional administrative buildings were completed during the 1970s, 1980s, and 1990s.

Camp Charles Wood was purchased in 1941 and opened in 1942. The eastern half of the property was formerly a golf course, and the western half was residential property and farmland. During World War II, the Camp was used for training Signal Corpsmen. Antenna shelters were constructed on 26.5 acres of land and used by the Signal Corps Laboratory for R&D purposes.

A new R&D facility, the Myer Center (Building 2700), was completed in 1954. R&D activities that had formerly been conducted at Squier Laboratory and some activities from the Evans Area were transferred to the Myer Center. To this day, laboratories within the Myer Center facility continue to develop state-of-the-art electronic and communications equipment for use by the U.S. Armed Forces. FTMM has a long history of R&D activity. The majority of this activity has been related to communications

and electronic equipment. For the completion of these research activities, FTMM has operated and continues to operate a variety of laboratories. Additionally, FTMM has a significant history of training and housing troops. In support of these activities, FTMM has had a full complement of support activities including vehicle maintenance, warehousing, medical and dental services, photo processing, printing, historic solid waste handling methods (i.e. landfills), and facility infrastructure [i.e., underground storage tanks (USTs)]. Many of the former activities have resulted in environmental releases that are being addressed within the IRP and BRAC ECP processes.

2.4 ENVIRONMENTAL SETTING

The following is a description of the geological and hydrogeological setting of the area. The information in the following sections was taken from previous environmental reports produced by Roy F. Weston, Inc. (1995).

2.4.1 CLIMATE

The climate, temperature, and humidity of Monmouth County, New Jersey, is characteristic of the temperate zone of the Mid-Atlantic states. The mean annual temperature for Monmouth County is about 52 degrees Fahrenheit (°F); the summers are generally warm, with an average temperature around 70°F and average minimum and maximum temperatures above 60°F and 80°F, respectively. Winters are moderate, with an average temperature around 30°F.

Precipitation in Monmouth County averages between 40 and 50 inches per year; slightly more than half the total annual precipitation falls between April and September. Thunderstorms generally occur during the summer months, and hurricanes or tropical storms move northward along the Mid-Atlantic coast.

2.4.2 TOPOGRAPHY

The land surface at the MP is relatively flat and ranges in elevation from 4 feet above mean sea level (ft msl) in the east at Oceanport Creek to 32 ft msl at the western end of the post, near Highway 35. The eastern half of the post is generally 10 ft msl in elevation. The greatest elevation is at Landfill 8, located on Parkers' Creek, and along Lafetra Creek, Mill Creek, and Husky Brook.

At CWA, the land surface slopes from 72 ft msl in the southwest to 20 ft msl at the eastern end of the golf course. In general, the southwestern corner of CWA is gently rolling and has the greatest relief.

2.4.3 SURFACE WATER DRAINAGE AND WETLANDS

Within the western part of the MP, surface water runoff flows either north into Lafetra Creek or south into Mill Creek. Lafetra Creek and Mill Creek both originate off site to the west of the MP. Mill Creek flows along the southern boundary of MP until it turns north and joins Lafetra Creek to form Parkers Creek. Parkers Creek flows eastward along the northern boundary and joins Oceanport Creek east of MP. Most of Parkers Creek, Lafetra Creek, and Mill Creek are tidally influenced.

Surface water runoff from the southern half of the MP flows into Husky Brook and Husky Brook Lake through a series of drainage ditches and outfalls. Husky Brook originates off site to the west of the MP and flows into Husky Brook Lake on site. Husky Brook exits Husky Brook Lake and flows into Oceanport Creek, which forms the southern boundary of the eastern area. Oceanport Creek and Husky Brook below Husky Brook Lake are tidally influenced.

The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory indicates the presence of wetlands at the MP. Parkers Creek and Oceanport Creek are classified as estuarine and marine deepwater with estuarine and marine wetland areas. Husky Brook and Lafetra Creek are classified predominantly as freshwater riverine, emergent wetland, and forested/shrub wetland. Husky Brook Lake is classified as a freshwater pond.

Surface water runoff at the CWA is drained by Wampum Brook and Shrewsbury Creek. Shrewsbury Creek flows eastward through the center of the CWA and Wampum Brook flows along the southern boundary. These join east of the CWA before becoming Wampum Lake. Wampum Lake discharges into Mill Creek, which flows through the MP.

Several wetland areas are identified on the USFWS National Wetland Inventory. Most of Shrewsbury Creek and Wampum Brook are classified as freshwater forested/shrub wetland, and the open water in the golf course in the eastern portion of the CWA is classified as a freshwater pond.

2.4.4 REGIONAL AND LOCAL GEOLOGY

Monmouth County lies within the New Jersey Section of the Atlantic Coastal Plain physiographic province. The MP, as well as the CWA and the Evans Area, are located in what may be referred to as the Outer Coastal Plain subprovince or the Outer Lowlands.

In general, New Jersey Coastal Plain formations consist of a seaward-dipping wedge of unconsolidated deposits of clay, silt, and gravel. These formations, which typically strike northeast-southwest with a dip ranging from 10 to 60 feet per mile, were deposited on Precambrian and lower Paleozoic rocks. The sediments, predominantly derived from deltaic, shallow marine, and continental shelf environments, date from the Cretaceous through the Quaternary Periods. The mineralogy ranges from quartz to glauconite.

The formations record several major transgressive/regressive cycles and contain units that are generally thicker to the southeast and reflect a deeper water environment. Over 20 regional geologic units are present within the sediments of the Coastal Plain. Regressive, upward coarsening deposits are usually aquifers (for example, the Englishtown and Kirkwood Formations, and the Cohansey Sand), while the transgressive deposits act as confining units (for example, the Merchantville, Marshalltown and Navesink formations). The individual thicknesses for these units vary greatly (that is, from several feet to several hundred feet).

Based on the regional geologic map, the Cretaceous Age Red Bank and Tinton Sands outcrop at the MP. The Red Bank sand conformably overlies the Navesink Formation and dips to the southeast at a slope of 35 feet per mile. The upper member of the Red Bank Sand (Shrewsbury) is a yellowish-gray to reddish-brown clayey, medium- to coarse-grained sand that contains abundant rock fragments, minor mica, and glauconite. The lower member (Sandy Hook) is a dark gray to black, medium- to fine-grained sand with abundant clay, mica, and glauconite.

The Tinton sand conformably overlies the Red Bank sand and ranges from a clayey medium- to very coarse-grained feldspathic quartz and glauconite sand to a glauconitic coarse sand. The color varies from dark yellowish-orange or light brown to moderate brown, and from light olive to grayish-olive. Glauconite may constitute 60 to 80 percent of the sand fraction in the upper part of the unit. The upper part of the Tinton sand is often highly oxidized and iron-oxide encrusted.

Both the Tinton sand and the Hornerstown sand (or marl) crop out at the CWA. The Hornerstown unconformably overlies the Tinton sand and is a dusky-green to grayish-olive or grayish-olive-green clayey glauconitic sand that may oxidize to moderate reddish-brown and dusky red. The percentage of quartz sand ranges from a few percent to 30 percent. Approximately half of this formation is composed of silt and clay.

The Kirkwood Formation (part of the Kirkwood-Cohansey system) crops out southeast of the MP and dips to the southeast at a slope of 20 feet per mile. The Kirkwood Formation consists of alternating layers of sand and clay. The upper unit is a light gray to yellowish-brown fine-grained quartz sand with quartz nodules and small pebbles. The lower unit is a brown silt in Monmouth County.

2.4.5 SOILS

According to the Monmouth County Soil Survey (USDA, 2008), much of the MP is covered by urban land (developed land with disturbed soils). The majority of the area is of the Udorthents-Urban land complex with 0 to 8 percent slopes (UDauB). The following soil series and classification units are mapped in the MP Area:

- AptAV – Appoquinimink-Transquaking-Mispillion complex, 0-1% slope, very frequently flooded
- DoeB – Downser sandy loam, 2-5% slopes
- FrkB – Freehold sandy loam, 2-5% slopes

- FrrC – Freehold-Urban land complex, 0-10% slopes
- HumAt – Humaquepts, 0-3% slopes, frequently flooded
- KrhB – Kresson loam, 2-5% slopes
- ShrA – Shrewsbury sandy loam, 0-2%
- ThgB – Tinton loamy sand, 0-5% slopes
- ThhB – Tinton-Urban land complex, 0-5% slopes
- UdaB – Udorthents, 0-8% slopes
- UdauB – Urban land complex, 0-8% slopes

The CWA is covered by less urban land complexes than the MP. The Shrewsbury sandy loam, Freehold sandy loam, and Freehold-Urban land complex are the dominant soil types. The following soil series and classification units are mapped in the CWA:

- AtsA – Atsion sand, 0-2% slopes
- EveB – Evesboro sand, 0-5% slopes
- FrkB – Freehold sandy loam, 2-5% slopes
- FrkC – Freehold sandy loam, 5-10% slopes
- FrrC – Freehold-Urban land complex, 0-10% slopes
- HocA – Holmdel sandy loam, 0-2% slopes
- HofB – Holmdel-Urban land complex, 0-5% slopes
- PHG – Pits, sand and gravel
- ShrA – Shrewsbury sandy loam, 0-2% slopes
- UdauB – Udorthents-Urban land complex, 0-8% slopes

2.4.6 HYDROGEOLOGY

FTMM lies in the Atlantic and Eastern Gulf Coastal Plain groundwater region. This groundwater region is underlain by undeformed unconsolidated to semi-consolidated sedimentary deposits. Water chemistry near the surface is variable with low dissolved solids and high iron concentrations. In the areas underlain by glauconitic sediments such as the Red Bank and Tinton sands, the water chemistry is dominated by calcium, magnesium, and iron. The sediments in the area of the site were deposited in fluvial-deltaic to nearshore environments.

The water table aquifer is identified as part of the composite confining units or minor aquifers, which include the Navesink formation, the Red Bank sand, Tinton sand, Hornerstown sand, Vencentown Formation, the Manasquan Formation, Shark River Formation, Piney Point Formation, and the basal clay of the Kirkwood Formation. The Hornerstown sand probably serves as an aquitard or aquiclude rather than as an aquifer due to its high silt and clay content.

2.4.7 ECOLOGY

The MP and CWA are within the Atlantic Coastal Plain, regionally characterized by salt marsh wetlands. This physiographic province and associated ecosystems include marsh grasses, small mammals, reptiles, amphibians, and migrating waterfowl. Except for occasional transient species, no federally listed or proposed threatened or endangered flora or fauna are known to exist on the site. There was one observance in 1992 of a New Jersey listed endangered species, the clustered sedge.

As indicated in **Section 2.4.3**, the USFWS National Wetland Inventory maps have designated wetland areas at the MP and CWA. Areas along Oceanport Creek and Parkers Creek are designated estuarine and marine wetlands or open waters; areas along Mill Creek, Husky Brook, Lafetra Creek, and Shrewsbury Creek are freshwater emergent or forested/shrub wetlands.

3.0 SITE DESCRIPTION

The Phase I ECP Assessment conducted in 2006 and 2007 evaluated the existing environmental conditions of FTMM MP and CWA (including IRP sites) and MP and CWA were characterized into 95 parcels according to their environmental condition (Shaw, 2007). **Tables 3-1 and 3-2** list all ECP parcels and IRP sites at CWA and MP, respectively. **Tables 3-1 and 3-2** are organized by ECP parcel, with all IRP sites listed with the parcel in which they are included. Within the FTMM MP and CWA are 21 parcels that were evaluated through the FTMM SI under the BRAC 2005 ECP process and 27 active/open IRP Sites. Of the 27 active/open IRP Sites, 14, as well as one IRP site listed as Response Complete (Fort Monmouth, 2007), are considered to require further evaluation through the BEE process. In addition, another 8 of the 21 ECP parcels are deemed to require a BEE based on NJDEP correspondence. In total, 23 sites/parcels will be evaluated as part of this BEE. The IRP sites and ECP parcels to be further evaluated as part of the BEE are summarized in **Table 3-3**.

This section provides brief site descriptions and summaries of the previous investigations or remedial actions at the IRP and ECP sites that will be addressed in the BEE. Though detected concentrations were often compared to criteria within these previous reports, the criteria are not necessarily ecologically based. The comparisons are simply summarized and do not imply ecological risks.

Table 3-1
Charles Wood Area
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Site Name	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
1	2600, 3001 - 3052, 3216	Pine Brook residential housing area, General Storage Warehouse	63.14	No	This is the Pine Brook residential housing area in the southeast portion of CWA and includes one general storage warehouse (2600). No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. Tank AST-2070-a (500 gallon capacity for gasoline) and tank AST-2070-b (500 gallon capacity for diesel fuel) are in use; secondary containment is in place; and no evidence of a release was identified. Former residential fuel oil storage tanks have been either removed or closed in place and no contamination was identified during closure. No evidence of release or contamination has been detected; a BEE is not required.
2	IRP Site FTMM-63 (Bldg 2603)	Sewage Lift Station	0.19	No	This parcel is a sewage lift station at which a 275-gallon UST and 225 cubic yards of potentially contaminated soil were removed in 1998. No contaminants remain at the site in soil or groundwater at concentrations above NJDEP cleanup criteria. Tank AST-2603 (500 gallon capacity for diesel) and an emergency generator are present for the lift station; secondary containment is in place; and no evidence of a release was identified. Though Wampum Brook runs past Parcel 2, potentially contaminated soil was removed and no contamination remains in soil or groundwater. No migration pathway exists to environmentally sensitive areas. A BEE is not required. BEEs and sampling being conducted related to CW-6 also addresses Parcel 2 and Wampum Brook.
3	3050	Former UST	0.05	No	This is the location of a former residential UST for #2 fuel oil (UST-3050-30). The UST and 23 cubic yards of potentially contaminated soil have been removed. A Closure Report was submitted to NJDEP on 06/01/00, and a No Further Action approval letter was received from the NJDEP on 8/29/00. Contaminated soils have been removed and no migration pathway exists to environmentally sensitive areas, so a BEE is not required.
4	3027	Former UST	0.05	No	This is the location of a former residential UST for #2 fuel oil (UST-3027-28). The UST and 8.7 cubic yards of petroleum-contaminated soil have been removed. A closure report was submitted to the NJDEP requesting a No Further Action determination on 10/17/2001; however, no regulatory concurrence is required for former residential USTs. Contaminated soils have been removed and no migration pathway exists to environmentally sensitive areas, so a BEE is not required.
5	3021	Former UST	0.08	No	Former Residential UST-3021-27 (#2 fuel oil) and 113 tons of contaminated soil were removed from this parcel. No contamination above NJDEP criteria remains in groundwater. A Closure Report was submitted to the NJDEP, and a No Further Action approval letter was received from the NJDEP on 10/17/00. Though Wampum Brook runs past Parcel 5, potentially contaminated soil was removed and no contamination remains in soil or groundwater; a BEE is not required. No migration pathway exists to environmentally sensitive areas. BEEs and sampling being conducted related to CW-6 also addresses Parcel 5 and Wampum Brook.
6	FTMM-31 (CW-9)	Former Sludge Disposal	1.60	No	This parcel was investigated under the Fort Monmouth IRP. Sludge generated from Fort Monmouth sewage treatment plants was historically stored in this area before being used as a soil conditioner and fertilizer on the golf course. This parcel is located on the CWA Golf Course southeast of Building 2070. No contaminants were identified above NJDEP Direct Contact Soil Cleanup Criteria or groundwater quality standards during the Site Investigation. A No Further Action determination was approved by the NJDEP in 1996. Since no contaminants are present, a BEE is not required.
7	IRP Site FTMM-28 (CW-6)	Former Pesticide Storage Building 2044 UST-2044-24 UST-2044-32 UST-2044-33	0.67	Yes	This parcel was investigated under the Fort Monmouth IRP. Use of pesticides and herbicides prior to and as part of Army ownership have occurred in this parcel. The pesticide dieldrin was detected in one soil sample slightly above NJDEP Direct Contact Soil Cleanup Criteria; pesticides - heptachlor epoxide and chlordane as well as arsenic were historically detected above criteria in groundwater but have been at concentrations below criteria in recent rounds of sampling. An RI report requesting an NFA determination from the NJDEP was submitted in May 2005. Three former USTs and potentially contaminated soil were removed in 1993. Fuel-related contaminants were initially detected in groundwater above NJDEP criteria and a long term monitoring program was initiated. No fuel-related contaminants were detected subsequent to 1997, and a No Further Action approval letter for all three former USTs was received from the NJDEP on 1/10/2003. A BEE is recommended to address potential contamination related to CW-6 in soils and sediment/soils in adjacent deciduous wooded wetlands as well as Wampum Brook.
8	2043	UST-2043-36	0.05	No	This is the location of a former UST for diesel fuel (UST-2043-36). The UST and potentially contaminated soil have been removed. No contaminants were detected in groundwater above the NJDEP GW criteria. A closure report was submitted to the NJDEP requesting a No Further Action determination in 1998, and a No Further Action approval letter was received from the NJDEP on 10/23/2000. Contaminated soils have been removed and no migration pathway exists to environmentally sensitive areas, so a BEE is not required.

Table 3-1
Charles Wood Area
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Site Name	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
9	2068 Golf Course Pesticide Mixing Area Outdoor Pool & Chlorination facilities Residential housing	Golf Course Pesticide Mixing Area Outdoor Pool & Chlorination facilities Residential housing	161.27	No	This parcel is inclusive of the CWA Golf Course (including clubhouse, maintenance facilities, and current pesticide mixing facilities), residential housing along Megill Drive (Buildings 2022 - 2042), and the outdoor pool and associated chlorination facilities. The current pesticide mixing facilities are state-of-the-art and include secondary containment. No storage of pesticides occurs on Fort Monmouth property. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. Tanks AST-2021, AST-2043, and AST-2044 are in use; secondary containment is in place; and no evidence of a release was identified. Twenty-one former residential fuel oil USTs have been removed, no contamination was identified during closure, and no regulatory concurrence is required. Four non-residential USTs have been removed; no contamination was identified during closure; and No Further Action approval letters were received from the NJDEP in 2000. No contamination or releases have been identified; a BEE is not required.
10	2000	Former UST	0.04	No	Former Residential UST-2000-38 (#2 fuel oil). Petroleum-related contaminants were detected in post-excavation soil samples at concentrations below the NJDEP cleanup criteria. A Closure Report was submitted to the NJDEP, and a No Further Action approval letter was received from the NJDEP on 1/10/2003. Contaminated soils were removed and no migration pathways are present to environmentally sensitive areas; a BEE is not required.
11	2067	UST-2067-37	0.08	No	This is the location of a former UST for #2 fuel oil (UST-2067-37). The UST and 90 cubic yards of potentially contaminated soil have been removed. A closure report was submitted to the NJDEP requesting a No Further Action determination in 2002, and a No Further Action approval letter was received from the NJDEP on 1/10/2003. Contaminated soils were removed and no migration pathways are present to environmentally sensitive areas; a BEE is not required.
12	FTMM-29 (CW-7)	Former PCB Transformer Location	0.10	No	This parcel was investigated under the Fort Monmouth IRP. A PCB transformer, formerly located in front of the Officers Club in Building 2000, was removed from service in 1990 and disposed off site; PCB contamination in the soil was removed in 1998. An RI report requesting a No Further Action determination from the NJDEP was submitted in September 2004. Though Parkers Creek is within 300 feet of Parcel 12, PCB contaminated soil has been removed and migration pathways to Parkers Creek are not present; a BEE is not required.
13	Former Residential Bldgs 2004 - 2016	Potential USTs associated with former residential housing	6.42	No	A 1956 fuel distribution plan displays fuel oil USTs associated with former residential dwellings in this area. Due to the age of these USTs, there is no documentation regarding whether they have been removed. This area is currently paved. No contamination has been detected and no suspected USTs were identified during a geophysical survey conducted as part of the 2008 Site Investigation; a BEE is not required.
14	NW Area of CWA	Former Residential Housing in NW Area of CWA Former #2 Fuel oil UST Former wash rack, vehicle storage area	77.47	No	Former residential area in northwest portion of CWA. Based on the timeframe in which these early structures existed (buildings were demolished prior to 1960), it is likely that USTs were utilized for fuel storage. No documentation exists confirming whether USTs have been removed. One suspected UST was identified during a geophysical survey conducted as part of the 2008 Site Investigation and is currently being addressed. This parcel also includes a former UST for #2 fuel oil (UST-2275-12) at which a release was noted during removal activities. The UST and contaminated soils have been removed. A closure report was submitted to the NJDEP requesting a No Further Action determination in 1998, and a No Further Action approval letter was received from the NJDEP on 8/29/2000. This parcel includes the area identified in a 1947 aerial photograph as a vehicle wash rack and vehicle storage area. Contaminated soil has been removed, evidence of a release to groundwater has not been detected, and there are no migration pathways to environmentally sensitive areas; a BEE is not required. BEEs and sampling being conducted related to Parcel 15 and Parcel 28 also address Parcel 14 and Shrewsbury Creek.

Table 3-1
Charles Wood Area
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Site Name	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
15	2700 (Myer Center) 2705 FTMM-23 (CW-2)	Industrial and Laboratory Activities	37.99	Yes	This parcel encompasses current and former laboratory and industrial processes within Building 2700 and the surrounding area. Building 2705 is a former photo processing facility and night vision laboratory. Chemical and hazardous susbstance use has been extensively documented in association with the historic and current research and industrial activities in this parcel. Due to groundwater volatile organic compound contamination identified in adjacent parcel 16, vapor intrusion is a potential recognized environmental condition in this area. The former wastewater treatment lime pit located northwest of Building 2700 was investigated under the Fort Monmouth IRP as Site FTMM-23 (CW-2). The lime pit was demolished and disposed of in 2002. A No Further Action determination has been requested from the NJDEP. No response has been received from the NJDEP. Tank AST-2700A (500 gallon capacity for diesel fuel and tank AST-2700B (500 gallon capacity for diesel fuel) are in use; secondary containment is in place; and no evidence of a release was identified. A 1999 freon release due to a ruptured disc on equipment in Building 2706 is listed in the New Jersey Hazardous Material Incident Database. Acenaphthene, fluorene, chromium, and copper were identified as constituents of concern in sediment during the 2008 Site Investigation. A BEE is recommended for Parcel 15 to address potential discharges through stormwater outfalls into Shrewsbury Creek.
16	FTMM-22 (CW-1)	Former Wastewater Treatment Lime Pit	0.62	No	The former wastewater treatment lime pit located in the courtyard of Building 2700 and is being addressed under the Fort Monmouth IRP as Site FTMM-22 (CW-1). Volatile organic compounds are present in groundwater at concentrations above NJDEP GW Quality Criteria. At present, the contaminant plume has not encroached upon Building 2700. However, the downgradient migration pathway is in the direction of the referenced building and vapor intrusion is a potential recognized environmental condition. A contaminant treatment system (soil vapor extraction and air sparging) was in place until 2005. Treatment of the groundwater through enhanced bioremediation (HRC injection) will commence in FY 07 with the goal of achieving groundwater compliance by FY10. No migration of contaminants towards Parker Creek is occurring and a BEE is not recommended.
17	UST-2700-36 UST-2700-37 UST-2700-38 UST-2700-39	Former #6 Fuel oil USTs	0.16	No	Five former #6 fuel oil tanks (UST-2700-35, UST-2700-36, UST-2700-37, UST-2700-38, and UST-2700-39) and a total of 500 cubic yards of potentially contaminated soil were removed in 1998. A closure report was submitted to the NJDEP requesting a No Further Action determination in 2000, and a No Further Action approval letter was received from the NJDEP on 10/23/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
18	UST-2700-61	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST and potentially contaminated soil were removed in 1994. Petroleum-related contaminants were detected in confirmatory soil samples at concentrations below the NJDEP cleanup criteria. A closure report was submitted to the NJDEP requesting a No Further Action determination in 2002, and a No Further Action approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required. BEEs and sampling being conducted related to Parcel 15 and Parcel 28 also address Parcel 18 and Shrewsbury Creek.
19	UST-2337-65	Former #2 Fuel oil UST	0.17	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1994. Petroleum-related contaminants were detected in confirmatory soil samples at concentrations below the NJDEP cleanup criteria. A closure report was submitted to the NJDEP requesting a No Further Action determination in 2002, and a No Further Action approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required. BEEs and sampling being conducted related to Parcel 15 and Parcel 28 also address Parcel 19 and Shrewsbury Creek.
20	Undisturbed area along SW portion Parkers Creek	Undisturbed area along SW portion Parkers Creek	8.30	No	This is the undisturbed, wooded area surrounding Parkers Creek in the southwest portion of the CWA. No release or disposal of hazardous substances or petroleum products has occurred; a BEE is not required.
21	FTMM-25 (CW-3A)	Suspected former landfill	2.08	Yes	The suspected former landfill located in the southwestern portion of the CWA north of Building 2707 is being addressed under the Fort Monmouth IRP as Site FTMM-25 (CW-3A). Construction debris and coal ash were identified during the excavation of exploratory test pits. No contaminants of concern were identified in soil or groundwater at this site during RIs conducted under the IRP, and a No Further Action determination was submitted for NJDEP approval. A BEE is recommended since a potential migration pathway may exist for contaminants to enter Shrewsbury Creek.

Table 3-1
Charles Wood Area
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Site Name	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
22	UST-2707-40	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1998. A closure report was submitted to the NJDEP requesting a No Further Action determination in 1999, and a No Further Action approval letter was received from the NJDEP on 2/24/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
23	UST-2500-53 UST-2500-54 UST-2500-55	Former Gasoline USTs	0.05	No	Five former gasoline USTs and petroleum-contaminated soil were removed in 1993. A closure report was submitted to the NJDEP requesting a No Further Action determination in 1996, and a No Further Action approval letter was received from the NJDEP on 4/20/2001. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
24	UST-2502-13	Former #2 Fuel oil UST	0.03	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1996. A closure report was submitted to the NJDEP requesting a No Further Action determination in 1998, and a No Further Action approval letter was received from the NJDEP on 8/29/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
25	UST-2503-14	Former #2 Fuel oil UST	0.03	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1996. A closure report was submitted to the NJDEP requesting a No Further Action determination in 1998, and a No Further Action approval letter was received from the NJDEP on 7/10/1998. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
26	UST-2504-15	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1995. A closure report was submitted to the NJDEP requesting a No Further Action determination in 2000, and a No Further Action approval letter was received from the NJDEP on 10/23/00. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
27	2501 2503 2506 2507 2624 2625 2630 2632 2704 2707 2708 2709 2710 2713 Former Watson Laboratories	Southwest portion of CWA that includes the former Pulse Power Center, Machine Shop, Paint and Fabrication facility, Former Motor Pool, and portions of the former Watson laboratories	29.83	Yes	This parcel in the southwestern portion of CWA includes numerous current and former industrial and research operations. This area formerly housed the Pulse Power Center (2707, 2708, 2709, 2710, 2713), a paint shop (2506), a machine shop (2503), motor pool (2501), hazardous waste storage locations, and portions of the former Watson laboratories. 2501 - Former motor pool. 2503 - This facility is a machine shop and formerly contained a parts cleaner that utilized solvents. 2506 - Former paint and fabrication shop that utilized solvents and petroleum products. 2507 - Tactical Vehicle Repair Shop where petroleum and solvent use would be common during vehicle maintenance operations. 2624 - Former Hazardous Waste Storage Facility; 1980 USATHAMA reported that this facility was used for storage of bulk research chemicals. 2704 - Environmental testing of electronic equipment. Floor drains shown as connected to storm sewer. Former Watson Laboratories - this former complex of laboratories included Buildings 2532, 2533, 2534, and 2538. Operations at these former facilities occurred in the early to mid-1950s. The buildings have been demolished. Four ASTs currently in use. Twelve USTs removed from 1993 to 2002. No releases noted. NJDEP Closure Approval Letters received for seven closures. Awaiting NJDEP response for five tanks closed in 2002. Metals were identified as constituents of concern in sediment during the 2008 Site Investigation. A BEE is recommended to address potential discharges from floor drains and storm sewers from Buildings 2507 and 2704 into Shrewsbury Creek.
28	2525 2535 2539 2540 Former Motor Pool NW of 2566	Former Eatontown Laboratory, Battery Test Facility, Safety calibration laboratory office, Former Motor Pool	37.78	Yes	This parcel encompasses Buildings 2525, 2535, 2539, 2540, and all land within this area. Numerous demolished buildings located to the east and southeast of 2525. Industrial operations include the battery test facility (2535), former Eatontown laboratory (2525), and the Safety office calibration laboratory. Outdoor storage and ground staining were identified in the area of the former motor pool in aerial photographs from 1947, 1957, 1963, 1974, and 1991. Ten former fuel oil USTs have been removed; no contamination was identified during closure; and No Further Action approval letters were received from the NJDEP. Chromium was identified as a constituent of concern in sediment during the 2008 Site Investigation. A BEE is recommended to address potential historic discharges from former floor drains to outfalls that were associated with Building 2525 into Shrewsbury Creek.
29	UST-2561-31	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1995. A closure report was submitted to the NJDEP requesting a No Further Action determination in 1998, and a No Further Action approval letter was received from the NJDEP on 7/10/98. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.

Table 3-1
Charles Wood Area
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Site Name	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
30	UST-2562-41	Former gasoline UST	0.05	No	A former gasoline UST and potentially contaminated soil were removed in 1993. All confirmatory soil analytical results were below NJDEP criteria. Methyl-tertiary-butyl ether (MTBE) and lead were previously detected in groundwater above NJDEP criteria, but have been below the standards since November 1998. A closure report requesting No Further Action was submitted to the NJDEP on 01/02/02. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
31	UST-2537-27	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST and 15 cubic yards of petroleum-contaminated soil were removed in 1997. A closure report was submitted to the NJDEP requesting a No Further Action determination in 1998, and a No Further Action approval letter was received from the NJDEP on 8/29/00. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
32	Former Indoor Small Arms Range (Bldg T-2537) FTMM-26 (CW-4)	Former Indoor Small Arms Range (Bldg T-2537)	0.33	No	The former indoor small arms firing range located west of Building 2566 was investigated under the Fort Monmouth IRP as Site FTMM-26 (CW-4). Lead identified in soil above NJDEP Direct Contact Soil Cleanup Criteria, spent rounds, and casings were removed in 1997. An RI report requesting an NFA determination from the NJDEP was submitted in October 2005. A No Further Action was issued on April 26, 2007. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas. A BEE is not required.
33	UST-2534-24	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST was removed in 1994. Petroleum-related contaminants were detected in post-excavation soil samples at concentrations below the NJDEP cleanup criteria. A Closure Report was submitted to the NJDEP, and a No Further Action approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
34	2567 FTMM-58	AAFES Gasoline Station (FTMM-58)	1.26	No	This parcel is being addressed under the Fort Monmouth IRP as Site FTMM-58 (Building 2567). Site FTMM-58 is an active gasoline service station operated by the AAFES organization. Three modern gasoline USTs are in use at Building 2567. The station is located at the corner of Hope Road and Laboratory Road. Five single-walled steel USTs and 1,000 cubic yards of petroleum-contaminated soil were removed as part of a renovation project that was initiated in 1991. Gasoline-related contaminants were detected in groundwater above NJDEP groundwater quality criteria. Due to groundwater contamination from volatile organic compounds, vapor intrusion is a recognized environmental condition in this area. A CEA was filed with the NJDEP; and in situ bioremediation (ORC injection) and monitored natural attenuation, including groundwater monitoring, were selected as the remedial approach. Groundwater contamination is restricted to the immediate vicinity of Building 2567 and no evidence of migration to environmentally sensitive areas has been detected; a BEE is not required.
35	Child Development Center (2290) Residential Housing (2231-2240, 2260) FTMM-27 Former sewage treatment plant	2290, 2231 - 2240, 2260	58.88	No	This parcel includes the Child Development Center (2290), existing residential housing (2231 - 2240, 2260), the former sewage treatment plant, and the wooded portion of CWA south of 2566. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. The former Charles Wood sanitary treatment plant (STP) is addressed under the Fort Monmouth IRP as Site FTMM-27 (CW-5). The former STP was located in the center of the CWA, bounded by Hope Road to the east, Corregidor Road to the north, Guam Lane to the west, and Laboratory Road to the south. The STP was closed on 29 October 1975 and demolished in 1983. No compounds of concern were detected above NJDEP criteria, and a No Further Action determination was approved by the NJDEP in 1994. Eleven former residential fuel oil USTs have been removed; no contamination was identified during closure; and no regulatory concurrence is required. Since no contamination is present, a BEE is not required.

Table 3-2
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
36	1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1230 1231 1152 170 200 FTMM-09, 47	Current use is administrative and government tenant activities, electrical substation (1231), Military Academy Prep School (1204, 1230), former Signal School (1200)	118.54	No	This parcel is the western portion of Main Post. Batteries associated with UPSs are present in association with electrical substations and computer/mission activities throughout the area. Two ASTs, one located at Building 200 and one located at Building 127, are in use with secondary containment in place. One UST with leak detection and secondary containment in place is located at Building 1203. FTMM-09 (M-9 Former PCB Transformer Site) and FTMM-47 (Buildings 1002, 1208, and 1209 former PCB transformer site) were investigated under the IRP and it was determined no transformers were leaking and all transformers are considered non-PCB class equipment. Staining of concrete and elevated concentrations of PCBs in concrete samples collected below existing transformers at Buildings 1208 and 1209 were determined to be minor in nature and will be addressed accordingly upon removal or replacement of existing transformers. An NFA determination was approved by the NJDEP in 1994. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas; therefore, no BEE is required.
37	1220 FTMM-10	Boiler Plant	1.06	No	This parcel includes the boiler plant (Building 1220), small amounts of various chemicals utilized during operation of the facility, and associated current and former petroleum storage locations. Ten former fuel oil USTs and petroleum-contaminated soil were removed, and NFA approval letters were received from the NJDEP in 2000 and 2003. FTMM-10 (Asbestos Storage Area) was inspected under the IRP, no asbestos containing material was found, and an NFA determination was approved by the NJDEP in 1994. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
38	Former Outdoor Firing Range (1940-1955 Pistol Range) FTMM-21	Former Outdoor Small Arms Firing Range	0.59	No	This parcel is the 1940-1955 Small Arms Training Range and is included in the Fort Monmouth Military Munitions Response Program (MMRP). The area has been a maintained grass-covered area for over 40 years. Due to the historic use of this site as a small arms firing range, metals contamination in soil was investigated and no metals were found above NJDEP soil criteria. The former pistol range is overlain by maintained grass areas and asphalt pavement. No contaminants were identified during the 2008 Site Investigation; therefore, no BEE is required.
39	1150	Vail Hall - Communications back up and administrative offices	0.60	Yes	This parcel is the area between Building 1150 and Parkers Creek. Floor drains and a sump pump are present in the basement of 1150 for high water table intrusion and ultimately discharge to Parkers Creek via a basin behind the building. Building 1150 houses a large UPS room in the basement for communications backup and previous activities included film developing. Base/Neutrals (B/Ns) and metals were identified as constituents of concern in sediment during the 2008 Site Investigation. A BEE is recommended to address potential discharges to Parkers Creek.
40	FTMM-02	Former Landfill	5.53	Yes	This parcel was investigated under the Fort Monmouth IRP as Site FTMM-02. This is the location of former landfill M-2. An NFA recommendation was submitted to the NJDEP for near surface soil; no response has been received from the NJDEP. An equivalent to a Declaration of Environmental Restriction has been incorporated into the Fort Monmouth Master Plan for PCB contamination in below grade soil. A Groundwater CEA was established with the NJDEP. Volatile organic compounds present in groundwater at concentrations above NJDEP GW Quality Criteria are being remediated via enhanced bioremediation (ORC injection) through FY08. Long-Term Monitoring of groundwater and surface water continues on a quarterly basis. Potential migration pathways may exist for contaminants to enter Parkers Creek from the Landfill; a BEE is recommended.
41	FTMM-59	Groundwater in vicinity of Building 1122	0.34	No	This parcel was investigated under the Fort Monmouth IRP as IRP Site FTMM-59. A Groundwater CEA was submitted to the NJDEP. Volatile organic compounds present in groundwater at concentrations above NJDEP GW Quality Criteria are being remediated via enhanced bioremediation (HRC injection). Long-Term Monitoring of groundwater and surface water continues on a quarterly basis. The identification of volatile organic compounds in the groundwater in excess of criteria and the potential for migration into overlying buildings qualifies vapor intrusion as a recognized environmental concern in this area. The contaminated groundwater will be evaluated through the BEE for Parcel 43 (Building 1122).

Table 3-2
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
42	UST-1122-171	Former UST	0.02	No	A fuel oil tank and potentially contaminated soil were removed in 1994. Metals were detected in groundwater above criteria. Agreement was reached with the NJDEP in 1998 to conduct 4 rounds of sampling and close out the groundwater monitoring due to high background metals. Report was submitted and no response has been received from the NJDEP; monitoring is ongoing. The metals in groundwater will be evaluated through the BEE for Parcel 43 (Building 1122).
43	1122	Do-it-Yourself Auto Repair and Craft Shop	1.54	Yes	This parcel encompasses Building 1122 (Do-it-yourself auto repairs) and Building 1124 (Car wash). Building 1122 is a hazardous waste generator and numerous areas of patched asphalt and old concrete pads have been noted. An oil/water separator (w/vessel) and floor drains confirmed to be connected to sanitary system per 1993 floor plans. Surface drainage from this area may have had the potential to allow contaminants to migrate into Mill Creek and B/Ns and metals were identified as constituents of concern in sediment during the 2008 Site Investigation. A BEE is recommended.
44	Former Skeet Range FTMM-03, 04, 05, 06, and 08	Former Skeet Range and Former Landfills	25.30	Yes	This parcel includes one MMRP site (1940-1955 Skeet Range) and IRP sites FTMM-03, 04, 05, 06, and 08. The IRP sites are former landfill areas (M-3, M-4, M-5, M-8) and a post burning area (M-6). Extensive soil evaluation has been conducted throughout this parcel, and an NFA determination has been requested from the NJDEP in relation to near surface soils throughout the parcel. No response has been received from the NJDEP. The DPW incorporated an equivalent to a Declaration of Environmental Restriction into the Fort Monmouth Master Plan for PCB below grade soil contamination at M-8. FTMM-03 - Groundwater - CEA currently being prepared for subsequent submission to the NJDEP. A Monitored Natural Attenuation program is approved by the NJDEP and is currently under way. Long-Term Monitoring of groundwater and surface water continues on a quarterly basis. FTMM-05 - Groundwater - CEA currently being prepared for subsequent submission to the NJDEP. An HRC injection program is approved by the NJDEP and is currently under way through FY08 to address volatile organic compounds in groundwater. Long-Term Monitoring of groundwater and surface water continues on a quarterly basis throughout the parcel. BEE recommended for Former Landfills since a potential migration pathway may exist for contaminants to enter either Lafetra Creek, Mill Creek or Parkers Creek from the Landfills.
45	UST-697-194 UST-697-195 UST-697-195	Former USTs	0.04	No	Three 1,000-gallon waste oil tanks were removed on June 1, 1990. No documentation existed on condition of tanks or adjacent soils during removal. A site assessment was initiated at the suspected locations of the former USTs in November 1992. Petroleum-related compounds were detected in soil samples below State criteria. Initial groundwater samples exceeded New Jersey Groundwater Quality Criteria (NJ GWQC) for chlorinated volatile organic compounds and pesticides. Closure Report submitted to NJDEP on 02/26/96 recommending additional groundwater sampling. Quarterly groundwater samples were collected from August 1997 to December 2001. Groundwater concentrations in the 2001 samples were below the NJ GWQC. Revised Closure Report submitted to NJDEP on 5/15/02. NJDEP closure approval letter received 01/10/2003. No contamination remains at the site and no migration to environmentally sensitive areas has been detected; therefore, no BEE is required. BEEs and sampling being conducted related to M-8 and M-18 also address Parcel 45 and Parkers Creek.
46	FTMM-07	Former Incinerator	0.03	No	This parcel was investigated under the Fort Monmouth IRP as Site FTMM-07 (M-7 Burning Area). The M-7 burning area was a former incinerator located within Building 697. The incinerator was used until 1990 for burning classified documents. The Incinerator was dismantled in 1993; NFA determination approved by NJDEP in 1994. There is no contamination present at Parcel 46 or evidence of migration to environmentally sensitive areas; therefore, no BEE is required. BEEs and sampling being conducted related to M-8 and M-18 also address Parcel 46 and Parkers Creek.
47	FTMM-19	Former Pistol Range	2.23	No	This parcel includes a former pistol range and the former sanitary treatment plant (FTMM-19). The firing range was used from 1935 to 1940 for small arms. The sewage treatment plant closed in 1975. No compounds of concern detected above NJDEP criteria for soil or sediment. NFA approved by NJDEP in 1996. Since no contaminants were found at Parcel 47, no BEE is required.
48	FTMM-18	Former Training Area	3.33	Yes	This parcel was investigated under the Fort Monmouth IRP as Site FTMM-18 - Near Surface Soils (Cover Soil). A geophysical survey and subsequent trenching identified buried waste materials at the site. A BEE is recommended since a potential migration pathway may exist for contaminants to enter Parkers Creek.
49	283, 288, 291, 292, 293, 295	Former Squier Laboratory Complex, Museum, Battery Test Facility	9.09	Yes	Building 283 is currently administrative space. Previous use included the Squier laboratory - primary R&D laboratory until 1954 (when the laboratory operations were transferred to Building 2700). Former repair/experimental work within this parcel included photographic equipment, a battery test facility (which was destroyed by fire in the 1980s and subsequently rebuilt), climatic testing lab, plastics research and development. Numerous former buildings existed in this parcel that were associated with Squier laboratory operations in the 1950s. B/Ns and PCBs were identified as constituents of concern in soil and metals were identified as constituents of concern in sediment during the 2008 Site Investigation. Migration of contaminants from UST at Building 283 or discharges from former septic and sump systems associated with Squier Complex to Parkers Creek may have occurred, so a BEE is recommended.

Table 3-2
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
50	FTMM-54 Building 296) FTMM-55 (Building 290) FTMM-61 (Building 283)	Former fuel distribution facility, Former USTs	2.18	No	Three sites within this parcel are included in the Fort Monmouth IRP. Site FTMM-54 is a former abandoned fuel distribution facility that was removed during a renovation project at Building 296. Benzene and lead are present in groundwater above criteria and are being addressed through the implementation of Monitored Natural Attenuation (MNA), which includes quarterly groundwater monitoring. Site FTMM-55 is the site of a former UST system which was located at Building 290. Petroleum-contaminated soil has been removed; lead and arsenic detections in groundwater are being addressed through MNA (including quarterly GW monitoring), while a request for an NFA determination is under review by the NJDEP. FTMM-61 is a former 3,000-gallon UST site at which petroleum-contaminated soil was removed and petroleum-related contaminants are present in groundwater. In-situ bioremediation (ORC injection) is being conducted through FY08 to address groundwater, long-term monitoring of groundwater is ongoing. In total within this parcel, 15 USTs that were removed had evidence of petroleum release during closure and were properly addressed via removal of contaminated soil, and NFA approval letters were received for all 15 USTs. Contaminated groundwater is addressed through the Fort Monmouth IRP as summarized above. The identification of volatile organic compounds in the groundwater in excess of criteria indicates vapor intrusion is a potential recognized environmental concern in this area. Contaminated soils have been removed and no pathways to environmentally sensitive areas are present; no BEE is required. BEEs and sampling being conducted related to M-8 and M-18 also address Parcel 50 and Parkers Creek.
51	750 Area 787, 788, 789 500 Area 600 Area 1100 former Barracks FTMM-11	Motor Pool Administrative Barracks Former USTs	87.00	No	This parcel includes the 750 motor pool; the area around Buildings 787, 788, and 789; the 600 Area Buildings; 500 Area Buildings; former barracks along Semaphore Ave, and IRP Site FTMM-11. Per communications with facility personnel involved with the 750 Motor Pool construction project in the 1980s, multiple former USTs associated with former barracks in the area were removed during construction. Extensive soil sampling and three UST removals were conducted in the area of Buildings 787, 788, and 789 as part of the U.S. Army's Residential Communities Initiative (RCI) and Enhanced Use Leasing (EUL) programs. Soil grid sampling was conducted throughout the area. Locations at which contaminated soil was identified above NJDEP residential cleanup criteria were excavated and disposed off site. Numerous UST removals and extensive investigation of the 600 Area were conducted under the 600 Area Work Plan that was approved by the NJDEP. A petroleum release was documented to have potentially occurred at 24 of the removed USTs in this parcel. An NFA approval letter was obtained from the NJDEP for all 24 locations where evidence of a petroleum release was identified. Current operations in the 600 Area include dry metal fabrication of vehicle equipment shelters (no solvents used). Small amounts of chemicals are utilized in this area, and lead acid batteries are present in association with emergency generators and UPSs. FTMM-11 (M-11 Elevated Water Tank) was investigated unde the IRP. Site reconnaissance work revealed no visible stains, stressed vegetation or soil at the site and an NFA determination was approved by the NJDEP in 1994. Eleven suspected USTs were identified during a geophysical survey conducted as part of the 2008 Site Investigation and are currently being addressed. This parcel consists of maintained grass and pavement associated with residential housing and the 750 motor pool. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
52	FTMM-53, Bldg 699	gasoline service station	1.38	No	This parcel was investigated under the Fort Monmouth IRP as FTMM-53 (Building 699). Site FTMM-53 is an active gasoline service station operated by the Army/Air Force Exchange Services (AAFES) organization. On 5 November 1984, a tank tightness test identified a leak in two USTs. No action was taken until 1989 when a line leak was identified; subsequently, the piping was excavated and replaced. Volatile organic compounds were identified in soil and groundwater at concentrations exceeding NJDEP cleanup criteria. Since that time, a groundwater treatment system (to recover free product and to control plume migration) has been operating in conjunction with a quarterly groundwater monitoring program. The cleanup strategy is to continue remedial action activities and monitoring efforts at the Building 699 site. Shut-down of the treatment system is expected in FY08 and quarterly groundwater monitoring of 13 wells will be performed for 2 years after shut-down. A CEA is currently being prepared for subsequent submission to the NJDEP. The identification of volatile organic compounds in the soil and groundwater in excess of criteria indicates vapor intrusion is a potential recognized environmental concern in this area and PCE was identified as a constituent of concern in soil gas during the 2008 Site Investigation. Contaminated soil has been removed and contaminated groundwater is contained in the immediate vicinity of Building 699; no migration to environmentally sensitive areas had been detected; a BEE is not required.
53	700 Area	former housing	11.53	No	Extensive soil sampling and numerous UST removals were conducted as part of the U.S. Army's Residential Communities Initiative (RCI) and Enhanced Use Leasing (EUL) programs. Soil grid sampling was conducted throughout the area. Locations at which contaminated soil was identified above NJDEP residential cleanup criteria were excavated and disposed off site and there are no migration pathways to environmentally sensitive areas; therefore, no BEE is recommended.

Table 3-2
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
54	700 Area 800 Area	Lane Hall (Social events and food service) Former Dental Clinic	44.74	No	This parcel includes a sewage lift station (Building 752) at which antifreeze is stored for an emergency generator, former dental clinic and photoprocessing facility currently utilized as a locker room (Building 814); and Lane Hall (Building 702) which is utilized for social events and food service. No release or disposal of hazardous substances or petroleum products has occurred; therefore, no BEE is required.
55	876 FTMM-47	Former Motor Pool Former Medical and Veterinarian Laboratory	11.80	No	Medical and veterinarian laboratories were previously located in former Building 876 and a 1999 Chemical Inventory recorded storage of hazardous substances in this former building. A motor pool formerly existed within this parcel. FTMM-47 (Buildings 1002, 1208, and 1209 former PCB transformer site) was investigated under the IRP and it was determined the staining of concrete and elevated concentrations of PCBs in concrete samples collected below existing transformers at Building 1002 was minor in nature and will be addressed accordingly upon removal or replacemen of existing transformers. An NFA determination was approved by the NJDEP. There are no migration pathways to environmentally sensitive areas; a BEE is not required.
56	800 Area RCI Project	Former housing	15.18	No	Extensive soil sampling and numerous UST removals were conducted as part of the U.S. Army's Residential Communities Initiative (RCI) and Enhanced Use Leasing (EUL) programs. Soil grid sampling was conducted throughout the area. Locations at which contaminated soil was identified above NJDEP residential cleanup criteria were excavated and disposed off site. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
57		Former Coal Storage and RR Unloading area	8.71	No	Former coal storage and unloading area along former railroad in south central portion of Main Post. B/Ns were identified as constituents of concern in soil and metals were identified as constituents of concern in groundwater during the 2008 Site Investigation and are being further evaluated. No migration pathway to ecological receptors has been identified. There are no migration pathways to environmentally sensitive areas; a BEE is not required. BEE and sampling being conducted related to M-14 also addresses Parcel 57 and Husky Brook.
58	UST-800-127 UST-801-129	Former #2 fuel oil USTs	1.04	No	Two #2 fuel oil USTs and associated petroleum-contaminated soil were removed. Initial groundwater results showed one semi-volatile organic compound exceeded the NJDEP GWQC. A monitoring well was installed and no compounds were detected above NJDEP GWQC in four rounds of sampling. Closure Reports requesting NFA were submitted to the NJDEP, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
60	1077, 1078	Residential Housing	4.22	No	Residential housing area southwest of Patterson Army Health Clinic. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. Since no contaminants are present and no release has occurred, no BEE is required.
61	810, 1075, 1076	Medical Facility Veterinary Clinic	14.66	Yes	This parcel includes the veterinary clinic (Building 810), Patterson Army Health Clinic (Building 1075), and former Patterson Boiler Plant (former Building 1076). Former X-ray operations were conducted with film development at 1075; over the counter medicines stored on site; medical waste disposed through 1075. Based on extensive previous medical activities within this parcel, potential for historic release of developing chemicals and other waste associated with medical operations exists. B/Ns were identified as constituents of concern in soil and B/Ns and metals were identified as constituents of concern in sediment during the 2008 Site Investigation. Stormwater discharges to a tributary to Oceanport Creek from Building 1075 may have occurred; a BEE is recommended.
62	FTMM-13	Former Pathogenic Waste Incinerator	0.13	No	This parcel was investigated under the Fort Monmouth IRP as FTMM-13 (M-13 Pathogenic Waste Incinerator). The pathogenic waste incinerator formerly located on the west side of former Building 1076 was constructed in 1975. The pathogenic waste incinerator was taken out of service in December 1992. Site reconnaissance work revealed no ash or debris in or around the incinerator unit and the incinerator was dismantled in November 1993. An NFA determination was approved by the NJDEP in 1994. No contaminants have been identified and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
63	UST-810-131	Former #2 fuel oil UST	0.12	No	A former #2 fuel oil UST was removed in 1998. Visible petroleum contamination of soil was observed during the removal of the UST, and potentially contaminated soil was removed. No detections in groundwater or soil samples were above NJDEP criteria. A closure report was submitted to the NJDEP requesting an NFA determination in 2000, and an NFA approval letter was received from the NJDEP on 8/29/2000. No pathway to environmentally sensitive areas is present, so no BEE is required.
64	FTMM-64 (Building 812)	former gasoline distribution area	3.18	No	This parcel was investigated under the Fort Monmouth IRP as FTMM-64 (Building 812). This parcel is a former gasoline distribution area. Volatile organic compounds and metals are present in groundwater above the NJDEP GW Quality criteria; no contaminants identified in soil above criteria. Treatment of groundwater is underway via enhanced bioremediation (HRC/ORC injection). A CEA was submitted with the NJDEP, awaiting response. Long-Term Monitoring of groundwater continues on a quarterly basis. The identification of volatile organic compounds in the groundwater in excess of criteria indicates vapor intrusion is a potential recognized environmental concern in this area. There is no migration pathway to environmentally sensitive areas, so no BEE is required.

Table 3-2
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
65	FTMM-66 (Building 886)	former fuel oil storage area	3.15	No	This parcel is addressed under the Fort Monmouth IRP as FTMM-66 (Building 886). Based upon historical records, Site FTMM-66 was identified as a former fuel oil storage area. Aerial photos indicate a former AST was located adjacent to Building 886, located off Murphy Drive on the Main Post. The AST had a storage capacity of 250,000 gallons and stored #2 fuel oil. The AST was removed in the 1970s. Soil contamination was identified at the site during the removal of a 1,000-gallon steel, fuel oil UST located on the west side of Building 886. Soils contained petroleum contamination exceeding NJDEP residential direct contact soil cleanup criteria, and free product was observed in groundwater. 4,000 tons of soil were removed in February 2003. A CEA was filed with the NJDEP and monitored natural attenuation, including groundwater monitoring, was selected as the remedial approach. Long-term groundwater monitoring continues on a quarterly basis. There is no migration pathway to environmentally sensitive areas, so no BEE is required.
66	900 Building Area	Electrical Substation General Storage Police Station	28.92	No	This parcel includes general storage (Buildings 908, 975 and 976), the police station (977), and an electrical substation (Building 978). The electrical substation (Building 978) houses 18 lead acid batteries and non-PCB transformers, all contained within secondary containment. Building 977 houses lead acid batteries associated with an emergency generator. Building 901, currently used in an administrative capacity, formerly housed radar training. Chemicals utilized in this operation included alcohols and freon 113. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. Therefore, no BEE is required.
67	UST-949-203	Former #2 fuel oil UST	0.12	No	A former diesel UST and potentially contaminated soil were removed in 1998. One volatile organic compound was detected above the NJ GW Quality Criteria during the initial round of GW sampling. Subsequent quarterly samples collected in 9/2000, 10/2000, 1/2001, and 4/2001 showed no compounds above New Jersey GWQC. Closure Report requesting NFA submitted to NJDEP on 07/17/2001. NJDEP Closure Approval Letter received on 01/10/2003. No contaminants remain at the site and there is no pathway to environmentally sensitive areas, so no BEE is required.
68	900 Building Area former USTs	Former #2 fuel oil USTs	4.74	No	This parcel includes 12 former USTs. Petroleum discharges were identified at five of the USTs and associated petroleum-contaminated soil was remediated. NFA approval letters were received in 2000 (UST-909-147, UST-914-152, UST-977-204, and UST-979-205) and 2003 (UST-905-145). Lead acid batteries associated with an emergency generator are present at Building 979. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
69	900	Former vehicle repair/motor pool	0.31	Yes	This facility is a former vehicle repair/motor pool facility where solvent-based parts cleaners were previously utilized as part of routine vehicle maintenance activities. This building has been used as general storage for the past 10 years. Metals and B/Ns were identified as constituents of concern in sediment during the 2008 Site Investigation. Stormwater outfalls discharging into Oceanport Creek may have the potential to have led to migration of contaminants to Oceanport Creek, so a BEE is recommended.
70	551	Classroom, former (early 1950s) photoprocessing	1.73	No	Former industrial processes included the use of carbon tetrachloride, benzol, acids, and photographic chemicals in an adjacent Quonset hut in the early 1950s. This facility is currently used for administrative and classroom activities. No constituents of concern were identified in sediment or soil during the 2008 Site Investigation. Though Husky Brook is adjacent to Parcel 70, no contaminants have been found in environmental media, so a BEE is not required.
71	FTMM-12, FTMM-14	Former Landfill	14.65	Yes	This parcel was investigated under the Fort Monmouth IRP as FTMM-12 (M-12 Landfill) and FTMM-14 (M-14 Landfill). A remedial action that addressed soil erosion problems along Husky Brook was completed in June of 2001. An NFA recommendation for near surface soil was submitted to the NJDEP; no response has been received from the NJDEP. Metals and volatile organic compounds have been detected in groundwater slightly above the NJ Groundwater Quality Criteria. Long-Term Monitoring of groundwater and surface water continues on a quarterly basis, and a CEA request has been submitted to the NJDEP for groundwater. An NFA recommendation was submitted to the NJDEP. A BEE is recommended since a potential migration pathway may exist for contaminants to enter Husky Brook.

Table 3-2
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
72	200 Area 300 Area	Residential Housing Parade Grounds Administrative	101.38	No	This parcel is located in the north-central portion of Main Post and includes residential housing along Gosselin Ave., Sherrill Ave., Allen Ave., and Signal Ave.; the parade grounds; administrative offices in Building 286 (Russell Hall), and electronic research facilities in the northeastern portion of the parcel. Hospital facilities were formerly located in Building 209 prior to the construction of Patterson Army Health Clinic. Building 209 is now used for administrative purposes. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. Forty-five former fuel oil USTs have been removed and no contamination was identified during closure. Approval of an NFA recommendation was received from the NJDEP for six USTs, the remaining 39 removed USTs were residential USTs for which no regulatory concurrence is required. Since no contamination is present related to Parcel 72, no BEE is required.
73	UST-286-60	Former #2 fuel oil UST	0.12	No	A former #2 fuel oil UST and 3 cubic yards of petroleum-contaminated soil were removed. A closure report was submitted to the NJDEP requesting an NFA determination in 1999, and an NFA approval letter was received from the NJDEP on 2/24/2000. Additionally, there are no migration pathways to environmentally sensitive areas, so no BEE is required.
74	205, 206, 207, 208, 257, 282, 287	Residential Housing, Fire House, and former fuel oil USTs	10.74	No	This parcel includes the fire house and existing housing southeast of Hidreth Ave. Eight former residential fuel oil USTs and associated petroleum-contaminated soil have been removed. No regulatory concurrence is required for residential USTs. Despite no requirement for regulatory concurrence, an NFA approval letter was obtained for 7 of the 8 USTs. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
75	FTMM-20	Pre-1941 Sewage Treatment Plant	0.28	Yes	This parcel is addressed under the Fort Monmouth IRP as FTMM-20 (Pre-1941 Sewage Treatment Plant). During the RI, metals were detected in sediment samples above criteria. Though these metals may be comparable to background levels; a BEE is recommended.
76	200 Area 300 Area	Residential Housing Former Barracks	12.06	No	This parcel includes the existing residential housing buildings north of Housing Ave. and the former 300 Area Barracks. Numerous USTs are illustrated on historic maps associated with the 300 Area Barracks that are not documented to have been removed. Thirteen residential USTs and associated petroleum-contaminated soil (for which no NJDEP closure approval is required) were removed in association with existing residential housing in this parcel as well. Seven suspected USTS were identified during a geophysical survey conducted as part of the 2008 Site Investigation; however, no constituents of concern were identified in soil or groundwater. The 7 suspected USTs are currently being investigated. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
77	UST-210-8	Former #2 fuel oil UST	0.37	No	A former #2 fuel oil UST and 10 cubic yards of petroleum-contaminated soil were removed in 1994, and no contaminants were detected in groundwater above NJDEP criteria. A closure report was submitted to the NJDEP requesting an NFA determination in 1996. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
78	FTMM-15	Elevated Water Tank	0.30	Yes	This parcel is addressed under the Fort Monmouth IRP as Site FTMM-15 (M-15 Water Tank). Two pesticides and three metals were identified above NJDEP direct contact soil cleanup criteria. A corrective action was implemented in 1999 involving the removal of the contaminated soil from the site. A Remedial Action report will be submitted to NJDEP with an NFA recommendation from the Army. RI sampling had confirmed that horizontal migration towards Parkers Creek had occurred prior to Remedial Action, so BEE is recommended.
79	142 494 Bldg 75 Former Tank Farm	Box/Crate Shop Marina Former Bulk Petroleum Storage Tanks	43.64	No	This parcel includes the Box/Crate shop (all hazmat packaged and shipped through this building, but not stored at this location), the water supply treatment building (Building 494), former Building 75 Tank Area adjacent to the railroad, the marina, and the former 400 area housing. There were 38 USTs removed from this parcel. Eight of the tanks had leaked and soil removals were conducted. Some of the USTs were residential and did not require closure documentation. Twenty-five approval letters for the UST removals were received from the NJDEP. Four suspected USTs were identified during a geophysical survey conducted as part of the 2008 Site Investigation; however, no constituents of concern were identified in soil or groundwater. The four suspected USTs are currently being investigated. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
80	Former Buildings 105 and 106		0.93	No	This parcel includes former Buildings 105 and 106 - former photoprocessing facilities located northeast of Oceanport Ave., directly southeast of the current credit union (Building 495). These building served as photoprocessing facilities from the 1940s until they were demolished in the 1980s. No constituents of concern wer idetified during the 2008 Site Investigation and the parcel consists of maintained lawn, pavement, and buildigns. No migration pathway to sensitive environmental resource is present; a BEE is not required.

Table 3-2
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
81	FTMM-16 (Bldg 498)	Former Pesticide Storage Area	0.12	Yes	A former pesticide storage and mixing area was located at the M-16 site on Main Post. The facility (Building 498) is a brick structure and was constructed in 1939. Pesticide management practices were conducted at the site until the late 1950s. Remedial actions were completed in 1999 under the Fort Monmouth IRP to remove pesticide-contaminated soil. A Remedial Action report will be submitted to NJDEP with an NFA recommendation from the Army. Sampling prior to Remedial Action confirmed that migration horizontally in the direction of Oceanport Creek had occurred, so a BEE is recommended.
82	400 Area RCI	Remediated soil contamination in 400 Area	0.13	No	PCB-contaminated soil was excavated to below NJDEP cleanup criteria and disposed off site in 2005 as part of the U.S. Army's Residential Communities Initiative (RCI) and Enhanced Use Leasing (EUL) programs. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
83	109	Former photoprocessing Current and former maintenance shops (carpentry, plumbing, heating, HVAC, electrical) Former coal storage	35.34	No	This parcel is located in the northeastern portion of the Main Post and is associated with numerous current and former industrial processes and vehicle operations including former vehicle wash platforms, former photoprocessing and printing plants, current and former vehicle maintenance areas, former heating plants, former refrigerant repair, former coal storage, and current and former carpentry, plumbing, and electrical shops. Three modern USTs are currently in use at Building 273 (Garrison Motor Pool), three waste oil ASTs are present at Building 484, one waste oil AST is present at Building 481, and one waste oil AST is present at Building 121. All existing USTs and ASTs have secondary containment in place. Numerous former USTs have been removed throughout this parcel, and petroleum-contaminated soil was addressed when encountered at each UST location. Lead and B/Ns were identified as constituents of concern in surface soil during the 2008 Site Investigation. The entire parcel consists of maintained lawn, pavement, and buildings. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
84	FTMM-56 (Former Building 80)	Former #2 fuel oil UST	0.29	No	This parcel is addressed under the Fort Monmouth IRPas Site FTMM-56 (Building 80). A former #2 fuel oil UST and 56 cubic yards of petroleum-contaminated soil were removed in 1993. Although a discharge was identified during the UST closure, the discharge is believed to have come from activities prior to and not related to the UST removal (pre-1984). Gasoline-related constituents and one pesticide were detected at concentrations above the NJDEP Groundwater Quality Criteria. Monitored natural attenuation (which includes quarterly groundwater monitoring) has been implemented as the remedial approach for this parcel pending approval of an NFA recommendation by the NJDEP. An RI report requesting an NFA determination was submitted to the NJDEP in May 2005. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
85	UST-116-9	Former #2 fuel oil UST	0.13	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1994. A closure report was submitted to the NJDEP requesting an NFA determination in 2000, and an NFA approval letter was received from the NJDEP on 10/23/00. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
86	UST-117-72	#2 fuel oil UST	0.13	No	A former #2 fuel oil UST was removed in 1994. Petroleum-related contaminants were detected in confirmatory soil samples at concentrations below the NJDEP cleanup criteria. A closure report was submitted to the NJDEP requesting an NFA determination in 1998. There are no migration pathways to environmentally sensitive areas; a BEE is not required.
87	UST-64-4 (#2 fuel oil) UST-65-5 (#2 fuel oil) UST-161-14 (#2 fuel oil) UST-161-68 (waste oil) UST-173-19 (#2 fuel oil)	5 former USTs	0.45	No	This parcel includes 5 former USTs and associated petroleum-contaminated soil that were removed. Closure Reports requesting NFA have been submitted for all 5 USTs. NFA approval letters were received from NJDEP for UST-64-4 on 10/23/00, UST-65-5 on 8/29/2000, and UST-173-19 on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
88	FTMM-17 (Former Building 65)	Former Pesticide Storage Area	0.27	No	This parcel was included in the Fort Monmouth IRP under Site FTMM-17 (M-17 Former Pesticide Storage Area, Bldg 65). Building 65 has been demolished; chlordane was detected in the soil 6-12 inches below grade consistent with termite control practices in the 1980s; no chlordane was detected in groundwater. An NFA determination was approved by the NJDEP in 1994. There are no migration pathways to environmentally sensitive areas; a BEE is not required.
89	UST-64-3 'UST-485-57	2 former #2 fuel oil USTs	0.14	No	Two former #2 fuel oil tanks (UST-64-3, UST-485-57) and petroleum-contaminated soil were removed. A closure report was submitted to the NJDEP requesting an NFA determination in 2000, and an NFA approval letter was received from the NJDEP on 8/29/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.

Table 3-2
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
90	FTMM-57 (Former Bldg 108 USTs)	5 former #2 fuel oil USTs	0.38	No	Five former USTs associated with former Building 108 are addressed under the Fort Monmouth IRP as Site FTMM-57. The 5 USTs were removed in 1993; volatile organic compounds and metals have been detected in groundwater above NJDEP GW Quality Criteria. A CEA for site groundwater, which restricts the use of groundwater within a defined area until such time that contaminants of concern achieve compliance with the NJDEP Ground Water Quality Criteria, was filed with the NJDEP. An RI report requesting an NFA determination has been submitted to the NJDEP. Currently, as part of a monitoring program, four groundwater monitoring wells are sampled on a quarterly basis. Contaminated groundwater is restricted to the area in the vicinit of the former USTs and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
91	UST-280-25	Former #2 Fuel oil UST	0.14	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1997. A closure report was submitted to the NJDEP requesting an NFA determination in 2000, and an NFA approval letter was received from the NJDEP on 10/23/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
92	UST-484-56	Former #2 Fuel oil UST	0.04	No	A former #2 fuel oil UST and 13 cubic yards of petroleum-contaminated soil were removed in 1995. Petroleum-related contaminants were detected in confirmatory soil samples at concentrations below the NJDEP cleanup criteria. A closure report was submitted to the NJDEP requesting an NFA determination in 1998, and an NFA approval letter was received from the NJDEP on 8/29/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
93	UST-482-54	Former #2 Fuel oil UST	0.04	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1994. Petroleum-related contaminants were detected in confirmatory soil samples at concentrations below the NJDEP cleanup criteria and groundwater results were below the NJDEP Groundwater Quality Criteria. A closure report was submitted to the NJDEP requesting an NFA determination in 2002, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
94	UST-164-15 UST-277-24	Former #2 Fuel oil USTs	0.17	No	Two former #2 fuel oil tanks (UST-164-15, UST-277-24) and petroleum-contaminated soil were removed. A closure report was submitted to the NJDEP requesting an NFA determination in 2002, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
95	PCB Transformer leak near Bldgs 454 and 456	Pole Mounted PCB Transformer leak	0.44	No	This parcel is located northeast of Oceanport Ave. in the vicinity of Buildings 454 and 456. Three pole-mounted 50 KVA transformers (PCB-contaminated class) were knocked to the ground as a result of a storm in 1992 and the contents of two of the transformers leaked onto the ground. The transformers were properly disposed of along with 50 cubic yards of PCB-contaminated soil. Final post-excavation samples were non-detect for PCBs and showed levels of TPH below the NJDEP standard. An additional 20 surface soil samples were collected from the perimeter of the entire excavation. These samples were analyzed for TPH. None of these samples contained TPH in excess of the NJDEP soil standard. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.

Table 3-3: Fort Monmouth Main Post/Charles Wood Area BEE Sites

Site No.	Associated Building/Feature	AEDB-R No.	Proximal Ecological Feature to be Evaluated
Main Post			
IRP Site M-2	Landfill 2	FTMM-02	Mill Creek
IRP Site M-3	Landfill 3	FTMM-03	Lafetra Creek
IRP Site M-4	Landfill 4	FTMM-04	Mill Creek
IRP Site M-5	Landfill 5	FTMM-05	Mill Creek
IRP Site M-8	Landfill 8	FTMM-08	Parkers Creek
IRP Site M-12	Landfill 12	FTMM-12	Huskybrook Creek
IRP Site M-14	Landfill 14	FTMM-14	Huskybrook Creek
IRP Site M-15	Water Tank	FTMM-15	Parkers Creek
IRP Site M-16	Building 498, Pesticide Storage	FTMM-16	Oceanport Creek
IRP Site M-18	Former Training Area	FTMM-18	Parkers Creek
IRP Site Pre-1941 STP	Pre-1941 Former Sanitary Sewage Treatment Plant	FTMM-20	Parkers Creek
IRP Site Building 1122	Building 1122, Unknown Discharge	FTMM-59	Mill Creek
IRP Site Building 283	Building 283, Leaking UST, Gasoline	FTMM-61	Parkers Creek
ECP Parcel 39	Building 1150, Former Photoprocessing Activities	N.A.	Mill Creek
ECP Parcel 43	Building 1122, “Do-It-Yourself” Vehicle Repair Shop	N.A.	Shrewsbury Creek
ECP Parcel 49	Buildings 283, 288, 291, 292, 293, 295, Former Squier Laboratory Complex	N.A.	Parkers Creek
ECP Parcel 61	Building 1075, Patterson Army Health Clinic	N.A.	Huskybrook Creek

Table 3-3: Fort Monmouth Main Post/Charles Wood Area BEE Sites

Site No.	Associated Building/Feature	AEDB-R No.	Proximal Ecological Feature to be Evaluated
ECP Parcel 69	Building 900, Former Tactical Motor Pool	N.A.	Oceanport Creek
Charles Wood Area			
IRP Site CW-3A	Landfill, CW-3A	FTMM-25	Shrewsbury Creek
IRP Site CW-6	Former Pest. Storage	FTMM-28	Un-named Wetland
ECP Parcel 15	Building 2700, Meyers Center laboratory	N.A.	Shrewsbury Creek
ECP Parcel 27	Buildings 2507 and 2704	N.A.	Shrewsbury Creek
ECP Parcel 28	Building 2525	N.A.	Shrewsbury Creek

3.1 MAIN POST

3.1.1 LANDFILL 2 (M-2)

The M-2 landfill is located in the southwestern corner of the MP, on the south bank of Mill Creek. The 8.1-acre landfill operated from 1964 until 1968. The types of materials disposed of in the landfill have been reported to include construction debris, scrap metal, asbestos-containing materials (ACM), vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the sewage treatment plant (STP), soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components. Metal, concrete, and other types of landfill debris can be observed protruding from the stream bank along Mill Creek.

Under the SI phase, three monitoring wells were installed to evaluate groundwater quality. In addition, surface water samples were collected from Mill Creek. All samples were analyzed for target compound list (TCL)+30, target analyte list (TAL) metals, and cyanide. The results are as follows:

- Chlorobenzene, arsenic, and lead were detected in downgradient monitoring wells above NJDEP Groundwater Quality Criteria (GWQC).
- Trichloroethene (TCE) and tetrachloroethene (PCE) were detected in surface water above NJDEP Surface Water Criteria.

Under an enhanced SI phase, seven additional monitoring wells were installed to further evaluate groundwater quality. Subsequently, consecutive quarterly rounds of groundwater samples were collected for analysis. The results are as follows:

- Benzene, chlorobenzene, cadmium, and lead have been detected in six of the seven downgradient monitoring wells above NJDEP GWQC.

A remedial investigation (RI) to delineate compounds of concern within groundwater and soil has been completed. A second RI that evaluated the potential for environmental contaminants being present within the existing landfill cover material has also been completed. The results are as follows:

- Polychlorinated biphenyls (PCBs) were identified in site soils at two separate areas within the boundary of the landfill.

The IRP recommended an NFA for near surface soil (Versar, Inc., 2001). For PCB contamination in subsurface soils, the Directorate of Public Works (DPW) incorporated a document equivalent to a Declaration of Environmental Restriction (DER) into the FTMM Installation Master Plan. For groundwater, the DPW established a Classification Exception Area (CEA). In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Landfill 2 (M-2) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Mill Creek are recommended.

3.1.2 LANDFILL 3 (M-3)

The M-3 landfill is located between North Drive and Lafetra Creek in the west-central part of the MP. The 8.0-acre landfill operated from 1959 until 1964. The types of materials disposed of in the landfill have been reported to include construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components.

Under the SI, three monitoring wells were installed to evaluate groundwater quality. In addition, surface water samples were collected from Lafetra Creek. All samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- Chlorobenzene and lead were detected in downgradient monitoring wells above NJDEP GWQC.
- No compounds of concern were detected in surface water samples collected during the SI phase.
- Surface water samples collected under a New Jersey Pollutant Discharge Elimination System (NJPDES) permit identified PCE above NJDEP Surface Water Criteria.

Under an enhanced SI, five additional monitoring wells were installed to further evaluate groundwater quality. Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis. The results are as follows:

- Benzene, chlorobenzene, cadmium, and lead were detected in all five downgradient monitoring wells above NJDEP GWQC.

The IRP recommended NFA for near surface soil (Versar, Inc. 2004a), and a CEA was prepared for groundwater. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Landfill 3 (M-3) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Lafetra Creek are recommended.

3.1.3 LANDFILL 4 (M-4)

The M-4 landfill is located on MP in the area bounded by Avenue of Memories to the south, North Drive to the north, Mill Creek to the west, and Wilson Avenue to the east. The 1.4-acre landfill operated from 1955 until 1956. The types of materials disposed of in the landfill have been reported to include: construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components.

Under the SI, three monitoring wells were installed to evaluate groundwater quality. All samples were analyzed for TCL+30 parameters, TAL metals, and cyanide. The results are as follows:

- A single pesticide (4,4'-DDT) was detected in an upgradient monitoring well above NJDEP GWQC. As of 2002, 15 consecutive quarterly rounds of groundwater samples had been collected for subsequent analysis. Lead was initially detected in site monitoring wells above NJDEP GWQC.

The IRP recommended NFA for the site (Versar, Inc., 2004b, 2005a). In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Landfill 4 (M-4) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Mill Creek are recommended.

3.1.4 LANDFILL 5 (M-5)

The M-5 landfill is located just north of the M-4 landfill in the area bounded by North Drive to the south, an unpaved road south of Building 198 to the north, Wilson Avenue to the east, and Mill Creek and Parkers Creek to the west. The 3.2-acre landfill operated from 1952 until 1959. The types of materials disposed of in the landfill have been reported to include: construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components.

Under the SI, two monitoring wells were installed to evaluate groundwater quality. All samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- PCE was detected in one monitoring well. This compound exceeded the NJDEP GWQC. Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis.
- Surface water samples collected under an NJPDES permit identified PCE above NJDEP Surface Water Criteria.

Under the RI, approximately 260 groundwater and soil samples were collected by means of a Geoprobe® sampling device. Following the Geoprobe® investigation, 13 additional monitoring wells were installed to further evaluate groundwater quality. At present, the extent of the PCE plume has been delineated both vertically and horizontally within site soil and groundwater.

The IRP recommended NFA for near surface soil (Versar, Inc., 2004c), and a CEA was prepared for groundwater. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Landfill 5 (M-5) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Mill Creek are recommended.

3.1.5 LANDFILL 8 (M-8)

The M-8 landfill is located north of Buildings 692 and 697 in a bend of Parkers Creek. The 7.2-acre landfill operated from 1962 until 1981. Following closure of the M-8 landfill, all solid wastes generated at FTMM were directed to the Monmouth County Landfill. The types of materials disposed of in the landfill have been reported to include: construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components.

Under the SI, four monitoring wells were installed to evaluate groundwater quality. All samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- Benzene and chlorobenzene were detected in downgradient monitoring wells above NJDEP GWQC.

Under an enhanced SI phase, seven additional monitoring wells were installed to further evaluate groundwater quality. The results are as follows:

- Benzene and chlorobenzene were detected in four downgradient monitoring wells above NJDEP GWQC.

Contaminant levels are consistent with the levels identified during the SI phase and subsequent quarterly long-term monitoring results for surface water and groundwater at the M-8 landfill.

PCB soil contamination was identified at one location within the M-8 landfill. A second RI that evaluated the potential for environmental contaminants being present within the existing landfill cover material was also completed.

The IRP recommended NFA for near surface soil (Versar, Inc., 2004d). For subsurface soils, the DPW incorporated a document equivalent to a DER into the FTMM Installation Master Plan for PCB soil contamination. A CEA was prepared for groundwater. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Landfill 8 (M-8) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Parkers Creek are recommended.

3.1.6 LANDFILL 12 (M-12)

The M-12 landfill is located on the MP, on the south side of Husky Brook, west of Murphy Drive. Dates of operation for the 7.1-acre landfill are unknown. The types of materials disposed of in the landfill have been reported to include: construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components. Metal, concrete, and other types of landfill debris can be observed protruding from the stream bank along Husky Brook.

Under the SI, three monitoring wells were installed to evaluate groundwater quality. All samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- Arsenic, cadmium, mercury, and lead were detected in site monitoring wells slightly below NJDEP GWQC. Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis.

An RI of site groundwater has been completed and eight additional monitoring wells have been installed at the site. The results are as follows:

- Arsenic was detected consistently in two monitoring wells above NJDEP GWQC.

An RI that evaluated the potential for environmental contaminants being present within the existing landfill cover material was completed.

The IRP recommended NFA for near surface soil (Versar, Inc. 2003), and a CEA was submitted for groundwater. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Landfill 12 (M-12) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Husky Brook Creek are recommended.

3.1.7 LANDFILL 14 (M-14)

The M-14 landfill is located on the MP, on the north side of Husky Brook, west of Murphy Drive. The 6.9-acre landfill operated from 1965 until 1966. The types of materials disposed of in the landfill have been reported to include: construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components. Metal, concrete, and other types of landfill debris were previously observed protruding from the stream bank along Husky Brook.

Under the SI, three monitoring wells were installed to evaluate groundwater quality. In addition, surface water samples were collected from Husky Brook. All samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- Lead was detected in one downgradient monitoring well above NJDEP GWQC.

As of 2002, 11 consecutive quarterly rounds of groundwater samples had been collected for subsequent analysis. The results are as follows:

- Arsenic was detected in one site monitoring well above NJDEP GWQC.
- Lead and 1,2-dichloroethene were detected in surface water samples slightly below NJDEP Surface Water Quality Criteria.

The IRP recommended NFA for the site (Versar, Inc., 2004e). In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Landfill 14 (M-14) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Husky Creek are recommended.

3.1.8 WATER TANK (M-15)

The 1980 Installation Assessment (IA) report (USATHAMA, 1980) identified the 0.7 acre M-15 site as a potential Area of Concern. A 500,000-gallon above-ground storage tank (AST) is located at the M-15 site. The tank was built in 1941 and is of steel construction. It has always been used for the storage of potable water. The tank is located in the northeast section of the MP next to Parkers Creek, a tributary of the Shrewsbury River.

Under the SI, environmental contaminants in the form of pesticides and heavy metals were identified in site soil. The results are as follows:

- Two pesticides, 4,4'-DDE and 4,4'-DDT, were identified above NJDEP Direct Contact Soil Cleanup Criteria. It was determined that the pesticide contamination was the result of past over spraying practices.
- Three heavy metals—cadmium, lead, and zinc—were also identified above NJDEP Direct Contact Soil Cleanup Criteria.

Under the RI, environmental sampling confirmed that the contaminants of concern had migrated horizontally towards Parkers Creek. A corrective action was implemented at the M-15 site involving the removal of the contaminated soil from the site, thereby eliminating the contaminants of concern. Final remedial activities were completed in November of 1999. A Remedial Action (RA) report will be submitted to NJDEP with an NFA recommendation from the Army.

The IRP recommended NFA for the site. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), the Water Tank (M-15) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Parkers Creek are recommended.

3.1.9 PESTICIDE STORAGE, BUILDING 498 (M-16)

A former pesticide storage and mixing area was located at the 0.15-acre M-16 site on MP. The facility (Building 498) is a brick structure and was constructed in 1939. Pesticide management was conducted at the site until the late 1950s. Following this, the operation was moved to Building 65.

Under the SI, a total of 10 pesticide compounds were detected above laboratory quantitative limits in site soil. Five pesticide compounds were found at concentrations exceeding the NJDEP Direct Contact Soil Cleanup Criteria.

Environmental sampling confirmed that the contaminants were migrating horizontally in the direction of Oceanport Creek. The creek is located approximately 250 feet downgradient of the M-16 site. A corrective action was implemented to remove the contaminated soil from the site, and final remedial activities were completed in February of 1999. An RA report will be submitted to NJDEP with an NFA recommendation.

The IRP recommended an NFA for the site. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Pesticide Storage Building 498 (M-16) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Oceanport Creek are recommended.

3.1.10 FORMER TRAINING AREA/LANDFILL (M-18)

The M-18 site is a former training area utilized by the Army Signal School and other Army units. The M-18 site is located on the MP, between Parkers Creek to the north and Buildings 283, 289, 293, and 294 to the south. The 4.85-acre site is partially paved and the remaining portion is an open sandy area. A tidal marsh adjoins the site. The 1980 IA report (USATHAMA, 1980) identifies diesel and gasoline generators and military vehicles being used at this site. The report states that numerous fuel spills occurred at the site as a result of these activities.

Under the SI, nine soil borings in a grid pattern were drilled at the site. Two soil samples were collected from each boring, either 6 to 12 inches or 12 to 18 inches below the bottom of the asphalt (to avoid bias) and either from intervals with visible staining or from just above the water table. Soil samples were analyzed for volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH). The results are as follows:

- No compounds of concern were detected above NJDEP Direct Contact Soil Cleanup Criteria.

Two soil boring locations were converted to monitoring wells in order to evaluate groundwater quality. One existing monitoring well was also used to evaluate groundwater quality. Groundwater samples were analyzed for TCL+30, TAL metals, and TPH. The results are as follows:

- Arsenic, lead, and 4,4'-DDD were detected in downgradient monitoring wells above NJDEP GWQC.

Under an enhanced SI, three additional monitoring wells were installed to further evaluate groundwater quality. Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis. The results are as follows:

- Benzene and lead were detected in four of the six site monitoring wells above NJDEP GWQC.

A geophysical survey was also conducted under the SI in order to determine whether the M-18 site was a former landfill. The data gathered from geophysical survey identified waste materials buried at the site. Subsequent trenching work confirmed the presence of construction debris at the site.

An RI that evaluated the potential for environmental contaminants being present within the existing landfill cover material was completed. This resulted in an NFA determination regarding the landfill cover material.

The IRP recommended NFA for near surface soil (Versar, Inc., 2004f), and a CEA was submitted for groundwater. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Former Training Area/Landfill (M-18) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Parkers Creek are recommended.

3.1.11 PRE-1941 FORMER SANITARY SEWAGE TREATMENT PLANT

Site FTMM-20 is the location of the former Sanitary STP adjacent to Parkers Creek in an area north of Allen Avenue in approximately the same location as current Building 259. Though the date of construction and period of operation are unknown, it is believed that this STP operated until the second MP STP came on line in 1941.

As part of the SI (Roy F. Weston, 1995), one sediment sample was collected from Parkers Creek at the former wastewater discharge point. The results from this sample are as follows:

- Arsenic, cadmium, chromium, and zinc were detected at concentrations slightly exceeding NJDEP sediment criteria and background levels.

Additional sediment samples were collected during the RI to delineate the extent of the metal contamination at the site (Versar, Inc., 2004g). Sediment samples at three depths at seven locations in the vicinity of the former wastewater discharge point, as well as three locations northwest and away from the influence of the STP discharge were collected. The RI results are as follows:

- Heavy metal concentrations at the site were consistent with background metal concentrations from nearby, undisturbed locations.

The RI Report was submitted to the NJDEP in 2004 requesting an NFA determination. No response has been received from the NJDEP.

In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), the former pre-1941 STP (M-20) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, additional sediment and surface water sampling within Parkers Creek is recommended.

3.1.12 BUILDING 1122, UNKNOWN DISCHARGE

Site FTMM-59 is located on Alexander Avenue, adjacent to Mill Creek on the MP. The 0.4-acre Site FTMM-59 contains Building 1122 which is also identified as Parcel 43. Site FTMM-59 and Parcel 43 are addressed in this WP as one site – FTMM-59.

Building 1122 is located on the MP and houses a modern "do-it-yourself" vehicle repair shop. Building 1122 is a one-story slab building built and is approximately 11,600 square feet in size. Furniture paint stripping was reported in the Woodworking Craft Shop section of Building 1122 in 1973. Currently, all vehicle repairs are done by FTMM personnel and are performed inside the building. Degreasing solvents are used, which generates hazardous waste. Pneumatic lifts are present. The 2006 Stormwater Pollution Prevention Plan states, "Floor drains located near the pneumatic lifts, have been closed off." Used oil is collected in a 55-gallon drum stored inside the shop. When filled, the contents are pumped into a 995-gallon double-walled AST located between the repair shop and the car wash (Building 1124). The floors drains, previously connected to the car wash facility in Building 1124, were sealed off in June 2007. The enclosed car wash facility is located to the east of the repair shop. All wash water is recycled and reused and an active oil/water separator is in place. A 1993 renovation plan, which details the replacement of the floor drains, shows that the drains were connected to the sanitary sewer system. A former oil/water separator was associated with this building.

In 2007, as part of an SI (Shaw, 2008), sediment, soil gas, and indoor air samples were collected to assess environmental conditions on Parcel 43.

Six sediment samples were collected from three sample borings located along the south bank of Mill Creek at potential discharge locations adjacent to Building 1122. Mill Creek is a tidally influenced water body in this portion of the facility. At each sample location, two samples were collected; one from the 0- to 6-inch below ground surface (bgs) interval, and the other from the 12- to 18-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. All samples collected were analyzed for TCL+30 (w/o pesticides) and TAL metals. The results are as follows:

A total of 11 B/N compounds, two VOCs, and 18 metals were detected in Parcel 43 sediment samples.

- Of the 11 B/N compounds, eight [anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene] were detected at concentrations that exceeded the respective criteria in two samples.
- The two VOCs were detected at concentrations below the respective criteria.
- Of the 18 metals, eight (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) were detected at concentrations that exceeded the respective criteria in all six samples.

Five soil gas samples (including one duplicate) and one indoor air sample were collected in and around Building 1122 to further evaluate vapor intrusion. Samples were analyzed for VOCs. The results are as follows:

A total of 21 VOCs were detected in all five soil gas samples. A total of 25 VOCs were detected in the indoor air sample collected.

- Of the 21 VOCs detected in soil, two (PCE and TCE) exceeded the respective criteria.
- Of the 25 VOCs detected in indoor air, two (benzene and dichloromethane) exceeded the respective criteria.

The DPW removed one UST located next to Building 1122 (a self-help vehicle repair shop) in June 1994. The UST was a single wall steel tank used for storing No. 2 fuel oil. During tank closure activities, a petroleum discharge to site soil and groundwater was identified. Upon further investigation, the DPW determined that a second UST was removed from the same area during the late 1980s. Discussions with site personnel indicated that the tank was removed because of inventory control problems. It is assumed that the site was not fully remediated during the first UST closure.

In accordance with NJDEP UST Site Assessment activity requirements, all petroleum contaminated soils have been removed and disposed of. In addition, the DPW has installed two monitoring wells to determine any adverse impact to groundwater. The results are as follows:

- TCE was initially detected at levels above NJDEP GWQC.

Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis. The results are as follows:

- TCE continues to be quantified in one of the two site monitoring wells above NJDEP GWQC.

Surface water sampling points (Mill Creek) currently exist downgradient from the site and are being monitored.

The IRP recommended a CEA for groundwater. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Building 1122 (Site FTMM-59) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, surface water sampling within Mill Creek is recommended.

3.1.13 BUILDING 283, LEAKING UST, GASOLINE

Site FTMM-61 is located off of Sherrill Avenue in the northern section of the MP and encompasses an area of less than 0.2 acres. On August 28, 1997, a 3,000-gallon steel UST (No. 0081533-229) was removed. The tank was used to store gasoline. The UST was located within the courtyard of Building 283. Following its removal, the UST was inspected for corrosion holes. Numerous holes in the UST were noted. Soils within the tank excavation that corresponded with the locations of the holes were dark in color and appeared to be contaminated. Based on site assessment activities, it was concluded that a discharge to the environment had taken place. The NJDEP hotline was notified and the site was assigned case # 97-8-28-1330-33. Approximately 400 cubic yards of contaminated soil was removed and disposed of in accordance with NJDEP requirements. Groundwater was encountered at 12.0 feet below grade and a sheen was observed on the groundwater. In response to this observation, one groundwater sample was collected. The sample was analyzed for VOCs to include a calibration for xylene plus 15 tentatively identified compounds. The results are as follows:

- Benzene, ethyl benzene, toluene, and lead were detected above the NJDEP GWQC.

Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis. The results are as follows:

- Benzene was detected at a concentration above the GWQC.
- Ethyl benzene was detected at a concentration above the GWQC.
- Toluene was detected at a concentration above the GWQC.
- Lead was detected at a concentration above the GWQC.

The IRP recommended that a CEA for groundwater be submitted. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Site FTMM-61 will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, surface water sampling within Parkers Creek is recommended.

3.1.14 BUILDING 1150 (PARCEL 39)

Parcel 39 is located in the southwestern portion of the MP and encompasses the area between Building 1150 (Vail Hall) and Mill Creek, approximately 0.5 acres. Building 1150 is utilized for administrative purposes. Within the basement is a large Uninterruptible Power Supply Room, emergency generator, floor drains, and a sump pump strictly for high water table events (discharges to basin behind building and ultimately to Mill Creek). Film developing activities formerly occurred in the basement of the building.

In 2007, as part of an SI (Shaw, 2008), sediment and surface soil were collected to assess environmental conditions on Parcel 39.

A total of four sediment samples were collected from two sample borings located along the north bank of Mill Creek adjacent to Building 1150. Samples were collected from deposition locations immediately downgradient of the drainage basin located directly behind Building 1150. At each sample location, two samples were collected; one from the 0- to 6-inch bgs interval, and the other from the 18- to 24-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. All samples collected were analyzed for TCL+30 (w/o pesticides) and TAL metals. The results are as follows:

A total of nine base/neutral (B/N) compounds and 18 metals were detected in Parcel 39 sediment samples.

- Of the nine B/N compounds, six [benzo(a)anthracene, benzo(a)pyrene, chrysene, fluoranthene, phenanthrene, and pyrene] were detected at concentrations that exceeded the respective criteria in two samples.
- Of the 18 metals, eight (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) were detected at concentrations that exceeded the respective criteria in all four samples.

One surface soil sample was collected from one boring located below an outfall on the north bank of Mill Creek adjacent to Building 1150. The outfall is the end of an underground terracotta pipe that leads from the direction of Building 1150. A sample was collected in order to determine if any contamination exists from potential historic discharges from Building 1150. The surface soil sample for non-VOC analysis was collected from the 0- to 6-inch interval bgs, and the soil sample for VOC analysis was collected from the 18- to 24-inch bgs interval. No visual or olfactory evidence of soil contamination was noted. All samples collected were analyzed for TCL+30 (w/o pesticides) and TAL metals. The results are as follows:

- A total of four B/N compounds and 18 metals were detected at concentrations below the respective criteria in the Parcel 39 surface soil sample.

Based upon the resulting data, the SI recommended that NFA be taken for soil within Parcel 39. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Building 1150 (Parcel 39) will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Mill Creek are recommended.

3.1.15 BUILDINGS 283, 288, 291, 292, 293, 295 (ECP PARCEL 49)

Parcel 49 encompasses the buildings associated with the former Squier Laboratory and other facilities with similar operational histories in the north-central portion of the MP and incorporates an area of approximately 4 acres. The Squier Laboratory Complex included existing Buildings 283, 285, 288, 292, 293, and 298, and former Buildings S-5, S-6, S-6 Annex, S-9, S-10, S-11, S-12, and S-15. Buildings 291, 294, and 295, and former Buildings 289, 290, L-3, T-45, X-9, and X-7 have a similar operational history and are included in Parcel 49 along with the Squier Laboratory buildings. Environmental concerns associated with Squier Laboratory operations include the use of chemicals, solvents, radioisotopes, and metals when waste handling procedures may not have been sufficiently protective to preclude a release to the environment.

A corollary investigation of the historical use of radioactive materials (RAM) was conducted by Cabrera. A Special Investigation Report issued in 1951 for the Squier Signal Laboratory Director discussed a wipe test performed on samples of aluminum covered with polonium lacquer (approximately 230 microcuries) to ensure that no hazard was present at Building 283. Building 292 serves as storage space for the communications-electronics museum. This storage space contains or contained a Chinese radio and a vacuum tube where radiological commodities were identified with radiological readings above background levels, and radium-contaminated components were found in a posted radioactive storage locker. This storage space once contained 65 items containing RAM, but numerous non-radioactive items have since been removed.

In 2007, as part of an SI (Shaw, 2008), sediment, soil, and groundwater samples were collected to assess environmental conditions on Parcel 49.

Seven (including one duplicate) sediment samples were collected from three sample borings located along the south bank of Parkers Creek. Parkers Creek is a tidally influenced water body in this portion of the facility. Samples were collected in order to determine if previous discharges from former septic and sump systems associated with the Squier Complex have impacted sediment within Parkers Creek. At each sample location, two samples were collected; one from the 0- to 6-inch bgs interval, and the other from the 18- to 24-inch bgs interval. No visual or olfactory evidence of impacted sediment was

noted. All samples collected were analyzed for TCL+30 (w/o pesticides), TAL metals, and cyanide. The results are as follows:

A total of ten B/N compounds, one VOC, and 20 metals were detected in Parcel 49 sediment samples.

- All ten B/N compounds and the one VOC (acetone) were detected at concentrations below the respective criteria.
- Of the 20 metals, nine (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) were detected at concentrations that exceeded the respective criteria in all seven sediment samples.

Six surface soil samples and seven subsurface soil samples (including one duplicate sample) were collected from six distinct Geoprobe® borings located throughout Parcel 49. An additional seven surface soil samples were collected via hand-auger throughout Parcel 49. Surface soil samples for non-VOC analysis were collected from the 0- to 6-inch interval bgs. For borings located in paved areas, non-VOC surface soil samples were collected from the 0- to 6-inch interval directly below the pavement sub-base. Surface soil samples for VOC analysis were collected from the 18- to 24-inch interval bgs. Subsurface soil samples were collected from the 6-inch interval directly above the water table. No visual or olfactory evidence of contaminated soil was noted. All soil samples were analyzed for TCL+30 (w/o pesticides), TAL metals, and cyanide. The results are as follows:

A total of 22 B/N compounds, five VOCs, 20 metals, and one Aroclor were detected in Parcel 49 soil samples.

- Of the 22 B/N compounds, seven [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene] were detected at concentrations that exceeded the respective criteria in five surface soil samples.
- The five VOCs were detected at concentrations below regulations.
- Of the 20 metals, one (arsenic) was detected at concentrations that exceeded regulatory standards.
- Aroclor 1260 was detected in one surface soil sample at a concentration that exceeded regulatory standards.
- Cyanide was not detected in soil.

Two groundwater samples were collected from two distinct temporary wells that were installed using the Geoprobe® rig. P49GW-1 was installed north of Building 293, and P49GW-2 was installed east of former Building 289. The samples were analyzed for TCL+30 (w/o pesticides/PCBs) and tertiary butyl alcohol (TBA). Five groundwater samples (including one duplicate sample) were collected from four existing FTMM monitoring wells located along the northern perimeter of the former Squier Complex area to evaluate groundwater on a parcel-wide basis. These samples were analyzed for TCL+30 (w/o pesticides), TBA, TAL metals, and cyanide. The results are as follows:

A total of four B/N compounds, nine VOCs, and 18 metals were detected in groundwater samples collected in Parcel 49.

- Of the four B/Ns compounds, one [bis(2-ethylhexyl)phthalate] was detected at concentrations that exceeded the NJDEP GWQC in three groundwater samples. The contamination was most likely the result of the polyethylene sampling tube that is commonly used for sampling wells. Therefore, it is not considered to be a concern in groundwater at Parcel 49.
- Of the nine VOCs, two (benzene and bromodichloromethane) were detected at concentrations that exceed the NJDEP GWQC in two groundwater samples.
- Of the 18 metals, six (aluminum, arsenic, beryllium, iron, manganese, and sodium) were detected at concentrations that exceeded the NJDEP GWQC.

Based upon the resulting data, the SI recommended further evaluation of soils and that groundwater be further evaluated under the M-18 groundwater CEA. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Parcel 49 will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, surface water sampling within Parkers Creek is recommended.

3.1.16 BUILDING 1075 (ECP PARCEL 61)

Parcel 61, located in the south-central portion of the MP, encompasses Patterson Army Health Clinic (Building 1075) and the surrounding land (approximately 27 acres). Building 1075 was constructed in 1961 to house Patterson Army Hospital. Building 1075 has been used continuously since that time, although it was downgraded to a health clinic in 1995. Operations in the 1960s, 1970s, and 1980s included X-ray processing and laboratory operations. Operations in the building extensively used mercury-containing equipment, developing chemicals, and other chemicals and waste associated with medical operations.

In 2007, as part of an SI (Shaw, 2008), sediment and surface soil samples were collected to assess environmental conditions on Parcel 61.

Four sediment samples were collected from two borings to investigate potential historic discharges to stormwater from Building 1075. One sample was collected at the stormwater outfall, MP17, located along the southeast bank of Oceanport Creek directly north of Building 975. The other sample was collected downstream on the southeast bank of the tributary to Oceanport Creek. Oceanport Creek is a tidally influenced water body in this portion of the facility. At each sample location, two samples were collected, one from the 0- to 6-inch bgs interval, and the other from the 18- to 24-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. All samples were analyzed for TCL+30 (w/o pesticides) and TAL metals. The results are as follows:

A total of 16 B/N compounds, one VOC, and 18 metals were detected in Parcel 61 sediment samples.

- Of the 16 B/N compounds, 11 [acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene] were detected at concentrations that exceeded the respective criteria in all four sediment samples.
- The VOC toluene was detected at concentrations below the respective criteria in one sample.
- Of the 18 metals, four (arsenic, chromium, copper, and lead) were detected at concentrations that exceeded the respective criteria.

Four surface soil samples were collected from one hand auger location (P61SS-1) and three Geoprobe® boring locations (P61SS-2, 3, and 4). Samples were located along the southeast and northeast corners of Building 1075. Sample P61SS-1 was collected in a grass-covered area near a door at the southeastern corner of Building 1075. Samples P61SS-2 and P61SS-3 were collected near the loading docks of Building 1075. Sample P61SS-4 was collected near the basement door at the northeast corner of Building 1075. Surface soil samples for non-VOC analysis were collected from the 0- to 6-inch interval bgs. For surface soil samples located in paved areas, non-VOC surface soil samples were collected from the 0- to 6-inch interval directly below the pavement sub-base. Surface soil samples collected for VOC analysis were collected from the 18- to 24-inch interval bgs. All samples were analyzed for TCL+30 (w/o pesticides), TAL metals, and cyanide. No visual or olfactory evidence of soil contamination was noted. The results are as follows:

A total of 19 B/N compounds and 18 metals were detected in Parcel 61 soil samples.

- Of the 19 B/N compounds, three [benzo(a)anthracene, benzo(b)fluoranthene, and benzo(a)pyrene] were detected at concentrations exceeding the respective criteria in one surface soil sample.
- All 18 metals identified in soil were detected below the respective criteria.
- Cyanide was not detected in soil at Parcel 61.

Based upon the resulting data, the SI recommended soil for further evaluation. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Parcel 61 will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, surface water sampling within Oceanport Creek is recommended.

3.1.17 BUILDING 900 (ECP PARCEL 69)

Building 900 is a former tactical motor pool. It is located in the southeastern portion of the MP and has been utilized for general storage for approximately the past 10 years. It encompasses an area of approximately 0.3 acres. The building formerly contained a waste oil tank immediately outside the building that was connected by a fill pipe originating from inside the building (since removed). A storm sewer inlet was observed in the parking lot in close proximity to the building during the 2006 Visual Site Inspections (VSIs). A boiler was formerly located outside the building. A 1993 U.S. Army Environmental Hygiene Agency report cites a TCE parts cleaner and 500-gallon aboveground waste oil tank being present at the building at the time of the 1993 site visit. The tank has been removed from the building. All TCE parts cleaners were eliminated from use (MP and CWA) in February 1994 under Environmental Program Requirements Project FM0094F088.

Solvents were previously used for cleaning vehicle parts at various locations throughout FTMM. Both the military and the contractors operated solvent parts cleaners. These solvent parts cleaners consisted of a tank and sink with nozzle. The military used Super Agitine for its parts cleaners while the contractor used Siloo Tyme II. Each parts cleaner held about 30 gallons of fluid, which was reused until it needed changing. Fluid changes occurred every 4 months to every 3 years, depending on location and usage.

In 2007, as part of an SI (Shaw, 2008), sediment, soil, and groundwater samples were collected to assess environmental conditions on Parcel 69.

Five sediment samples (including one duplicate sample) were collected from two borings located along the south bank of Oceanport Creek. Oceanport Creek is a tidally influenced water body in this portion of the facility. Sediment samples were collected in order to investigate any potential historic discharges to stormwater from Building 900. One sample was collected directly at a stormwater outfall within Oceanport Creek upstream of Murphy Drive, and the other sample was collected at a stormwater outfall discharging to Oceanport Creek downstream of Murphy Drive. At each sample location, two samples were collected; one from the 0- to 6-inch bgs interval, and the other from the 18- to 24-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted.

All samples collected were analyzed for TCL+30 (w/o pesticides) and TAL metals.

The results are as follows:

A total of eight B/N compounds, four VOCs, and 20 metals were detected in Parcel 69 sediment samples.

- Of the eight B/Ns compounds, seven [acenaphthene, anthracene, benzo(a)anthracene, chrysene, fluoranthene, phenanthrene, and pyrene] were detected at concentrations that exceeded the respective criteria.
- All four VOCs were detected at concentrations below the respective criteria.
- Of the 20 metals, nine (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) were detected at concentrations that exceeded the respective criteria.

Four surface soil samples and five subsurface soil samples (including one duplicate sample) were collected from four distinct Geoprobe® borings. Three borings, P69SB1, P69SB2, and P69SB3, were located in the vicinity of the former waste oil AST. The other boring, P69SB-4, was located downgradient (north) of Building 900 to evaluate the absence or presence of contamination downgradient of the building. Surface soil samples for non-VOC analysis were collected from the 0- to 6-inch bgs interval. For borings located in paved areas, non-VOC surface soil samples were collected from the 0- to 6-inch interval directly below the pavement sub-base. Surface soil samples collected for VOC analysis were collected from the 18- to 24-inch bgs interval. Subsurface soil samples were collected from the 6-inch interval directly above the water table. No visual or olfactory evidence of soil contamination was noted.

All samples collected were analyzed for TCL+30 (w/o pesticides), TAL metals, and cyanide. The results are as follows:

- A total of five B/N compounds, 17 metals, and two VOCs were detected in concentrations below the respective criteria in Parcel 69 surface soil.

Three groundwater samples (including one duplicate sample) were collected from two distinct temporary wells that were installed with the Geoprobe® rig. One temporary well, P69GW-1, was installed in an area of the former waste oil AST east of Building 900, and the other well, P69GW-4, was installed downgradient (north) of Building 900. Samples were analyzed for TCL+30 (w/o pesticides/PCBs). The results are as follows:

A total of one B/N compound and three VOCs were detected in Parcel 69 groundwater.

- The B/N compound bis(2-ethylhexyl)phthalate was detected at concentrations above the NJDEP GWQC in two samples. The contamination was most likely the result of the polyethylene sampling tube that is commonly used for sampling wells. Therefore, it is not considered to be a concern in groundwater at Parcel 69.
- Of the three VOCs detected, one (PCE) was detected at a concentration that exceeds the NJDEP GWQC in one sample.

Based upon the resulting data, the SI recommended NFA for soil, but further evaluation for groundwater. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Parcel 69 will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, surface water sampling within Oceanport Creek is recommended.

3.2 CHARLES WOOD AREA

3.2.1 LANDFILL, SITE CW-3A

The CW-3A site (3.1 acres) was identified as a suspected landfill area during the Preliminary Assessment (PA) phase study. Interviews with long-term DPW employees suggested that a former landfill might be present at the site in question. The suspected landfill is located north of the Pulse Power facility (Building 2707), which is also located in the southwestern part of the CWA.

On September 25, 1997, several test pits were excavated at the CW-3A site to ascertain whether the site was previously utilized as a landfill. Upon excavating the test pits, waste materials, mostly in the form of construction debris, were observed within the test pits. The debris itself consisted of concrete, asphalt, brick, wood, glass, and assorted scrap metals. Coal ash was also observed within each of the test pits. To further evaluate the potential impact the landfill may have had on site soils and groundwater, four shallow monitoring wells were installed at the site. During monitoring well construction, continuous split spoon soil samples were collected in 4-foot increments. Based upon field observations and measurements, soil samples were collected at the following intervals: 0 to 6 inches, 18 to 24 inches, and just above the water table. Samples collected at the 18- to 24-inch interval were collected solely for VOCs to include a gas chromatography/mass spectrometry library search. Samples collected at the 0- to 6-inch interval were analyzed for TCL+30 minus the VOC parameters, TAL metals, and cyanide. Samples collected just above the water table were analyzed for TCL+30 parameters, TAL metals, and cyanide. The results are as follows:

- Benzo(a)anthracene, benzo(a)pyrene, and cadmium were detected within site soils slightly above NJDEP Direct Contact Soil Cleanup Criteria.

A coal ash sample was also collected on December 17, 1997, and was analyzed for TCL+30, TAL metals, and cyanide.

During the week of January 12, 1998, groundwater samples were collected from each of the four wells. A second round of groundwater samples was collected during the week of January 26, 1998. All groundwater samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- Benzene and lead were detected in three downgradient monitoring wells slightly above NJDEP GWQC.

- Arsenic, chromium, and lead were detected in one upgradient monitoring well slightly above NJDEP GWQC.

As of 2002, eight consecutive quarterly rounds of groundwater samples had been collected for analysis. A second RI that evaluated the potential for the presence of environmental contaminants within the existing landfill cover material also was completed.

The IRP recommended NFA for the site (Versar, Inc., 2004h, 2005b). In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Landfill Site CW-3A will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface water sampling within Shrewsbury Creek are recommended.

3.2.2 FORMER PESTICIDE STORAGE AREA, SITE CW-6

Building 2044 was part of a small complex of buildings located in the southwest section of the CWA golf course. The complex also included Building 2070, a large metal shed, and two smaller metal igloos. Currently, Buildings 2070, 2071, and 2046 are located in the area as confirmed by the VSI. Building 2070 is used to store golf course maintenance and landscaping equipment, such as mowers and tractors. Building 2071 is used as the equipment repair facility. Building 2046 is used as a golf cart and equipment wash area (closed loop) and was also used for pesticide mixing until 2001. The golf course maintenance complex may predate the purchase of the golf course by the Army. Pesticides and herbicides may have been stored and mixed in this area prior to Army ownership of the property. The 1980 IA report (USATHAMA, 1980) contains a 1979 inventory of pesticides and herbicides that were used on the golf course and stored in Building 2044. Pesticides that were present in significant quantities include: malathion, floriable sevin, resmithrin, Borocel IV, chlordane, and Dibrom. The IA also discusses a pest control program that was in effect in 1979. The compounds that were used in large quantities include carbaryl (sevin), malathion, chlordane, and diazinon. Some of the herbicides identified in the IA include 2,4-dichlorophenoxyacetic acid, Dacthal, 2,4,5-trichlorophenoxyacetic, and sodium arsenite (USATHAMA, 1980).

The course groundskeeper, who had been part of the grounds crew for 33 years (1960 to 1993), was interviewed during the PA phase. The groundskeeper stated that pesticides and herbicides also were stored inside the two metal igloos and that former mixing activities generally took place directly outside the two igloos. Pesticides and herbicides are not currently stored or mixed on site. The facility has hired an outside contractor to apply pesticides and herbicides.

Under the SI, soil borings were completed at two locations where pesticide mixing was documented to occur within the 0.6-acre site. Two soil samples were collected from each boring, one surface sample and the other sample from the interval just above the water table. In addition, each boring was converted to a monitoring well in order to evaluate groundwater quality. Both soil and groundwater samples were analyzed for TCL+30. The results are as follows:

- Dieldrin was identified in one soil sample slightly above NJDEP Direct Contact Soil Cleanup Criteria.
- Benzene was detected in one groundwater sample above NJDEP GWQC.

Two additional monitoring wells were installed during the IRP RI phase. As of 2002, 15 consecutive quarterly rounds of groundwater samples had been collected for subsequent analysis. The results are as follows:

- Heptachlor epoxide and arsenic were initially detected in two of the four site monitoring wells above NJDEP GWQC. Alpha-chlordane, gamma-chlordane, and 4,4'-DDD also were detected in the two monitoring wells; however, these contaminants were identified slightly below the NJDEP GWQC.

The IRP recommended NFA for the site (Versar, Inc., 2005c). In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), the Former Pesticide Storage Area Site CW-6 will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, sediment and surface soil sampling are recommended.

3.2.3 BUILDING 2700 (ECP PARCEL 15)

The Myer Center facility (Building 2700) is located in the CWA of FTMM at the intersection of Pearl Harbor Avenue and Corregidor Road. Parcel 15 encompasses an area of approximately 70 acres of which the Building 2700 footprint is 171,000 square feet. It was built in 1954 and has an extensive history of laboratory operations, photoprocessing, and paint spraying booths. Operations included electrochemical research, growing and shaping of crystals, various plating operations, mixing of magnetic powders, machining, welding, spray painting, use of solvents for equipment cleaning, and other miscellaneous laboratory operations utilizing standard laboratory chemicals. By 1959, additional operations included shock and vibration testing of certain components; glass blowing; a plastics laboratory that made plastic castings, laminates, and forms sprayed with polyester resins; and a ceramics laboratory. A satellite dispensary and dental clinic was present in 1972 that serviced 2,610 employees. During the 2006 VSI performed as part of the Phase I ECP, the Dental Clinic was no longer operational at Building 2700. According to FTMM personnel, no chemical wastes have been discharged to the sanitary sewer since the mid-1980s. Activities at Building 2700 have since been converted primarily to administrative functions. Current waste management practices prohibit the discharge of any materials, other than water and biodegradable soaps, into the sanitary sewer system.

In 2007, as part of an SI (Shaw, 2008), sediment, soil, groundwater, soil gas, and indoor air samples were collected to assess environmental conditions on Parcel 15. Geophysical surveys were conducted to determine if any USTs remained on site.

Seven sediment samples (including one duplicate sample) were collected from three sample borings located adjacent to three stormwater outfalls within Shrewsbury Creek. These sample locations were south of the walking bridge, near the southwest portion of Building 2525 on the western side of Shrewsbury Creek. Samples were collected to investigate any potential historic discharges from Building 2700 into Shrewsbury Creek. Shrewsbury Creek is a non-tidal water body in this portion of the facility located southeast of Building 2700 in the CWA.

At each sample location, two samples were collected; one from the 0- to 6-inch bgs interval, and the other from the 18- to 24-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. Samples collected were analyzed for TCL+30 (w/o pesticides) and TAL metals. The results are as follows:

A total of 12 B/N compounds and 18 metals were detected in Parcel 15 sediment samples.

- Of the 12 B/N compounds, two (acenaphthene and fluorene) were detected at concentrations that exceeded the respective criteria in one sample.
- Of the 18 metals, two (chromium and copper) were detected at concentrations that exceeded the respective criteria in three samples.

Fifty-three surface soil samples and 59 subsurface soil samples (including six duplicate samples) were collected from 53 distinct Geoprobe® borings in order to investigate any potential releases associated with former barracks located north of Building 2700. Surface soil samples for non-VOC analysis were collected from the 0- to 6-inch interval bgs. For borings located in paved areas, non-VOC surface soil samples were collected from the 0- to 6-inch interval directly below the pavement sub-base. Surface soil samples collected for VOC analysis were collected from the 18- to 24-inch bgs interval. Subsurface soil samples were collected from the 6-inch interval directly above the water table from each boring. Samples were analyzed for TPH and VOC+10. The results are as follows:

- TPH was detected in seven of the 53 surface soil samples and in two of the 59 subsurface soil samples. None of the TPH results exceeded regulatory standards; therefore, VOCs were not analyzed.

Seven groundwater samples (including one duplicate sample) were collected from six distinct temporary wells that were installed. Temporary wells were installed along the downgradient boundary of the parcel (along Shrewsbury Creek). Groundwater samples were collected to investigate any potential release from possible former heating oil USTs associated with former barracks, as well as other potential

discharges from historic activities at Building 2700. Samples were analyzed for TCL+30 (w/o pesticides or PCBs) and TAL metals. The results are as follows:

A total of one B/N, one VOC, and 19 metals were detected in Parcel 15 groundwater samples.

- One B/N, bis(2-ethylhexyl)phthalate, was detected at concentrations that exceeded the NJDEP GWQC. The contamination was most likely the result of the polyethylene sampling tube that is commonly used for sampling wells. Therefore, it is not considered to be a concern in groundwater at Parcel 15.
- One VOC, toluene, was detected at a concentration below the NJDEP GWQC.
- Of the 19 metals detected, six (aluminum, arsenic, iron, lead, manganese, and sodium) were detected above the NJDEP GWQC.

A total of 15 soil gas and 15 indoor air samples were collected in and around Building 2700. A total of 32 VOCs were detected in Parcel 15 soil gas samples and a total of 22 VOCs were detected in Parcel 15 indoor air samples. The results are as follows:

- Of the 32 VOCs detected, four (benzene, PCE, TCE, and vinyl chloride) were detected at concentrations that exceeded the respective criteria in 14 soil gas samples.
- Twenty-two VOCs were detected at low concentrations below the respective criteria in indoor air samples.

As part of the geophysical survey, an electromagnetic induction (EMI) survey was conducted throughout the area of the parcel where former barracks were identified to determine if USTs are present. Follow-up ground-penetrating radar surveys were conducted where anomalies were identified during the EMI surveys. No suspected USTs were identified as a result of the geophysical survey.

Based upon the resulting data, the SI recommended that NFA be taken for soil and groundwater within Parcel 15. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Parcel 15 will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, surface water sampling within Shrewsbury Creek is recommended.

3.2.4 BUILDINGS 2507 AND 2704 (ECP PARCEL 27)

Parcel 27 is located in the southwest portion of CWA and includes the Environmental Test Facility (Building 2704), former Pulse Power Center (Building 2707), Sheet Metal Shop (Building 2502), Machine Shop (2503), Paint and Fabrication Facility (2506), and a Former Motor Pool (2501). Parcel 27 encompasses an area of approximately 30 acres.

Building 2704 has been used as an environmental test chamber since 1965. Chemical use in this building is limited to hydraulic fluid and standard shop chemicals (i.e., petroleum-based solvents, oils, and greases). While current waste handling practices are modern, historical waste handling practices are unknown. The building has multiple floor drains which, according to engineering drawings, are connected to the storm sewer.

Building 2507 is the Tactical Vehicle Repair Shop where petroleum and solvent use would be common during vehicle maintenance operations.

In 2007, as part of an SI (Shaw, 2008), sediment and surface soil were collected to assess environmental conditions on Parcel 27. Geophysical surveys were conducted to determine if a former debris burial area remained on site.

Four sediment samples were collected from two sample borings located within Shrewsbury Creek. One sample was located adjacent to a stormwater outfall and the other was located downstream. At each sample location, two samples were collected; one from the 0- to 6-inch interval bgs, and the other from the 12- to 18-inch interval bgs. No visual or olfactory evidence of sediment contamination was noted. All samples were analyzed for TCL+30 (w/o pesticides) and TAL metals. The results are as follows:

A total of eight B/N compounds and 20 metals were detected in Parcel 27 sediment samples.

- Of the eight B/N compounds, none were detected that exceeded the respective criteria.
- Of the 20 metals, eight (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) were detected at concentrations that exceeded the respective criteria in all four samples.

Two surface soil samples were collected from two sample borings located in the wooded area to the northeast of Building 2507. At each location, the sample was collected from the 0- to 6-inch bgs interval, and a sample for VOC analysis was collected from the 18- to 24-inch bgs interval. No visual or olfactory evidence of soil contamination was noted. All samples collected were analyzed for TCL+30 (w/o pesticides) and TAL metals. The results are as follows:

- A total of eight B/N compounds and 18 metals were detected in Parcel 27 surface soil samples below the respective criteria.

An EMI survey was conducted over the area identified as a possible debris burial area.

- No anomalies indicative of debris burial areas were identified.

Based upon the resulting data, the SI recommended that NFA be taken for soil within Parcel 27. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Parcel 27 will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, surface water sampling within Shrewsbury Creek is recommended.

3.2.5 BUILDING 2525 (PARCEL 28)

Parcel 28 is located in the CWA and encompasses Building 2525 – the former Eatontown Laboratory complex. Parcel 28 encompasses an area of approximately 30 acres. Building 2525 was constructed between 1941 and 1942. The Eatontown Signal Laboratory was renamed Watson Laboratories in 1945 and subsequently moved to Rome, New York, in 1951.

Three separate septic tanks and leach fields and one underground transformer vault are located within the Building 2525 area. The main sanitary sewer line from the building is shown to discharge to a septic tank and leach field east of the building. A review of the DPW map and engineering drawings repository indicated a 2-inch “acid proof drain” leading from Bay 1 to a dry well southeast of the building. Floor drains were shown to discharge to the brook northwest of the building. Building revitalization plans show all floor drains were later connected to the sanitary sewer system. Building 2525 was included in the Watson Laboratory complex in the mid-1940s. Crystal growing and processing operations were conducted in the Watson Laboratory building located in the southwest portion of the CWA in the early 1950s. Operations included cleaning of crystals, quartz etching, soldering, and gold (and other metal) plating, which was conducted in Building 2532. These operations involved chemicals such as carbon tetrachloride, ammonium bifluoride, cadmium sulfate, and sulfuric acid. Crystal etching using ammonium bifluoride was also noted in Building 2538. Other processes associated with the Watson Laboratories included machining of metals and remelting lead in Building 2533, growing of crystals and physical chemistry in Building 2534, and machining of crystals in Building 2538.

Following the 1951 Watson Laboratories move, the Aviation Research and Development Command Laboratory was moved from the Myer Center to Building 2525. This laboratory operation occupied the building until 1978. A 1978 industrial hygiene survey reported ozalid reproduction in Room 5101 of Building 2525. Building revitalization plans show all floor drains connected to the sanitary sewer system. No sumps or floor drains were noted during the 2006 VSI. The use of the building has been strictly administrative since the late 1990s, as confirmed during the VSI.

Parcel 28 also contains the CECOM laboratory and radiological testing facility housed in Building 2540. This building contains a gamma irradiator, Radiac calibrators, a storage room for low-level RAM with multiple radioactive sources from the demilitarization of commodities, a nuclear counting laboratory, and several health physics laboratories. A survey of the interior of Building 2540 will be performed as part of the radiological scoping surveys.

According to the 1993 Environmental Research, Inc. Aerial Photographic Site Analysis, a fenced open storage area and possible tank pads in the northern portion of Parcel 28, to the northeast of Building 2525.

In 2007, as part of an SI (Shaw, 2008), sediment, soil, and groundwater samples were collected to assess environmental conditions on Parcel 28. Geophysical surveys were conducted to determine the absence or presence of formerly utilized septic tanks, associated leaching fields, and USTs.

A total of four sediment samples were collected from two sample borings located along the southeast bank of Shrewsbury Creek adjacent to Building 2525. Samples were located directly downgradient of potential former discharge pipes observed on the southeast bank of the Creek. Samples were collected to investigate any potential historic discharges from former floor drains to outfalls that were associated with Building 2525 into Shrewsbury Creek. Shrewsbury Creek is a non-tidal water body in this portion of the facility located southeast on Building 2700 in the CWA. At each sample location, two samples were collected; one from the 0- to 6-inch bgs interval, and the other from the 12- to 18-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. All samples were analyzed for TCL+30 (w/o pesticides) and TAL metals. The results are as follows:

A total of five B/N compounds, one VOC, and 17 metals were detected in Parcel 28 sediment samples.

- All B/N compounds and the one VOC (acetone) were detected at concentrations below the respective criteria.
- Of the 17 metals, one (chromium) was detected at a concentration that exceeded the respective criteria in all for samples.

A total of three surface soil samples and three subsurface soil samples were collected from three distinct Geoprobe® borings in order to investigate potential septic system discharges and former storage pads that were identified through aerial analysis. An additional two surface soil samples were collected from hand-augered borings. Surface soil samples for non-VOC analysis were collected from the 0- to 6-inch bgs interval. Surface soil samples collected for VOC analysis were collected from the 18- to 24-inch bgs interval. Subsurface soil samples were collected from the 6-inch interval directly above the water table from each boring. No visual or olfactory evidence of soil contamination was noted during field operations. Samples were analyzed for TCL+30 (w/o pesticides) and TAL metals. The results are as follows:

A total of 12 B/N compounds, one VOC, and 17 metals were detected in Parcel 28 surface and subsurface soil samples collected from Geoprobe® and hand-augered borings.

- The 12 B/N compounds and one VOC (acetone) were detected at concentrations below the respective criteria.
- Of the 17 metals, one (arsenic) was detected at a concentration in excess of the respective criteria in one sample.

Four test pits located in an open field east of Building 2525 and Heliport Drive, and one test pit northeast of Building 2525, were excavated to determine if any contamination exists from former septic tank and leach fields that once serviced Building 2525. Soil sample depths were contingent upon field observations (i.e., depth to water table, thickness of layered engineered gravel) and field screening results. A total of eight subsurface soil samples (including two duplicate samples) were collected from the five test pits. No visual or olfactory evidence of impacted soil was noted. All samples were analyzed for TCL+30 (minus pesticides) and TAL metals. No visual or olfactory evidence of impacted soil was noted. The results are as follows:

- A total of 12 B/N compounds, one VOC, and 17 metals were detected in concentrations below the respective criteria in soil samples collected from test pits.

A total of five groundwater samples (including one duplicate sample) were collected from four distinct temporary wells that were installed with the Geoprobe® rig. Three temporary wells were installed downgradient of former drainage fields, and one temporary well was installed downgradient of a former

storage pad area located in an open field west of Building 2290 and Guam Lane. Samples were analyzed for TCL+30 (without pesticides/PCBs), TAL metals, ammonia, nitrate, and nitrite. The results are as follows:

A total of one B/N compound, three VOCs, and 13 metals were detected in Parcel 28 groundwater samples.

- One B/N compound, bis(2-ethylhexyl)phthalate, was detected at concentrations below the NJDEP GWQC.
- A total of three VOCs, acetone, chloroform, and toluene, were detected at concentrations below the NJDEP GWQC in Parcel 28 groundwater samples.
- Only two metals (aluminum and manganese) were detected at concentrations above the NJDEP GWQC.
- Nitrite and nitrate were detected at concentrations below the GWQC in groundwater samples.

The geophysical survey was conducted to investigate the location of former septic tanks, USTs, and drywells. The results are as follows:

- No drywell was identified within Parcel 28; however, one possible UST (P28-8), one suspected septic holding tank, and one suspected septic distribution box and associated piping were identified.

Based upon the resulting data, the SI recommended that NFA be taken for soil within Parcel 28. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2008), Parcel 28 will be addressed as part of this facility-wide BEE. In order to facilitate the BEE, surface water sampling within Shrewsbury Creek is recommended.

4.0 GENERAL APPROACH FOR THE BASELINE ECOLOGICAL EVALUATION

This section presents the approach that will be used to perform the BEE for the 14 IRP sites and 8 ECP sites that require further evaluation through the BEE process.

The work addressed in this plan is intended to meet NJDEP requirements (N.J.A.C. 7:26E-3.11; NJDEP, 2008) for a BEE. Though a BEE is often performed as part of an SI, this work is not intended to satisfy the general requirements of an SI or RI as presented in the TRSR (N.J.A.C. 7:26E; NJDEP, 2008) nor is it intended to provide data necessary for a sediment quality evaluation (NJDEP, 1998). Previous reports and comments have been reviewed to identify previous data gaps and data needs. Surface water, sediment, and surface soil samples are proposed to be collected to fill data gaps and gather enough information to satisfy the requirements of a BEE.

The BEE is Tier I of the ecological evaluation and ecological risk assessment process as developed by the SRP, and it is defined in the TRSR (N.J.A.C. 7:26E; NJDEP, 2008) and Site Remediation News (NJDEP, 1997). The BEE was developed to be an efficient and cost-effective screening process. As such, the results of this BEE will be a conclusion as to whether potential ecological impacts are negligible or whether more site-specific ecological evaluation is warranted.

The objective of the BEE is to examine sites for the co-occurrence of the following:

- COPECs.
- Environmentally sensitive natural resources.
- Chemical migration pathways to these environmentally sensitive natural resources.

The BEE is usually based on existing site documents, existing analytical data, and the results of a qualitative site visit to document the site conditions. The occurrence of COPECs is typically determined through a comparison of existing site data with ecological screening levels. An initial review of existing data to determine what data were available for use in the BEE determined that some sites did not contain sufficient information to adequately conduct a BEE. Although sufficient soil and groundwater data are available for most sites, surface water and sediment data for many sites was either non-existent or limited to few parameters. Without such data, additional investigation would most likely be recommended in the BEE report. In order to facilitate the ecological evaluation process, additional samples will be collected and analyzed to provide the necessary data to fill the identified gaps. The location and number of samples to be collected are based on previous investigations at the sites. An additional objective of the field sampling is to provide information regarding the general background characteristics of surface water and sediment in the FTMM area through the collection of several upgradient samples to assist risk managers in the decision-making process.

The occurrence of environmentally sensitive natural resources and of potential chemical migration pathways will be determined from existing literature for the site, a qualitative site visit, and other available information such as the NJDEP Natural Heritage database. Reviews of the NJDEP tidal and freshwater wetland maps, the USGS topographic maps, and the USDA Soil Conservation Service soil survey map will be performed to provide an overview of the habitat expected to occur at or in the vicinity of the site. The qualitative site visit is conducted for the purpose of verifying information gathered previously and to identify existing ecology communities and species, environmentally sensitive natural resources, and potential contaminant pathways.

If it is determined through the BEE process that there are COPECs present, that there are environmentally sensitive natural resources at or near the sites, and that there are potential pathways from the contamination to the environmentally sensitive natural resources, than further ecological investigation or risk assessments may be required. The nature of these investigations or Tier II and Tier III assessments would be determined based on the findings of the BEE and conducted in accordance with EPA (USEPA, 1989) and other applicable guidance. For example, further investigations could include or be limited to statistical background characterization for one site, toxicity testing, or food web modeling for potential ecological receptor species.

4.1 DATA AND LITERATURE REVIEW

One task in the BEE process is the data and literature review. Existing documents prepared for the site will be reviewed to identify the COPECs remaining on site in the various environmental media.

Analytical data for the various sites to be addressed in this BEE can be found within a variety of reports (e.g., SI Reports, RI Reports) and remedial actions have taken place at some sites since the collection of the analytical samples. The analytical data will be reviewed for applicability to current site conditions. The data will be reviewed and all applicable data will be identified for surface soil, surface water, sediment, and groundwater.

Exposure of ecological receptors to contaminants in soil predominantly occurs within the surface soils. Ecological receptors are not frequently exposed to subsurface soils; therefore, subsurface soils below 1 foot bgs will not be evaluated in the BEE.

Though ecological receptors are not exposed directly to contaminants in groundwater, pathways may exist by which groundwater may flow to potential exposure points (e.g., discharge of groundwater into surface water bodies). Therefore, the most recent 2-year period of readily available groundwater data will be evaluated in the BEE to best represent current conditions. Though groundwater may discharge to surface water bodies, groundwater contaminant concentrations are not meant to represent potential surface water concentrations. It should be noted that, though the CEAs are meant to minimize the potential human health exposure to contaminants in groundwater, they do not inhibit potential ecological exposures.

Ecological receptors may be exposed directly to contaminants in surface water and sediment of the various creeks and ponds that drain the sites. As with soils, ecological receptors are not frequently exposed to contaminants in subsurface sediments. The top 6 inches of sediment is usually considered to be the biotic zone, and only data from the top 6 inches of sediment will be evaluated in the BEE. Some of the previous sediment analytical samples have only been analyzed for PCBs. NJDEP comments have indicated that sediment samples are necessary to determine the potential presence of other contaminants. In such cases, additional samples are to be collected in support of this BEE, and the data from the new samples, and not the previous samples, will be evaluated in this BEE. Location information recorded during previous sampling events will be utilized to navigate back to the original sample locations for collection of the new samples from depositional areas and potential migration pathways. These samples will be collected for the purpose of identifying COPECs and are not intended to meet all requirements of a sediment quality evaluation (NJDEP, 1998) or to define the nature and extent of any contamination present.

As with sediment, surface water analysis in previous samples, particularly for IRP sites, has been for a limited suite of parameters. Additional samples are proposed to address such data gaps. The newer data will be evaluated in this BEE instead of the previous data.

Existing data from the 15 IRP sites to be evaluated in this BEE will be mostly limited to groundwater and near surface soil. Existing subsurface soil, sediment, and surface water data will not be used in the BEE, with the exception of surface sediment data from Parkers Creek collected to address metals concentrations at the pre-1941 STP (FTMM-20).

Though ecological receptors are not directly exposed to groundwater, groundwater could flow to adjacent surface water bodies providing a point of potential ecological exposure. As noted previously, groundwater data to be evaluated will be from the most recent and available 2-year period (most wells are sampled quarterly). The number of wells for each site that are currently part of the monitoring program is listed in **Table 4-1**.

Table 4-1. Existing IRP Site Data To Be Evaluated in the BEE

Site	Number of Soil Borings	Number of Monitoring Wells
Landfill 2	193	16
Landfill 3	203	8
Landfill 4	63	4
Landfill 5	254	10
Landfill 8	292	14
Landfill 12	147	11
Landfill 14	119	6
Water Tank, M-15	NA	0
Building 498, M-16	NA	1
Former Training Area, M-18	62	11
Pre-1941 STP, M-20	NA	NA
Landfill, CW-3A	48	4
Former Pest. Storage, CW-6	NA	4
Building 1122	NA	5
Building 283	NA	6

Ecological receptors can be directly and indirectly exposed to contaminants in surface soil. Though ecological exposure can occur to some limited depth sub-surface, these exposures are less likely and less frequent. Therefore, the surface soil is considered the point of maximum potential exposure. Near-surface soil data are available for most IRP sites in the RI reports. The number of soil borings for each site that contain near-surface samples is also listed in the following table. Contaminated soils have been excavated and removed and the areas backfilled and graded at Building 283, Building 1122, the Water Tank M-15, the pre-1941 STP, and Building 498 M-16. Soils at these sites will not be addressed in the BEE. Only subsurface soil sample data are available at CW-6. Surface soil samples will be collected from this site as part of the BEE. No additional groundwater samples will be collected as part of the BEE.

Though surface water and sediment data do exist for some IRP sites, the available data is limited in the parameters analyzed. For example, many of the surface water bodies were examined as part of a sediment quality investigation but the analysis was mostly limited to PCBs. Surface water and sediment data is addressed further in **Section 4.2**.

Existing data from the eight ECP sites to be addressed in this BEE will be limited to groundwater, near-surface soil, and near-surface sediment. The existing data that will be evaluated in the BEE were presented within the SI Report (Shaw, 2008) and were summarized in **Section 3.0**. **Table 4-2** summarizes the number of sample locations with analytical data at each of the ECP sites that will be evaluated in the BEE.

Table 4-2. Existing ECP Site Data To Be evaluated in the BEE

Site	Number of Soil Borings	Number of Monitoring Wells	Number of Sediment Sample Locations
Building 2700, Parcel 15	53	6	3
Building 2507, Parcel 27	2	0	2
Building 2525, Parcel 28	5	4	2
Building 1150, Parcel 39	1	0	2
Building 1122, Parcel 43	0	0	3
Building 283, 288, 291, 292, 293, 295, Parcel 49	13	6	3
Building 1075, Parcel 61	4	0	2
Building 900, Parcel 69	4	2	2

In addition to the data review, the information regarding the ecological setting will be reviewed to provide a preliminary overview of the habitat of the area. The USFWS and NJDEP wetland maps, the USGS topographic maps, and the USDA county soils survey maps will be reviewed. The NJDEP Natural Heritage database will also be evaluated to determine a list of threatened or endangered species potentially occurring at the site. The goal of the data and literature review is to identify COPECs and locate potential environmentally sensitive natural resources.

4.2 FIELD INVESTIGATION

The field investigation consists of two parts: a qualitative site visit and additional sample collection.

The qualitative site visit will be used to identify the different habitat types that occur on site and to identify the dominant species that occupy each habitat type. The presence of areas of obvious contamination, or areas of significantly stunted or stressed vegetation, will also be noted. The qualitative site visit will be used to support the information gathered during the literature review and to further delineate any areas of environmental sensitivity. Specific attention will be paid to the potential for threatened or endangered species identified during the literature review.

Many of the IRP sites, particularly the landfills, are located adjacent to one or more of the surface water bodies that drain the site. Although sufficient soil and groundwater data are available for most sites, existing surface water and sediment data needed to complete the BEE is minimal. **Table 4-3** and **Table 4-4** list the surface soil (needed at one IRP site only), surface water, and sediment samples that will be collected during the field investigation for the MP and CWA, respectively, to provide the data necessary to complete the BEE. As mentioned previously, only subsurface soil sample data is available for the Former Pesticide Storage Area, CW-6; soil samples will be collected from this site to support the BEE as indicated in the table.

Sediment data for most of the applicable ECP sites are reported in the SI Report (Shaw, 2008); however, surface water data for these sites is minimal. **Table 4-3** and **Table 4-4** also list the surface water and sediment samples that will be collected at the ECP sites in support of the BEE.

The proposed surface water, sediment, and soil sample locations are presented on **Figure 4-1** and **Figure 4-2** for MP and CWA, respectively. These figures present approximate locations of sampling points. All points will be located in the field based on depositional characteristics and potential contaminant migration pathways. The sample locations and media to be sampled are listed in **Table 4-3**

for the MP and **Table 4-4** for the CWA. The location and number of samples to be collected are based on previous investigations at the sites. As noted in **Table 4-3** and **Table 4-4**, though most surface water and sediment samples are to be collected adjacent to IRP or ECP sites targeting depositional areas or potential contaminant migration pathways, several samples are to be collected either upgradient or downgradient of a site. These samples can be used to provide a general characterization of background concentrations present that may not be related to the sites under investigation. This information will be used in comparisons to site data in order to assist in risk management decisions. These data are not intended to provide a statistically rigorous background study, which is outside the scope of a BEE.

Sampling points for soil boring locations, surface water locations, and sediment locations will be located in the field using a GPS receiver to accurately place the points on maps. These maps will be included in the BEE report.

To provide data consistent with that previously collected for the recent SI and RI phases, samples collected during the field investigation will be analyzed for TCL+30 organic parameters and TAL metals. This list of analytes was previously developed to provide a comprehensive analytical program based on site histories. Sites where the presence of pesticides is not suspected will not be analyzed for pesticides. These include two IRP sites (Building 1122 and Building 283) and the eight ECP sites. Surface water samples will be analyzed for both total TAL metals and filtered TAL metals and hardness. Field measurements of surface water dissolved oxygen, pH, temperature, salinity, and conductivity will also be made at the time of surface water and sediment sample collection. Sediment samples also will be analyzed for total organic content and grain size.

4.3 DATA ANALYSIS

The third task in the BEE will be the data analysis and preliminary hazard characterization task. In this task, the data resulting from the additional samples collected during the field investigation and the previous data assembled during the data review will be combined to evaluate the contaminants on site with regard to potential impact to ecological receptors and to determine whether additional ecological investigations will be required such as described in N.J.A.C. 7:26E-4.7 (NJDEP, 2008). Though many of the individual sites are small and unlikely to be the extent of a receptor's habitat, the data for each site will be reviewed separately during the BEE process. The environmentally sensitive natural resources identified during the site visit and literature review will be evaluated qualitatively with regard to the potential for COPECs to pose any adverse effects. The COPECs in each environmental medium will be evaluated by comparing on-site concentrations with the respective ESC.

Though the TRSR reference several sources for ESCs for use in a BEE, the NJDEP maintains a table of current recommended ESC based on those aforementioned sources as well as others (NJDEP, 2009b). The SRP's Environmental Toxicology and Risk Assessment Unit has developed this table from various sources to allow ease of reference for ESCs for surface water, sediment, and soil. When multiple ESCs are provided for the same contaminant and same media, generally the most conservative criterion is used. Not all contaminants have ESCs for all media. If such contaminants are detected in environmental media they will be identified in the BEE report, but the development of ESCs is beyond the scope of the BEE. The most recent version of the cited ESC will be used in this BEE. The NJDEP ESC table, which was last updated on March 10, 2009, is presented in **Appendix A**.

Although ecological exposures to groundwater are generally considered incomplete, COPECs in groundwater will be evaluated with regard to the potential migration of groundwater to surface water by comparing detected COPEC concentrations in groundwater to appropriate surface water criteria for the protection of aquatic life.

4.4 BASELINE ECOLOGICAL EVALUATION REPORT

Upon completion of the above tasks, a BEE report will be generated. The BEE report will include a description of the various habitats found at the sites, a summary of the analytical data relevant to the BEE, an identification of potential transport mechanisms that could provide exposure pathways to ecological receptors, and a summary of the COPECs identified for each environmental medium at the sites. The BEE will conclude with either of two recommendations for each site:

- The BEE report contains sufficient information to make a risk management decisions.
- Additional ecological investigation should be conducted as described in N.J.A.C. 7:26E-4.7 (NJDEP, 2008).

A weight-of-evidence approach will be used in making recommendations based on the BEE results. This weight-of-evidence could include, but is not limited to, a comparison to general background concentrations, frequency of exceedances of ESCs, degree of exceedance of ESCs, and comparisons to other screening values.

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
M-2	M2-SD3	SD			1	Sediment samples will be recollected at locations previously collected in 2000 for PCBs analyses. Sediment samples will be collected in Mill Creek adjacent to northern perimeter of Landfill M-2 targeting depositional zones or potential migration pathways.	x	x	x	x			x		x	x	x
M-2	M2-SD4	SD			2		x	x	x	x			x		x	x	x
M-2	M2-SD5	SD			3		x	x	x	x			x		x	x	x
M-2	M2-SD6	SD			4		x	x	x	x			x		x	x	x
M-2	M2-SD7	SD			5		x	x	x	x			x		x	x	x
M-2	M2-SD8	SD			6		x	x	x	x			x		x	x	x
M-2	M2-SD9	SD			7		x	x	x	x			x		x	x	x
M-2	M2-SD10	SD			8		x	x	x	x			x		x	x	x
M-2	M2-SD11	SD			9		x	x	x	x			x		x	x	x
M-2	M2-SD12	SD			10		x	x	x	x			x		x	x	x
M-2	M2-SD13	SD			11		x	x	x	x			x		x	x	x
M-2	M2-SD14	SD			12		x	x	x	x			x		x	x	x
M-2	M2-SW6		SW		4	Surface water samples will be recollected at locations previously sampled for VOCs monitoring. Surface water samples will be collected in Mill Creek adjacent to northern perimeter of Landfill M-2 targeting potential migration pathways.	x	x	x	x	x	x		x			x
M-2	M2-SW11		SW		9		x	x	x	x	x	x		x			x
Total Samples at M-2		12	2														
M-3	M3-SD1	SD			1	Sediment samples will be recollected at locations previously sampled in 2000 for PCBs analyses. Sediment samples will be collected in Lafetra Creek along northern perimeter of Landfill M-3 targeting depositional zones or potential migration pathways.	x	x	x	x			x		x	x	x
M-3	M3-SD2	SD			2		x	x	x	x			x		x	x	x
M-3	M3-SD3	SD			3		x	x	x	x			x		x	x	x
M-3	M3-SD4	SD			4		x	x	x	x			x		x	x	x
M-3	M3-SD5	SD			5		x	x	x	x			x		x	x	x
M-3	M3-SD6	SD			6		x	x	x	x			x		x	x	x
M-3	M3-SD7	SD			7		x	x	x	x			x		x	x	x
M-3	M3-SD8	SD			8		x	x	x	x			x		x	x	x
M-3	M3-SD9	SD			9		x	x	x	x			x		x	x	x
M-3	M3-SD10	SD			10		x	x	x	x			x		x	x	x
M-3	M3-SD11	SD			11		x	x	x	x			x		x	x	x
M-3	M3-SW3		SW		3	Surface water samples will be recollected at locations previously sampled for VOCs monitoring. Surface water samples will be collected in Lafetra Creek along northern perimeter of Landfill M-3 targeting potential migration pathways.	x	x	x	x	x	x		x			x
M-3	M3-SW8		SW		8		x	x	x	x	x	x		x			x

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)	Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
					VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
Total Samples at M-3		11 2													

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
M-4	M4-SD1	SD			1	Sediment sample will be recollected at locations previously collected in 2000 for PCBs analyses. Sediment samples will be collected in Mill Creek adjacent to western perimeter of Landfill M-4 targeting depositional zones or potential migration pathways.	x	x	x	x			x		x	x	x
M-4	M4-SD2	SD			2		x	x	x	x			x		x	x	x
M-4	M4-SD3	SD			3		x	x	x	x			x		x	x	x
M-4	M4-SD4	SD			4		x	x	x	x			x		x	x	x
M-4	M4-SD5	SD			5		x	x	x	x			x		x	x	x
M-4	M4-SD6	SD			6		x	x	x	x			x		x	x	x
M-4	M4-SW4		SW		NEW	Surface water sample will be collected in Mill Creek adjacent to Landfill M-4 targeting potential migration pathways.	x	x	x	x	x	x		x			x
Total Samples at M-4		6	1														
M-5	M5-SD1	SD			1	Sediment sample will be recollected at locations previously collected in 2000 for PCBs analyses. Sediment samples will be collected in Mill Creek adjacent to western perimeter of Landfill M-5 targeting depositional zones or potential migration pathways.	x	x	x	x			x		x	x	x
M-5	M5-SD2	SD			2		x	x	x	x			x		x	x	x
M-5	M5-SD3	SD			3		x	x	x	x			x		x	x	x
M-5	M5-SD4	SD			4		x	x	x	x			x		x	x	x
M-5	M5-SD5	SD			5		x	x	x	x			x		x	x	x
M-5	M5-SD6	SD			6		x	x	x	x			x		x	x	x
M-5	M5-SW4		SW		4	Surface water sample will be recollected at location previously sampled for VOCs monitoring. Surface water sample will be collected in Mill Creek adjacent to western perimeter of Landfill M-5 targeting areas of potential migration pathways.	x	x	x	x	x	x		x			x
Total Samples at M-5		6	1														

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
M-8	M8-SD1	SD			SED-1	Sediment samples will be recollected at locations previously sampled in 2000 for PCBs analyses. Sediment samples will be collected in Parkers Creek adjacent to Landfill M-8 targeting depositional zones or potential migration pathways.	x	x	x	x			x		x	x	x
M-8	M8-SD2	SD			SED-2		x	x	x	x			x		x	x	x
M-8	M8-SD3	SD			SED-3		x	x	x	x			x		x	x	x
M-8	M8-SD4	SD			SED-4		x	x	x	x			x		x	x	x
M-8	M8-SD5	SD			SED-5		x	x	x	x			x		x	x	x
M-8	M8-SD6	SD			SED-6		x	x	x	x			x		x	x	x
M-8	M8-SD7	SD			SED-7		x	x	x	x			x		x	x	x
M-8	M8-SD8	SD			SED-8		x	x	x	x			x		x	x	x
M-8	M8-SD9	SD			SED-9		x	x	x	x			x		x	x	x
M-8	M8-SD10	SD			SED-10		x	x	x	x			x		x	x	x
M-8	M8-SD12	SD			5	Sediment sample will be collected in Parkers Creek upgradient (west) of Landfill M-8 near confluence of Mill Creek and Lafetra Creek.	x	x	x	x			x		x	x	x
M-8	M8-SW3		SW		SED-3	Surface water samples will be collected in Parkers Creek adjacent to Landfill M-8 targeting potential migration pathways.	x	x	x	x	x	x		x			x
M-8	M8-SW7		SW		SED-7		x	x	x	x	x	x		x			x
M-8	M8-SW12		SW		5	Sediment sample will be collected in Parkers Creek upgradient (west) of Landfill M-8 near confluence of Mill Creek and Lafetra Creek.	x	x	x	x	x	x		x			x
Total Samples at M-8		11	3														

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
M-12/M-14	M14-SD1	SD			1	Sediment samples will be recollected at locations previously sampled in 2000 for PCBs analyses. Sediment samples will be collected along shoreline of Husky Brook targeting depositional areas adjacent to Landfill 12 and Landfill 14.	x	x	x	x			x		x	x	x
M-12/M-14	M14-SD2	SD			2		x	x	x	x			x		x	x	x
M-12/M-14	M14-SD3	SD			3		x	x	x	x			x		x	x	x
M-12/M-14	M14-SD4	SD			4		x	x	x	x			x		x	x	x
M-12/M-14	M14-SD5	SD			5		x	x	x	x			x		x	x	x
M-12/M-14	M14-SD6	SD			6		x	x	x	x			x		x	x	x
M-12/M-14	M14-SD7	SD			7		x	x	x	x			x		x	x	x
M-12/M-14	M14-SD8	SD			8		x	x	x	x			x		x	x	x
M-12/M-14	M14-SD9	SD			9		x	x	x	x			x		x	x	x
M-12/M-14	M14-SD10	SD			10		x	x	x	x			x		x	x	x
M-12/M-14	M14-SD11	SD			11		x	x	x	x			x		x	x	x
M-12/M-14	M14-SD12	SD			NEW	Sediment sample will be collected from Husky Brook from a location east of Murphy Drive. This location is downgradient of Landfill 12 and Landfill 14.	x	x	x	x			x		x	x	x
M-12/M-14	M14-SD13	SD			12	Sediment sample will be recollected at location previously sampled in 2000 for PCBs analyses. Sediment sample will be collected from Husky Brook upgradient (west) of Landfill 12 and Landfill 14 and Building 551.	x	x	x	x			x		x	x	x
M-12/M-14	M14-SW3		SW		3	Surface water samples will be recollected at locations previously sampled for VOCs monitoring. Surface water samples will be collected in Husky Brook in depositional areas adjacent to Landfill 12 and Landfill 14.	x	x	x	x	x	x		x			x
M-12/M-14	M14-SW8		SW		8		x	x	x	x	x	x		x			x
M-12/M-14	M14-SW12		SW		NEW	Surface water sample will be collected from Husky Brook from a location east of Murphy Drive. This location is downgradient of Landfill 12 and Landfill 14.	x	x	x	x	x	x		x			x
M-12/M-14	M14-SW13		SW		12	Surface water samples will be recollected at locations previously sampled for VOCs monitoring. Surface water sample will be collected from Husky Brook upgradient (west) of Landfill 12 and Landfill 14 and Building 551.	x	x	x	x	x	x		x			x
Total Samples at M-12/M-14		13	4														

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
M-15	M15-SD1	SD			NEW	Sediment sample will be collected in Parkers Creek downgradient (east) of Site M-15.	x	x	x	x			x		x	x	x
M-15	M15-SD2	SD			NEW	Sediment sample will be collected in Parkers Creek adjacent to east end of Site M-15.	x	x	x	x			x		x	x	x
M-15	M15-SD3	SD			NEW	Sediment sample will be collected in Parkers Creek adjacent to west end of Site M-15.	x	x	x	x			x		x	x	x
M-15	M15-SD4	SD			NEW	Sediment sample will be collected in Parkers Creek upgradient (west) of Site M-15.	x	x	x	x			x		x	x	x
M-15	M15-SW1		SW		NEW	Surface water sample will be collected in Parkers Creek downgradient (east) of Site M-15.	x	x	x	x	x	x		x			x
M-15	M15-SW2		SW		NEW	Surface water sample will be collected in Parkers Creek adjacent to east end of Site M-15.	x	x	x	x	x	x		x			x
M-15	M15-SW4		SW		NEW	Surface water sample will be collected in Parkers Creek adjacent to east end Site M-15.	x	x	x	x	x	x		x			x
Total Samples at M-15		4	3														

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
M-16	M16-SD1	SD			NEW	Sediment sample will be collected in Oceanport Creek downgradient (east) of Site M-16.	x	x	x	x			x		x	x	x
M-16	M16-SD2	SD			NEW	Sediment samples will be collected in Oceanport Creek south of Site M-16 targeting depositional areas and potential migration pathways from Building 498.	x	x	x	x			x		x	x	x
M-16	M16-SD3	SD			NEW		x	x	x	x			x		x	x	x
M-16	M16-SD4	SD			NEW	Sediment sample will be collected in Oceanport Creek upgradient (west) of Site M-16 near Oceanport Avenue.	x	x	x	x			x		x	x	x
M-16	M16-SW1		SW		NEW	Surface water sample will be collected in Oceanport Creek east of Site M-16.	x	x	x	x	x	x		x			x
M-16	M16-SW2		SW		NEW	Surface water samples will be collected in Oceanport Creek south of Site M-16 targeting potential migration pathways from Building 498.	x	x	x	x	x	x		x			x
M-16	M16-SW4		SW		NEW	Surface water sample will be collected in Oceanport Creek upgradient (west) of Site M-16 near Oceanport Avenue.	x	x	x	x	x	x		x			x
Total Samples for M-16		4	3														

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
M-18	M18-SD1	SD			NEW	Sediment samples will be collected in Parkers Creek adjacent to Landfill M-18 targeting depositional zones or potential migration pathways. Sediment samples M18-SD3 and M18-SD4 will be recollected at locations previously sampled in 2000 for PCBs analyses.	x	x	x	x			x		x	x	x
M-18	M18-SD2	SD			NEW		x	x	x	x			x		x	x	x
M-18	M18-SD3	SD			1		x	x	x	x			x		x	x	x
M-18	M18-SD4	SD			2		x	x	x	x			x		x	x	x
M-18	M18-SD5	SD			4	Sediment sample will be collected in Parkers Creek immediately (upgradient) west of Landfill M-18. Sediment sample will be recollected at location previously sampled in 2000 for PCBs analyses.	x	x	x	x			x		x	x	x
M-18	M18-SW2		SW		NEW	Surface water sample will be collected in Parkers Creek adjacent to Landfill M-18 targeting depositional zone or potential migration pathway.	x	x	x	x	x	x		x			x
M-18	M18-SW5		SW		4	Surface water sample will be recollected at location previously sampled for VOCs monitoring. Surface water sample will be collected in Parkers Creek immediately upgradient (west) of Landfill M-18.	x	x	x	x	x	x		x			x
Total Samples for M-18		5	2														
M-20	M20-SD1	SD			1	Sediment sample will be collected in Parkers Creek at point of former wastewater discharge.	x	x	x	x			x		x	x	x
M-20	M20-SD2	SD			NEW	Sediment sample will be collected in Parkers Creek at point upstream of former wastewater discharge.	x	x	x	x			x		x	x	x
M-20	M20-SW1		SW		NEW	Surface water sample will be collected in Parkers Creek at point of former wastewater discharge.	x	x	x	x	x	x		x			x
M-20	M20-SW2		SW		NEW	Surface water sample will be collected in Parkers Creek at point upstream of former wastewater discharge.	x	x	x	x	x	x		x			x
Total Samples for M-20		2	2														

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
43 & Building 1122	P43-SW2		SW		P43SD-2	Surface water samples will be collected in Mill Creek at locations previously identified through historic documents and stormwater management plans as potential discharge locations of Building 1122.	x	x	x		x	x		x			x
43 & Building 1122	P43-SW3		SW		P43SD-3		x	x	x		x	x		x			x
Total Samples for ECP43			2														
49 & Building 283	P49-SW2		SW		P49-SD2	Surface water sample will be collected in Parkers Creek at discharge location for sump pumps in basement of Building 283.	x	x	x		x	x		x			x
49 & Building 283	P49-SW3		SW		P49-SD3	Surface water sample will be collected in Parkers Creek downgradient (east) of discharge of sump pumps in basement of Building 283.	x	x	x		x	x		x			x
Total Samples for ECP49			2														
61	P61-SW1		SW		P61SD-1	Surface water sample will be collected in Oceanport Creek at stormwater outfall MP17.	x	x	x		x	x		x			x
Total Samples for ECP61			1														
69	P69-SW2		SW		P69SD-2	Surface water sample will be collected in Oceanport Creek at stormwater outfall downstream of Murphy Drive.	x	x	x		x	x		x			x
Total Samples for ECP69			1														

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
NA	MP-SD1	SD			NEW	Sediment sample will be collected in Lafetra Creek upgradient of Main Post and Rt 35.	x	x	x	x			x		x	x	x
NA	MP-SD2	SD			NEW	Sediment sample will be collected in Mill Creek upgradient of Main Post and Rt 35.	x	x	x	x			x		x	x	x
NA	MP-SD3	SD			NEW	Sediment sample will be collected in Huskey Brook upgradient of Main Post and NJ Route 71.	x	x	x	x			x		x	x	x
M-2	M2-SD1	SD			NEW	Sediment sample will be collected in Mill Creek west of M-2 in depositional zone near Rt 35.	x	x	x	x			x		x	x	x
M-2	M2-SD2	SD			NEW	Sediment sample will be collected in Mill Creek west of Landfill M-2 in depositional zone.	x	x	x	x			x		x	x	x
M-3	M3-SD12	SD			3	Sediment sample will be recollected at locations previously collected in 2000 for PCBs analyses. Sediment sample will be collected in Lafetra Creek west of Landfill M-3 in depositional zone.	x	x	x	x			x		x	x	x
M-3	M3-SD13	SD			14	Sediment sample will be recollected at locations previously collected in 2000 for PCBs analyses. Sediment sample will be collected in Lafetra Creek west of Landfill M-3 near Route 35 in depositional zone.	x	x	x	x			x		x	x	x
M-8	M8-SD11	SD			NEW	Sediment sample will be collected upgradient of Landfill M-8 in North Branch Parkers Creek near confluence with Parkers Creek.	x	x	x	x			x		x	x	x
M-12/M-14	M14-SD14	SD			19	Sediment sample will be recollected at location previously sampled in 2000 for PCBs analyses. Sediment sample will be collected from Husky Brook Lake west of its discharge into Husky Brook, upgradient of Landfill 12 and Landfill 14.	x	x	x	x			x		x	x	x
NA	MP-SW1		SW		NEW	Surface water sample will be collected in Lafetra Creek upgradient of Main Post and Rt 35.	x	x	x	x	x	x		x			x
NA	MP-SW2		SW		NEW	Surface water sample will be collected in Mill Creek upgradient of Main Post and Rt 35.	x	x	x	x	x	x		x			x

Table 4-3
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Main Post

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	BlN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
NA	MP-SW3		SW		NEW	Surface water sample will be collected in Huskey Brook upgradient of Main Post and NJ Route 71.	x	x	x	x	x	x		x			x
M-2	M2-SW1		SW		NEW	Surface water sample will be collected in Mill Creek west of Landfill M-2 in depositional zone near Route 35.	x	x	x	x	x	x		x			x
M-2	M2-SW2		SW		NEW	Surface water sample will be collected in Mill Creek west of Landfill M-2 in depositional zone.	x	x	x	x	x	x		x			x
M-3	M3-SW12		SW		3	Surface water sample will be recollected at locations previously sampled for VOCs monitoring. Surface water sample will be collected in Lafetra Creek west of Landfill M-3.	x	x	x	x	x	x		x			x
M-3	M3-SW13		SW		14	Surface water samples will be recollected at locations previously sampled for VOCs monitoring. Surface water sample will be collected in Lafetra Creek west of Landfill M-3 near Route 35.	x	x	x	x	x	x		x			x
M-8	M8-SW11		SW		NEW	Sediment sample will be collected upgradient of Landfill M-8 in North Branch Parkers Creek near confluence with Parkers Creek.	x	x	x	x	x	x		x			x
M-12/M-14	M14-SW14		SW		19	Surface water samples will be recollected at locations previously sampled for VOCs monitoring. Surface water sample will be collected from Husky Brook Lake west of its discharge into Husky Brook, upgradient of Landfill 12 and Landfill 14.	x	x	x	x	x	x		x			x
Total Upgradient Samples		9	9														
Total Samples at MP		83	38	0			121	121	121	115	38	38	83	38	83	83	121

Notes:
SW - Surface Water
SD - Sediment
SS - Surface Soil
NEW - indicates location does not coincide with a previous sample location

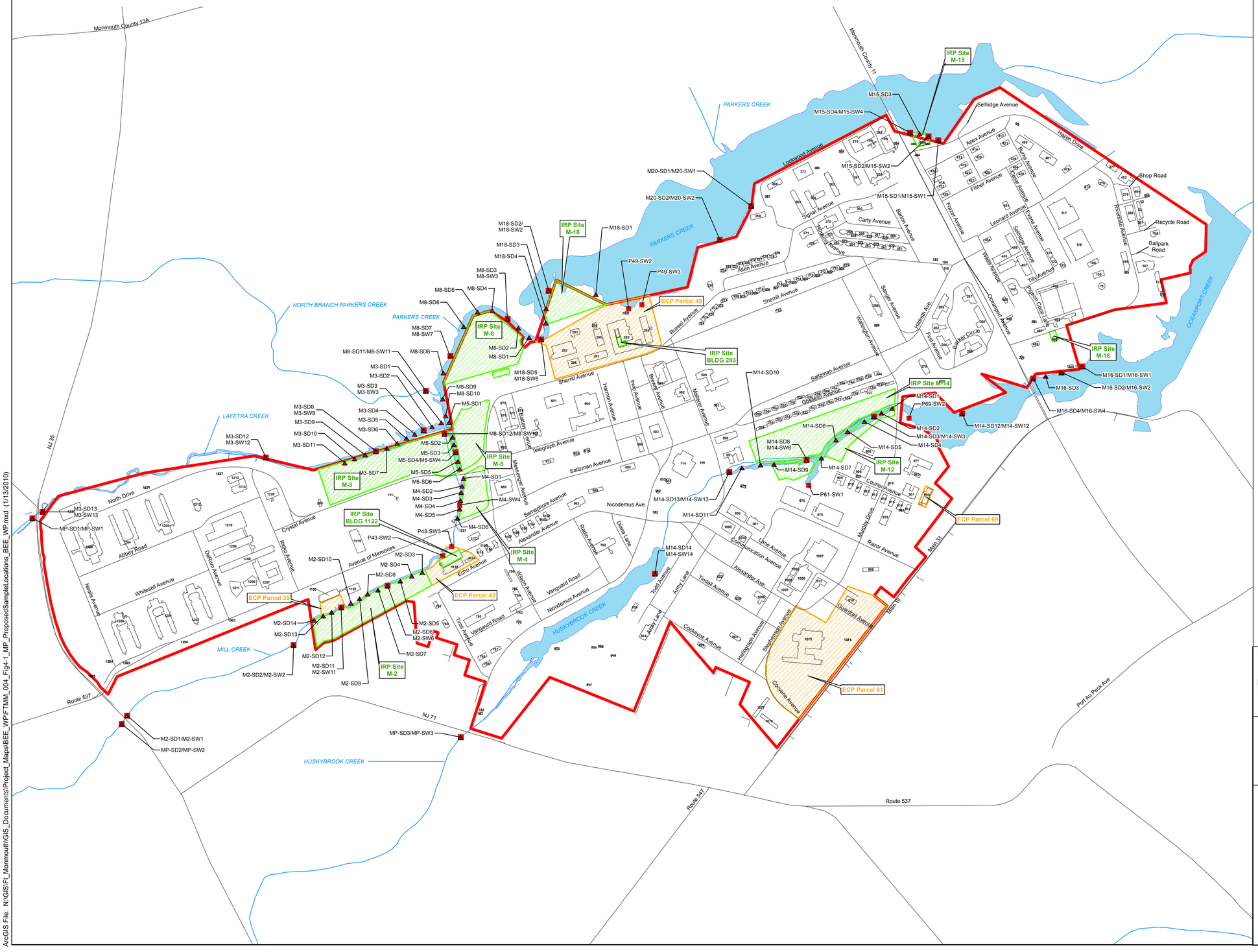
Table 4-4
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Charles Wood Area

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	B\N+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
CW-3	CW3-SD1	SD			1	Sediment samples will be recollected at locations previously collected in 2000 for PCBs analyses. Samples will be collected along the shoreline of Mill Creek approximately 130-180 feet apart targeting depositional areas on northern perimeter of the CW-3A Landfill.	x	x	x	x			x		x	x	x
CW-3	CW3-SD2	SD			2		x	x	x	x			x		x	x	x
CW-3	CW3-SD3	SD			3		x	x	x	x			x		x	x	x
CW-3	CW3-SD4	SD			4		x	x	x	x			x		x	x	x
CW-3	CW3-SD5	SD			5		x	x	x	x			x		x	x	x
CW-3	CW3-SD6	SD			6		x	x	x	x			x		x	x	x
CW-3	CW3-SW4		SW		4	Surface water samples will be collected in Mill Creek adjacent to the CW-3A Landfill.	x	x	x	x	x	x		x			x
CW-3	CW3-SW5		SW		5		x	x	x	x	x	x		x			x
Total Samples at CW-3		6	2														
CW-6	CW6-SD1	SD			NEW	Sediment samples will be collected in forested wetland at points identified during site visit most likely to represent discharge points from contaminant migration.	x	x	x	x			x		x	x	x
CW-6	CW6-SD2	SD			NEW		x	x	x	x			x		x	x	x
CW-6	CW6-SD3	SD			NEW		x	x	x	x			x		x	x	x
CW-6	CW6-SD4	SD			NEW		x	x	x	x			x		x	x	x
CW-6	CW6-SD5	SD			NEW	Sediment samples will be collected in Husky Brook upstream and downstream of CW6.	x	x	x	x			x		x	x	x
CW-6	CW6-SD6	SD			NEW		x	x	x	x			x		x	x	x
CW-6	CW6-SW5		SW		NEW	Surface water samples will be collected in Husky Brook upstream and downstream of CW6.	x	x	x	x	x	x		x			x
CW-6	CW6-SW6		SW		NEW		x	x	x	x	x	x		x			x
CW-6	CW6-SS1			SS	NEW	Surface soil samples will be collected in locations identified during site visit near to existing monitoring well locations CW6MW01, CW6MW02, CW6MW03, and CW6MW34.	x	x	x	x			x		x	x	
CW-6	CW6-SS2			SS	NEW		x	x	x	x			x		x	x	
CW-6	CW6-SS3			SS	NEW		x	x	x	x			x		x	x	
CW-6	CW6-SS4			SS	NEW		x	x	x	x			x		x	x	
Total Samples at CW-6		6	2	4													
15	P15-SW1		SW		P15SD-1	Surface water sample will be collected in Shrewsbury Creek at discharge point of an underground stream diversion near southwest end of Building 2525.	x	x	x		x	x		x			x
15	P15-SW3		SW		P15SD-3	Surface water sample will be collected in Shrewsbury Creek at 30-inch reinforced concrete stormwater pipe outfall.	x	x	x		x	x		x			x
Total Samples at ECP15			2														

Table 4-4
Proposed Sampling and Analytical Program
Baseline Ecological Evaluation
Charles Wood Area

IRP or ECP Site	BEE Sample Location Name	Media to be sampled (SD, SW, and SS)			Previous Sample Location I.D.	Sample Location Rationale	Analytical Suite										
							VO+15 (Method 8260B)	B\N+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)
27	P27-SW1		SW		P27-SD1	Surface water sample will be collected in Shrewsbury Creek at stormwater outfall.	x	x	x		x	x		x			x
27	P27-SW2		SW		P27-SD2	Surface water sample will be collected in Shrewsbury Creek downstream of stormwater outfall.	x	x	x		x	x		x			x
Total Samples at ECP27			2														
28	P28-SW1		SW		P28-SD1	Surface water sample will be collected in Shrewsbury Creek at former discharge point of 3-inch floor drains within Building 2525.	x	x	x		x	x		x			x
28	P28-SW2		SW		P28-SD2	Surface water sample will be collected in Shrewsbury Creek downstream of former discharge point of 3-inch floor drains within Building 2525.	x	x	x		x	x		x			x
Total Samples for ECP28			2														
CW-3	CW3-SD7	SD			NEW	Sediment sample will be collected along shoreline of Mill Creek immediately upstream (west) of CW-3A Landfill.	x	x	x	x			x		x	x	x
CW-3	CW3-SD8	SD			NEW	Sediment sample will be collected along shoreline of Mill Creek approximately 150 feet further upstream (west) of CW-3A Landfill.	x	x	x	x			x		x	x	x
CW-3	CW3-SW7		SW		NEW	Surface water sample will be collected along shoreline of Mill Creek immediately upstream (west) of CW-3A Landfill.	x	x	x	x	x	x		x			x
CW-3	CW3-SW8		SW		NEW	Surface water sample will be collected along shoreline of Mill Creek approximately 150 feet further upstream (west) of CW-3A Landfill.	x	x	x	x	x	x		x			x
Total Upgradient Samples		2	2														
Total Samples at CWA		14	12	4			30	30	30	24	12	12	18	12	18	18	26

Notes:
SW - Surface Water
SD - Sediment
SS - Surface Soil
NEW - indicates location does not coincide with a previous sample location



LEGEND

Proposed Sample Locations

- Sediment Sample Location
- Surface Water Sample Location
- Sediment/Surface Water Sample Location
- Road Centerline
- Building
- Water Feature
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary

Note: All displayed sample locations are approximate. Exact sample locations will be selected based on field observations of potential migration pathways and depositional areas. All locations will be GPS located at the time of collection for accurate display within the BEE Report.

N

Scale:

0 425 850 1,700 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

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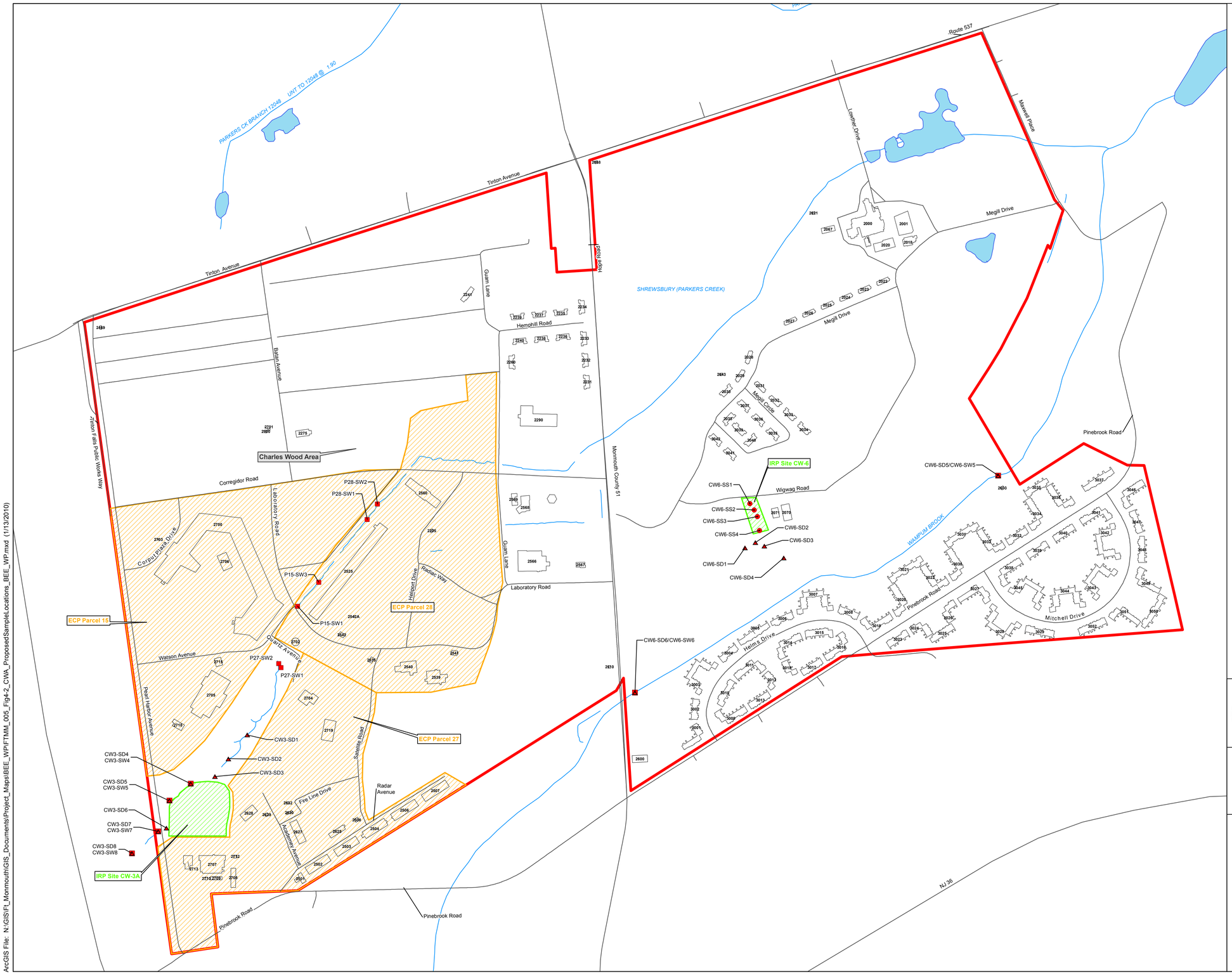
FIGURE 4-1

FORT MONMOUTH BASELINE ECOLOGICAL EVALUATION WORKPLAN

PROPOSED SAMPLE LOCATIONS

MAIN POST
FORT MONMOUTH
NEW JERSEY

ArcGIS File: N:\GIS\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_WP\FTMM_004_Fig4-1_MP_ProposedSampleLocations_BEE_WP.mxd (11/13/2010)



LEGEND

Proposed Sample Locations

- Sediment Sample Location
- Surface Water Sample Location
- Sediment/Surface Water Sample Location
- Surface Soil Sample Location
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary

Note: All displayed sample locations are approximate. Exact sample locations will be selected based on field observations of potential migration pathways and depositional areas. All locations will be GPS located at the time of collection for accurate display within the BEE Report.

N

Scale:

0 300 600 1,200 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

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FIGURE 4-2

FORT MONMOUTH BASELINE ECOLOGICAL EVALUATION WORKPLAN

PROPOSED SAMPLE LOCATIONS

CHARLES WOOD AREA
FORT MONMOUTH
NEW JERSEY

ArcGIS File: N:\GIS\FI_Monmouth\GIS_Documents\Project_Maps\BEE_WP\FTMM_005_Fig4-2_CWA_ProposedSampleLocations_BEE_WP.mxd (1/13/2010)

5.0 TECHNICAL APPROACH TO FIELD OPERATIONS

The methodologies, procedures, measurements and observations required for each type of proposed field activity are documented in the following sections. These activities include:

- Soil Sampling
- Surface Water Sampling
- Sediment Sampling
- Sample Preparation and Shipping Procedures
- Decontamination Procedures
- Investigation-Derived Waste (IDW)
- Mapping Controls
- Electronic Data Deliverables (EDDs)

Field sampling and related activities will be conducted in accordance with USACE Engineering Manual 200-1-3 (1994), the NJDEP Field Sampling Procedures Manual (FSPM) (2005), and the NJDEP TRSR (N.J.A.C. 7:26E; NJDEP, 2008), as applicable.

5.1 SOIL SAMPLING

Surface soil samples collected in support of this BEE will be collected from the top 6 inches of the soil in locations designated in **Section 4.2** and presented on **Figure 4-1** and **Figure 4-2**. Soil samples will be collected from the surface via hand-trowel or hand-auger techniques, as described below.

Trowel Sampling: Surface soil samples may be collected using a decontaminated stainless steel trowel. The surficial vegetative material will be manually removed from the sampling location prior to sample collection. A decontaminated stainless steel trowel will be manually inserted in the soil to extract the sample and transferred into an appropriate clean container for homogenization.

Hand-auger Sampling: Subsurface samples may be collected using a decontaminated 2- or 3-inch diameter stainless steel hand-auger. The surface vegetation will be manually removed from the sampling location prior to sample collection. The hand-auger will then be advanced to the appropriate sampling depth, being careful to keep the auger opening clean. A decontaminated auger head will be used to collect the sample. The soil sample will then be recovered from the auger head using a stainless steel spoon and transferred into an appropriate clean container for homogenization.

Once collected, all surface soil samples will be field screened with a properly calibrated photoionization detector (PID) and/or flame ionization detector (FID). To field screen the soil sample, a decontaminated stainless steel trowel will be used to make a cross-sectional slice of the soil sample to expose a porous surface. During the sampling phase, samples collected for VOCs analysis will be collected in accordance with the TRSR, N.J.A.C. 7:26E-2.1(a)4 (NJDEP, 2008), and NJDEP sampling procedures (NJDEP, 2005). Either an En Core sampler can be used without field preservation or a syringe or push-core sampler can be used with field preservation. Both procedures are outlined below. These procedures are only used for that portion of the sample intended for VOC analysis.

For the methanol extraction/preservation method, laboratory prepared sample bottles containing purge and trap grade methanol and surrogate compounds will be used for sample preservation. Each bottle will be labeled with a unique number designated by the laboratory. Sample collection will be implemented as follows:

- A decontaminated or clean disposable small diameter coring device will be used to collect the sample.

- A calibrated electronic balance or manual scale will be used to determine the total weight of the coring device prior to sample collection.
- Surface soil will be trimmed away from the side of the soil boring and the sample will be collected immediately with the coring device.
- The sample will be weighed while inside the coring device. Once 10 ±2 grams of soil remain in the coring device, the sample will immediately be extruded into the sample container, without splashing methanol out of the container or allowing the coring device to enter the container.
- The lid will be secured and the container will be gently swirled.
- No additional tape/adhesive labels will be affixed to the sample containers. The sample will be tracked on a Chain-of-Custody (COC) by the laboratory number and a unique sample name specified by the sampling technician. The sample containers will be placed upright in an iced cooler.
- A duplicate, which is not preserved with methanol, will be collected from each sample location to determine percent moisture content. This sample will not be weighed.

For the En Core method, laboratory prepared sample bottles are used but do not contain preservatives. Each bottle will be labeled with a unique number designated by the laboratory and is contained within a re-sealable bag for shipment and identification. Sample collection methodology will be implemented as follows:

- The En Core sample bottle is loaded into the corer according to manufacturer's instructions.
- Surface soil will be trimmed away from the side of the soil boring and the sample will be collected immediately with the coring device.
- The lid will be secured immediately and the container placed within the designated re-sealable bag.
- No additional tape/adhesive labels will be affixed to the sample containers but may be affixed to the re-sealable bag. The sample will be tracked on a COC by the laboratory number and a unique sample name specified by the sampling technician. The sample containers will be placed upright in an iced cooler.
- A duplicate will be collected from each sample location to determine percent moisture content.

The remaining soil will be used for additional analysis which may include, but not be limited to, semivolatile organic compounds (SVOCs), pesticides/PCBs, and/or metals. The remaining soil material will be placed in a pre-cleaned stainless steel pan, coned and quartered according to NJDEP protocol, and placed in the appropriate sample bottles using a stainless steel spatula. The procedures are listed below.

- Any rocks or organic matter will be removed from the sample.
- The soil will be thoroughly mixed by turning the entire sample over at least three times using a stainless steel trowel or spoon.
- The entire sample will then be shoveled into a conical pile in the middle of the pan.
- The conical pile will then be carefully flattened to a uniform thickness and diameter by pressing down the apex with the trowel or spoon.
- The flattened soil will be divided into four equal quarters.
- The sampling personnel will then make a determination as to whether the amount of soil is larger than the volume of the sample bottles.

- If the amount of soil in the pan is larger than the volume of the sample bottles, one or two quarters will be discarded. If two quarters are discarded, these should be from opposite quarters.
- After removal of one or two quarters, the entire coning and quartering procedure will be repeated until the amount of soil is approximately equal to the volume of the sample bottles to be filled.
- The required soil volume is then placed in the sample bottles.
- A label will be affixed to each sample bottle and will include the project number, sample number, analysis to be performed, time and date, and sampler's initials.
- Whenever possible, the sample bottle labels will be completed prior to sampling activities and before they are affixed to sample bottles.
- Record latitude and longitude of the sample location with a hand-held global positioning system (GPS) unit.

Disposable latex gloves will be used during all sampling activities and will be changed between each sample location. The COC will be completed following the collection of each sample. The label will be affixed on each sample bottle and the bottle will be placed immediately into a cooler. The cooler will be iced to maintain a temperature of about 4 degrees Celsius. The completed COC will be sealed in a plastic bag and taped to the lid inside the sample cooler.

5.2 SURFACE WATER SAMPLING

Prior to sample collection, surface water body characterization (size, depth, and flow) will be recorded. The appropriate sample methods will be utilized in accordance with the New Jersey Sampling Procedure Guide. The sampling of streams will proceed from downstream to upstream locations so that disturbances related to sampling do not affect sampling quality. The sampling of tidal waters will be completed from the predominant downgradient flow of the surface water at the time of collection; if samples are collected by boat, samples will be collected from the bow of the boat once the wake of the boat has subsided. At each location, the surface water sample will be collected prior to sediment samples, if applicable, to reduce sediment load in the sample.

Surface water samples will be collected by simple immersion of laboratory cleaned sample bottles in accordance with the FSPM (NJDEP, 2005). This is accomplished by gently dipping an unpreserved, pre-cleaned bottle in the water, with the mouth of the bottle facing the upgradient direction, to eliminate the collection of resuspended sediments from lowering the bottle. The sample water will be transferred to the appropriate (preserved) sample containers.

The following steps will be taken during surface water sample collection:

- If sampling from a boat, drop the boat anchor in an appropriate location to enable the boat to drift over the desired sample location.
- Measure the water depth and estimate the state of the tide at the sample location.
- Lower the probe of the calibrated multi-parameter water quality meter to mid-depth of the water column. Wait for each of the following parameters to stabilize and record the values for all parameters on the sample collection log or appropriate field log:
    - pH
    - Specific Conductivity
    - Dissolved Oxygen
    - Salinity
    - Temperature
- Dip clean and sample-dedicated bottle below surface.

- Carefully fill all of the appropriate sample containers by pouring the surface water from the sampling bottle into the appropriate preserved sample containers.
- For dissolved metals connect in-line filter with 0.45 µm filter paper to pump hose and connect hose to peristaltic pump, lower the sampling tube to a depth of at least 6 inches below the water surface and turn the peristaltic pump on, and carefully fill the dissolved metals sample container directly from the pump tubing.
- Ensure the sample container labels contain all pertinent sample information.
- Note the sample time and any comments regarding the sample collection or noticeable color/odor of the water on the sample collection log.
- Place the sample bottles on ice in the sample cooler supplied by the laboratory.
- Record latitude and longitude of the sample location with a hand-held GPS unit.

5.3 SEDIMENT SAMPLING

Prior to sample collection, surface water body characterization (size, depth, and flow) will be recorded. The appropriate sample methods will be utilized in accordance with the New Jersey Sampling Procedure Guide. The sampling of streams will proceed from downstream to upstream locations so that disturbances related to sampling do not affect sampling quality. The sampling of tidal waters will be completed from the predominant downgradient flow of the surface water at the time of collection; if sampling from a boat, samples will be collected from the bow of the boat once the wake of the boat has subsided. At each location, sediment samples will be collected following surface water samples, if applicable.

Sediment sampling, whenever possible, will be conducted from the shoreline. Specific sampling locations will target any discharge points from the sites or parcels under investigation and will target depositional areas.

Sediment samples will be collected from the 0- to 6-inch depth interval. Sediment samples from wetland areas without overlying water or tidal mudflat may be collected with a trowel or hand-auger. Submerged sediments in areas of low stream velocity will be collected with a hand-auger. For sampling locations where the water velocity is high, a decontaminated stainless steel corer or other device that eliminates sample washing will be used. All sampling locations will be marked on a map and GPS located.

The following steps will be taken during sediment sample collection:

- If sampling from a boat, drop the boat anchor in an appropriate location to enable the boat to drift over the desired sample location.
- Measure the water depth and estimate the state of the tide at the sediment sample location.
- Lower the probe of the calibrated multi-parameter water quality meter to mid-depth of the water column. Wait for each of the following parameters to stabilize and record the values for all parameters on the sample collection log:
    - pH
    - Specific Conductivity
    - Dissolved Oxygen
    - Salinity
    - Temperature
- Collect sediment sample and transfer the top 6 inches of material off the top to a stainless steel bowl. Once collected, all sediment samples will be field screened with properly calibrated combination PID/FID. To field screen the soil sample, a decontaminated stainless

steel trowel will be used to make a cross-sectional slice of the sediment sample to expose a porous surface.

- Immediately collect sample for VOC analysis from stainless steel bowl, or, preferably collect sample for VOC analysis directly from hand-auger or other sampling apparatus. Use method previously described for soil samples.
- Homogenize the sample with a stainless steel spoon or trowel in order to get a representative sample for analysis. To the extent possible, use the coning and quartering method described for soil samples.
- Ensure the sample bottle label contains all pertinent sample information.
- Fill the laboratory supplied sample container(s).
- Note the sample time and any comments regarding the sample collection or noticeable color/odor of the sediment on the sample collection log.
- Place the sample bottles on ice in the sample cooler supplied by the laboratory.
- Record latitude and longitude of the sample location with a hand-held GPS unit.

5.4 SAMPLE PREPARATION AND SHIPPING PROCEDURES

Samples will be returned to the sample preparation area at the end of each day. The samples will be prepared by the site personnel for transport to the laboratory in the following manner:

- Sample bottles, including QA/QC samples (i.e., trip, field and temperature blanks) will be removed from the field cooler and inspected for integrity.
- Labels and COCs will be inspected for completeness.
- Sample bottles will be wrapped with bubble wrap.
- The bottom and sides of a clean cooler will be lined with bubble wrap or Styrofoam packing material.
- Samples will be placed in the cooler using additional bubble wrap between bottles to provide a snug fit.
- Bagged ice or blue ice sealed in zip-lock bags will be placed above the sample bottles.
- The COC forms will be placed in a zip-lock bag and the bag will be taped to the inside of the cooler lid.
- The lid will be secured to the cooler with duct tape or packing tape.
- Cooler(s) will be delivered to the analytical laboratory.

5.5 DECONTAMINATION PROCEDURES

All equipment that comes into contact with potentially contaminated material will be decontaminated prior to use at each sampling location. Since surface water samples will be collected through immersion of dedicated sampling bottles, decontamination is not applicable to surface water sampling. Decontamination procedures for field equipment will be in accordance with the NJDEP FSPM (NJDEP, 2005) three-step decontamination procedure for non-aqueous samples, which is described below. All equipment will be thoroughly decontaminated before use and between sampling locations. Sample retrieval equipment will be decontaminated between sampling events.

All decontaminated equipment will be stored on clean pallets or plastic sheeting in a designated area. Equipment stored for long periods will be covered with clean plastic sheeting or placed in clean plastic bags. Stainless steel hand augers, pans, spoons, and other soil sampling equipment will be decontaminated as follows:

- Clean with a tap water (i.e., local fire hydrant or equivalent) and Alconox wash.
- Rinse generously with tap water.
- Rinse with distilled and deionized water

5.6 INVESTIGATION-DERIVED WASTE

Sampling activities performed as part of the site characterization and BEE will generate a variety of IDW, including used personal protective equipment (PPE), decontamination fluids, and disposable sampling equipment. The procedures and practices of handling IDW generated during the site activities are consistent with the NJDEP FSPM (NJDEP, 2005) and the guide "Management of IDW During Site Inspections" [U.S. Environmental Protection Agency (USEPA), 1991]. The following procedures for management of decontamination fluids, PPE, and disposable equipment will be used during this investigation.

5.6.1 DISPOSAL OF DECONTAMINATION WATERS

Decontamination of sampling equipment may generate IDW consisting of decontamination waters. Decontamination water may be re-applied to the ground surface, provided all of the following criteria are met:

- The water is not permitted to migrate off site.
- There is no potential for contaminating a previously uncontaminated aquifer.
- The discharge will not cause contamination to the ground surface soil.
- No immediate threat to human health or the environment exists.
- No indication from field instrumentation or visual observations exist to indicate that material is a potential Resource Conservation and Recovery Act hazardous waste (e.g., elevated PID readings above 5 parts per million, pH<2, or staining or discoloration).

If any of the above criteria are not met, the water will be placed in appropriate storage containers and stored on pallets in a secure area, pending chemical analysis. Drummed water will be appropriately labeled indicating the site ID, contents, and date generated.

5.6.2 DISPOSAL OF USED PPE AND DISPOSABLE EQUIPMENT

IDW may be generated from use of PPE (e.g., gloves, disposable cover-alls) and disposable equipment (dedicated surface water dipper, etc.) during environmental investigations. This material will be stored in plastic garbage bags in designated dumpsters and taken off site for proper disposal.

5.7 MAPPING CONTROLS (SURVEY AND GPS)

Sampling points for soil boring locations, surface water locations, and sediment locations will be located in the field using a GPS receiver to accurately place the points on maps.

5.8 ELECTRONIC DATA DELIVERABLES

The SRP has adopted a process for electronic data interchange to facilitate data integration and thereby help the SRP make informed cleanup decisions, respond accurately to questions, improve the quality and timeliness of data review, and efficiently perform its mandated functions.

The NJDEP TRSR require the electronic submittal of analytical results of environmental samples [N.J.A.C. 7:26E 3.13(c)3v; NJDEP, 2008]. Submittal of the EDD will be submitted in a database format, compatible with the NJDEP interface system, when final reports are submitted. The EDD submittal requires specific, mandatory, information to be submitted with each sample. It is understood that an NFA will not be granted from the NJDEP without the required data. The following is a list of requirements needed for a complete EDD submittal: SRP identification number, field identification name, laboratory identification number, laboratory name, New Jersey laboratory certification number, sample date, date sample was delivered to the laboratory, date sample was analyzed, analytical methods, sample matrix, sample depth, sample type, result type, analytical parameter, Chemical Abstract Service number, contaminant concentrations and units, laboratory qualifiers, method detection limits (MDLs), and the New Jersey State Planar coordinates of each sample.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

This section summarizes the QA/QC program that will be followed during implementation of the BEE activities. Field investigation and sampling activities are to be performed in accordance with this WP. QA measures are described in more detail below.

6.1 QUALITY ASSURANCE SAMPLES

The ratio of QA [duplicate, rinse blank, and matrix spike (MS)/matrix spike duplicates (MSDs)] to environmental samples will be checked to ensure compliance with the NJDEP requirement of at least 1 duplicate per 20 environmental samples and/or 1 duplicate sample per day.

The results of the duplicate samples and the calculated relative percent differences (RPDs) will be evaluated to verify the consistency of the sampling and analytical procedures. The RPD measures variability introduced by both field and laboratory operations. The majority of the RPD values should be low, which would be indicative of good precision in the field and laboratory operations; however, if some of the RPD values are high (exceeding the NJDEP specified maximum RPD of 25 percent), the possibility exists that the cause could be low sample concentrations and a corresponding low MDL used by the laboratory and not poor precision (the differences may be attributable to the analytical sensitivity).

In addition to the duplicate samples discussed above, field rinse blank samples will be collected during the sampling events, as necessary, to identify if the decontamination of sampling equipment is effective and that cross-contamination of samples is negated.

6.2 DATA QUALITY ASSESSMENT

The laboratory will perform data quality assessment of the samples analyzed for this project; as such, the analytical results received from the laboratory are expected to be deemed useable and reliable as submitted or qualified. Information on laboratory quality controls, including but not limited to method blanks, MSs, and MSDs, will be included in each laboratory data package. The laboratory authentication statements certifying the results, laboratory performance standards, and compliance with QC requirements specified in N.J.A.C. 7:18 and 40 CFR Part 136 for water and wastewater analyses and SW-846 for solid waste analyses also will be a part of each laboratory data package.

6.3 SAMPLE MANAGEMENT

Field sampling activities are to be completed in accordance with the WP and include the following activities:

- Field logbooks will be filled out completely and accurately for each sample location and will be checked to ensure agreement with the COC forms for each sample collected.
- Samples will be properly recorded on the COC form after collection, and either remain in the sampler's physical possession or in a locked vehicle to maintain custody.
- Sample glassware and sample labels are to be provided by the subcontract laboratory.
- The analytical parameters, sample identification information, a unique sample number, the sampler's initials, and the date and time of collection will be recorded on each sample label after samples collection.
- Clean PPE (e.g., latex gloves) will be used by sampling personnel at each new sample location.

Sample glassware will be provided by the subcontract laboratory and will contain necessary preservatives as applicable. **Table 6-1** provides a list of sample glassware and necessary preservatives applicable to the samples to be collected under this WP.

Table 6-1
Analytical Methods, Sample Containers, Preservation, and Holding Times

Parameter	Analytical Method	Sample Container (number, size and type)	Preservation	Holding Time
Aqueous Samples				
VO+15	8260B	three, 44 mL, vials	*4 °C , HCl*	14 days from collection
B/N+15	8270C	two, L, amber glass	*4 °C*	7 days from collection
PCBs	8082	two, L, amber glass	*4 °C*	7 days from collection
Pesticides	8081A	two, L, amber glass	*4 °C*	7 days from collection
TAL Metals - filtered	6010B/7471A	one, 500 mL, HDPE	*4 °C , HNO3*	180 days from collection/Hg-28 days from collection
TAL Metals - unfiltered	6010B/7471A	one, 500 mL, HDPE	*4 °C , HNO3*	180 days from collection/Hg-28 days from collection
Hardness	SM2340B	one, 500 mL, HDPE	*4 °C , HNO3*	180 days from collection
Soil/Sediment Samples				
VO+15	8260B	three, EnCores	*4 °C*	Preserve within 48 hours of collection, holding time is 14 days from collection
B/N+15	8270C	one, 8oz (250 mL), WM amber glass jar	*4 °C*	14 days from collection
PCBs	8082			
Pesticides	8081A			
TAL Metals	6010B/7470A	one, 2oz (60 mL), WM amber glass jar	*4 °C*	180 days from collection/Hg-28 days from collection
TOC	Lloyd Kahn			14 days from collection
Grain Size	D422-53	one, 16oz (500 ml) , WM glass jar	*4 °C*	NA

Notes:

B/N	*Base Neutrals*
°C	*degrees Celsius*
HDPE	*High Density Polyethylene*
WM	*Wide Mouth*
HCl	*Hydrochloric Acid*
HNO3	*Nitric Acid*
L	*Liter*
ml	*Milliliter*
NA	*Not Applicable*
PCB	*Polychlorinated Biphenyl*
TAL	*Target Analyte List*
TOC	*Total Organic Carbon*
VO	*Volatile Organic*

6.4 CHEMICAL DATA QUALITY MANAGEMENT

This section of the WP addresses the chemical quality management aspects of this project and describes QC requirements for environmental sampling and analysis activities. The objectives of this section are to document decisions made during the technical project planning/data quality objectives process and establish procedures to ensure that the environmental data quality meets contract and regulatory specifications. Specifically, this section:

- Defines project documentation and recordkeeping procedures for environmental sampling and analysis.
- Documents technical specifications for environmental sampling and analysis.
- Establishes QC procedures, including the necessary supervision and tests to ensure that environmental sampling and analysis meet applicable specifications.

6.4.1 DATA QUALITY OBJECTIVES

The analytical objectives established for this project are based on the intended data uses. For a BEE, the data are to be compared to ESCs to determine whether COPECs are present in environmental media at the site. In order to best meet this objective, the analyses should be able to reliably report concentrations of parameters that are present at concentrations above the ESCs. Because the ESCs are risk-based concentrations, practical quantitation limits achievable by standard analytical methods do not always attain MDLs below the ESCs for all parameters, or media, or samples. These occurrences will be addressed in the BEE report. **Appendix A** provides the NJDEP table of ESCs for each environmental medium. Though multiple ESCs may be provided within the table for a parameter in a medium, **Table 6-2** provides the minimum of those ESCs for each minimum as the analytical objective. **Table 6-2** also provides the subcontract laboratory's MDLs.

6.4.2 SAMPLE HANDLING AND CUSTODY

Collected samples are to be handled in a manner that ensures integrity and traceability to the sampling location. This is to be achieved through use of trained field and laboratory personnel; controlled field, transport and laboratory conditions; and implementation of rigorous sample procedures preparation, containerization, preservation, storage, packaging, transportation, and custody.

Sample custody will be maintained from sample collection to laboratory until receipt of analytical results. Specifically, sample custody procedures are to ensure that the following objectives are met:

- Each sample is identified uniquely and correctly.
- Each sample is traceable to its source/point of origin.
- Sample representativeness is preserved.
- Sample alteration (e.g., preservation or filtration) is documented.
- A record of sample integrity is established and maintained throughout the custody process.
- Sample custody is maintained and documented in the field, during shipment, and at the contract laboratory.

Field Custody includes sample collection, preservation, packaging, and delivery to the shipping agent. Field custody procedures are to provide for generation and control of sample custody records. Custody records are to be generated in the field at the time of sample collection. A person is in custody of a sample if the sample is in that person's physical possession, is in view after being in that person's physical possession, is placed in a locked repository by that person, or is placed in a secure restricted area by that person. Samples collected from a site are to be identified with a sample label and an entry on a COC record.

Table 6-2
Analytical Method Detection Limits and Environmental Screening Criteria
Baseline Ecological Evaluation Work Plan

Analyte	CAS No.	Surface Water MDL (ug/L)	Surface Water RL (ug/L)	Surface Water DQO (ug/L)	Sediment MDL (mg/kg)	Sediment RL (mg/kg)	Sediment DQO (mg/kg)	Soil MDL (mg/kg)	Soil RL (mg/kg)	Soil DQO (mg/kg)
Volatile Organics (Method 8260B)										
Acetone	67-64-1	2.5	5	NAV	0.0012	0.005	NAV	0.0012	0.005	NAV
Acrolein	107-02-08	2.2962	20	0.19	Lab does not analyze		14.4	Lab does not analyze		5.27
Acrylonitrile	107-13-1	1.73	20	66	0.00062	0.005	15.7	0.00062	0.005	0.02393
Benzene	71-43-2	0.2732	1	824	0.00025	0.005	0.34	0.00025	0.005	0.25462
Bromodichloromethane	75-27-4	0.2016	1	NAV	0.001	0.005	0.00113	0.001	0.005	0.53978
Bromoform	75-25-2	0.2453	1	230	0.001	0.005	0.99627	0.001	0.005	15.9
Carbon tetrachloride	56-23-5	0.3041	1	240	0.00025	0.005	0.03573	0.00025	0.005	2.98
Chlorobenzene	108-90-7	0.2255	1	47	0.0005	0.005	0.06194	0.0005	0.005	40
Chloroform	67-66-3	0.2415	1	140	0.00012	0.005	0.027	0.00012	0.005	1.19
Dibromochloromethane	124-48-1	0.1649	1	NAV	0.0001	0.005	0.26761	0.0001	0.005	2.05
1,2-Dichlorobenzene	95-50-1	0.2176	1	14	0.000076	0.005	NAV	0.000076	0.005	NAV
1,3-Dichlorobenzene	541-73-1	0.163	1	38	0.000074	0.005	NAV	0.000074	0.005	NAV
1,4-Dichlorobenzene	106-46-7	0.178	1	9.4	0.00014	0.005	NAV	0.00014	0.005	NAV
1,1-Dichloroethane	75-34-3	0.2432	1	NAV	0.000079	0.005	NAV	0.000079	0.005	NAV
1,2-Dichloroethane	107-06-2	0.2145	1	910	0.001	0.005	0.05418	0.001	0.005	21.2
1,1-Dichloroethene	75-35-4	0.2814	1	65	0.00012	0.005	0.02327	0.00012	0.005	8.28
cis-1,2-Dichloroethene	156-59-2	0.2738	1	NAV	0.00011	0.005	NAV	0.00011	0.005	NAV
trans-1,2-Dichloroethene	156-60-5	0.2722	1	970	0.00015	0.005	0.20894	0.00015	0.005	0.78373
1,2-Dichloropropane	78-87-5	0.1798	1	360	0.00032	0.005	0.35161	0.00032	0.005	32.7
cis-1,3-Dichloropropene	542-75-6	0.1945	1	NAV	0.000079	0.005	NAV	0.000079	0.005	NAV
trans-1,3-Dichloropropene	542-75-6	0.1834	1	NAV	0.00013	0.005	NAV	0.00013	0.005	NAV
Ethylbenzene	100-41-4	0.1816	1	81	0.001	0.005	1.4	0.001	0.005	5.16
Methyl-tert-butyl ether	1634-04-4	0.2019	1	18000	0.00017	0.005	NAV	0.00017	0.005	NAV
Methyl bromide (bromomethane)	74-83-9	0.3039	1	16	0.00056	0.005	0.000148	0.00056	0.005	0.23516
Methylene chloride	75-09-2	0.3177	1	940	0.00017	0.005	0.159	0.00017	0.005	4.05
Styrene	100-42-5	0.2177	1	32	0.00025	0.005	0.44496	0.00025	0.005	300
tert-Butyl alcohol	75-65-0	20.58	40	355000	0.0032	0.050	NAV	0.0032	0.050	NAV
1,1,1,2-Tetrachloroethane	630-20-6	0.2102	1	NAV	0.0005	0.005	NAV	0.0005	0.005	NAV
1,1,2,2-Tetrachloroethane	79-34-5	0.1539	1	380	0.00025	0.005	0.02908	0.00025	0.005	0.12722
Tetrachloroethene	127-18-4	0.2361	1	45	0.00025	0.005	0.45	0.00025	0.005	9.92
Toluene	108-88-3	0.2336	1	253	0.00007	0.005	2.5	0.00007	0.005	200
1,1,1-Trichloroethane	71-55-6	0.2505	1	76	0.00007	0.005	0.24685	0.00007	0.005	29.8
1,1,2-Trichloroethane	79-00-5	0.1959	1	500	0.00011	0.005	0.67351	0.00011	0.005	28.6
Trichloroethene	79-01-6	0.2932	1	47	0.00063	0.005	1.6	0.00063	0.005	12.4
Vinyl chloride	75-01-4	0.2906	1	930	0.00022	0.005	0.002	0.00022	0.005	0.64614
m,p-Xylene	1330-20-7	0.4256	2	27	0.00042	0.005	0.12	0.00042	0.005	10
o-Xylene	1330-20-7	0.1978	1	27	0.00025	0.005	0.12	0.00025	0.005	10
2-Butanone	78-93-3	0.4981	5	NAV	0.00068	0.005	NAV	0.00068	0.005	NAV
2-Chloroethyl vinyl ether	110-75-8	0.1931	2	NAV	0.00023	0.005	NAV	0.00023	0.005	NAV
Methyl isobutyl ketone (2-Hexanone)	108-10-1	0.5345	5	NAV	0.00042	0.005	NAV	0.00042	0.005	NAV
4-Methyl-2-pentanone	108-10-1	0.2256	5	NAV	0.00042	0.005	NAV	0.00042	0.005	NAV
Carbon disulfide	75-15-0	0.1956	1	NAV	0.000063	0.005	NAV	0.000063	0.005	NAV
Chloroethane	75-00-3	0.2491	1	NAV	0.00031	0.005	NAV	0.00031	0.005	NAV
Chloromethane	74-87-3	0.2665	1	NAV	0.00023	0.005	NAV	0.00023	0.005	NAV
Dichlorodifluoromethane	75-71-8	0.259	1	NAV	0.00014	0.005	NAV	0.00014	0.005	NAV
Di-isopropyl ether	108-20-3	Lab does not analyze		NAV	Lab does not analyze		NAV	Lab does not analyze		NAV
Trichlorofluoromethane	75-69-4	0.0804	1	NAV	0.000085	0.005	NAV	0.000085	0.005	NAV
Vinyl acetate	108-05-4	0.0777	1	NAV	0.001	0.005	NAV	0.001	0.005	NAV

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Base/Neutrals (Method 8270C)										
Acenaphthene	83-32-9	0.0144	0.2	38	0.015	0.33	0.016	0.015	0.33	20
Acenaphthylene	208-96-8	0.0085	0.2	4840	0.02	0.33	0.044	0.02	0.33	682
Aniline	62-53-3	0.0408	1	NAV	0.019	0.33	NAV	0.019	0.33	NAV
Anthracene	120-12-7	0.0086	0.2	0.035	0.02	0.33	0.085	0.02	0.33	1480
Azobenzene	103-33-3	0.0099	0.2	NAV	0.017	0.33	NAV	0.017	0.33	NAV
Benzidine	92-87-5	0.6136	20	NAV	0.17	0.83	NAV	0.17	0.83	NAV
Benzo(a)anthracene	56-55-3	0.0176	0.2	0.025	0.018	0.33	0.261	0.018	0.33	5.21
Benzo(a)pyrene	50-32-8	0.0117	0.2	0.014	0.016	0.33	0.37	0.016	0.33	1.52
Benzo(b)fluoranthene	205-99-2	0.0163	0.2	9.07	0.034	0.33	1.8	0.034	0.33	59.8
Benzo(g,h,i)perylene	191-24-2	0.00866	0.2	7.64	0.018	0.33	0.17	0.018	0.33	119
Benzo(k)fluoranthene	207-08-9	0.0164	0.2	NAV	0.035	0.33	0.24	0.035	0.33	148
Benzoic acid	65-85-0	0.5237	5	NAV	0.33	0.83	NAV	0.33	0.83	NAV
Benzyl alcohol	100-51-6	0.1042	1	NAV	0.031	0.33	NAV	0.031	0.33	NAV
bis(2-Chloroethoxy)methane	111-91-1	0.0137	1	NAV	0.024	0.33	NAV	0.024	0.33	NAV
bis(2-chloroethyl)ether	111-44-4	0.0264	0.2	1900	0.036	0.33	NAV	0.036	0.33	23.7
bis(2-Chloroisopropyl)ether	108-60-1	0.0347	0.2	NAV	0.03	0.33	NAV	0.03	0.33	19.9
bis(2-Ethylhexyl)phthalate	117-81-7	0.0462	1	0.3	0.019	0.33	0.18216	0.019	0.33	0.92594
4-Bromophenyl-phenylether	101-55-3	0.0188	1	NAV	0.018	0.33	NAV	0.018	0.33	NAV
Butylbenzylphthalate	85-68-7	0.3064	1	23	0.022	0.33	0.063	0.022	0.33	0.23889
4-Chloro-3-methylphenol (p-chloro-m-cresol)	59-50-7	0.0254	1	NAV	0.023	0.33	NAV	0.023	0.33	NAV
4-Chloroaniline	106-47-8	0.1088	1	NAV	0.011	0.33	NAV	0.011	0.33	NAV
2-Chlorophenol	95-57-8	0.0211	1	24	0.031	0.33	0.008	0.031	0.33	0.24266
4-Chlorophenyl-phenylether	7005-72-3	0.0104	1	NAV	0.015	0.33	NAV	0.015	0.33	NAV
Chrysene	218-01-9	0.0108	0.2	NAV	0.024	0.33	0.34	0.024	0.33	4.73
Dibenz(a,h)anthracene	53-70-3	0.0128	0.2	NAV	0.014	0.33	0.06	0.014	0.33	18.4
Dibenzofuran	132-64-9	0.0185	1	NAV	0.019	0.33	NAV	0.019	0.33	NAV
1,2-Dichlorobenzene	95-50-1	0.0291	0.2	14	0.045	0.33	0.013	0.045	0.33	2.96
1,3-Dichlorobenzene	541-73-1	0.028	0.2	38	0.047	0.33	3.01	0.047	0.33	37.7
1,4-Dichlorobenzene	106-46-7	0.0343	0.2	9.4	0.048	0.33	0.11	0.048	0.33	20
3,3'-Dichlorobenzidine	91-94-1	0.0361	1	4.5	0.013	0.33	0.02822	0.013	0.33	0.64636
2,4-Dichlorophenol	120-83-2	0.0135	0.2	11	0.019	0.33	0.005	0.019	0.33	87.5
Diethylphthalate	84-66-2	0.0449	1	110	0.019	0.33	0.006	0.019	0.33	100
2,4-Dimethylphenol	105-67-9	0.008	1	100	0.024	0.33	0.30453	0.024	0.33	0.01
Dimethylphthalate	131-11-3	0.014	1	NAV	0.018	0.33	NAV	0.018	0.33	NAV
Di-n-butylphthalate	84-74-2	0.0299	1	9.7	0.019	0.33	0.058	0.019	0.33	200
Di-n-octylphthalate	117-84-0	0.0156	1	NAV	0.013	0.33	NAV	0.013	0.33	NAV
2,4-Dinitrophenol	51-28-5	0.6139	5	19	0.33	0.33	0.00133	0.33	0.33	20
2,4-Dinitrotoluene	121-14-2	0.0165	1	44	0.018	0.83	0.07513	0.018	0.83	1.28
2,6-Dinitrotoluene	606-20-2	0.0191	1	NAV	0.018	0.33	NAV	0.018	0.33	NAV
Fluoranthene	206-44-0	0.01	0.2	1.9	0.018	0.33	0.6	0.018	0.33	122
Fluorene	86-73-7	0.0099	0.2	19	0.018	0.33	0.019	0.018	0.33	122
Hexachlorobenzene	118-74-1	0.0182	0.2	0.0003	0.024	0.33	0.02	0.024	0.33	0.19878
Hexachlorobutadiene	87-68-3	0.0121	0.2	0.053	0.03	0.33	0.0013	0.03	0.33	0.03976
Hexachlorocyclopentadiene	77-47-4	0.0115	1	77	0.028	0.33	0.90074	0.028	0.33	10
Hexachloroethane	67-72-1	0.0077	1	8	0.049	0.33	0.073	0.049	0.33	0.59634
Indeno(1,2,3-c,d)pyrene	193-39-5	0.0161	0.2	4.31	0.021	0.33	0.2	0.021	0.33	109
Isophorone	78-59-1	0.0289	1	920	0.016	0.33	0.4223	0.016	0.33	139
2-Methylnaphthalene	91-57-6	0.0157	0.2	330	0.022	0.33	0.07	0.022	0.33	3.24

Table 6-2
Analytical Method Detection Limits and Environmental Screening Criteria
Baseline Ecological Evaluation Work Plan

Analyte	CAS No.	Surface Water MDL (ug/L)	Surface Water RL (ug/L)	Surface Water DQO (ug/L)	Sediment MDL (mg/kg)	Sediment RL (mg/kg)	Sediment DQO (mg/kg)	Soil MDL (mg/kg)	Soil RL (mg/kg)	Soil DQO (mg/kg)
2-Methylphenol (o-Cresol)	95-48-7	0.014	1	NAV	0.022	0.33	NAV	0.022	0.33	NAV
4-Methylphenol (p-cresol)	106-44-5	0.0177	1	NAV	0.015	0.33	NAV	0.015	0.33	NAV
Naphthalene	91-20-3	0.0279	0.2	13	0.025	0.33	0.16	0.025	0.33	0.9939
Nitrobenzene	98-95-3	0.018	0.2	220	0.027	0.33	0.4876	0.027	0.33	1.31
2-Nitroaniline	88-74-4	0.0166	5	NAV	0.021	0.33	NAV	0.021	0.33	NAV
3-Nitroaniline	99-09-2	0.026	5	NAV	0.042	0.83	NAV	0.042	0.83	NAV
4-Nitroaniline	100-01-6	0.0228	5	NAV	0.013	0.83	NAV	0.013	0.83	NAV
2-Nitrophenol	88-75-5	0.014	1	NAV	0.028	0.33	NAV	0.028	0.33	NAV
4-Nitrophenol	100-02-7	0.70366	5	60	0.022	0.83	NAV	0.022	0.83	7
n-Nitroso-dimethylamine	62-75-9	0.0489	0.2	NAV	0.045	0.33	0.00000275	0.045	0.33	0.0000321
n-Nitroso-di-n-propylamine	621-64-7	0.0386	0.2	NAV	0.022	0.33	NAV	0.022	0.33	NAV
n-Nitrosodiphenylamine	86-30-6	0.0489	0.2	NAV	0.029	0.33	0.15524	0.029	0.33	0.54514
Pentachlorophenol	87-86-5	0.188	1	2.5	0.029	0.83	0.017	0.029	0.83	2.8
Phenanthrene	85-01-8	0.0284	0.2	3.6	0.02	0.33	0.24	0.02	0.33	45.7
Phenol	108-95-2	0.0237	0.2	180	0.022	0.83	NAV	0.022	0.83	NAV
Pyridine	110-86-1	0.0935	1	NAV	0.036	0.33	NAV	0.036	0.33	NAV
Pyrene	129-00-0	0.0111	0.2	0.3	0.023	0.33	0.49	0.023	0.33	78.5
1,2,4-Trichlorobenzene	120-82-1	0.0461	0.2	30	0.027	0.33	0.0048	0.027	0.33	20
2,4,5-Trichlorophenol	95-95-4	0.0152	1	NAV	0.034	0.83	0.003	0.034	0.83	4
2,4,6-Trichlorophenol	88-06-2	0.0091	1	4.9	0.019	0.33	0.006	0.019	0.33	4
Pesticides (Method 8081B)										
alpha-BHC	319-84-6	0.000379	0.0013	12.4	0.00026	0.0017	0.006	0.00026	0.0017	0.09939
beta-BHC	319-85-7	0.000362	0.0013	0.495	0.00045	0.0017	0.005	0.00045	0.0017	0.00398
gamma-BHC	58-89-9	0.000379	0.0013	0.026	0.00018	0.0017	0.003	0.00018	0.0017	0.005
delta-BHC	319-86-8	0.000237	0.0013	NAV	0.00025	0.0017	0.003	0.00025	0.0017	NAV
Aldrin	309-00-2	0.000278	0.0013	0.017	0.00018	0.0017	0.002	0.00018	0.0017	0.00332
alpha-Chlordane	5103-71-9	0.000281	0.0013	0.004	0.0002	0.0017	0.007	0.0002	0.0017	0.224
gamma-Chlordane	57-74-9	0.000189	0.0013	0.004	0.00041	0.0033	0.007	0.00041	0.0033	0.224
4,4'-DDD	72-54-8	0.000193	0.0013	NAV	0.00041	0.0033	0.002	0.00041	0.0033	0.75815
4,4'-DDE	72-55-9	0.000169	0.0013	4.51E-09	0.0004	0.0033	0.0022	0.0004	0.0033	0.59587
4,4'-DDT	50-29-3	0.000344	0.0013	0.001	0.00039	0.0033	0.001	0.00039	0.0033	0.0175
Dieldrin	60-57-1	0.0002	0.0013	0.0019	0.00039	0.0033	0.002	0.00039	0.0033	0.00238
Endosulfan I	115-29-7	0.000185	0.0013	0.0087	0.00017	0.0017	NAV	0.00017	0.0017	NAV
Endosulfan II	115-29-7	0.000377	0.0013	0.0087	0.00031	0.0033	NAV	0.00031	0.0033	NAV
Endosulfan sulfate	1031-07-8	0.000398	0.0013	2.22	0.00047	0.0033	0.0346	0.00047	0.0033	0.03578
Endrin	72-20-8	0.000191	0.0013	0.0023	0.00041	0.0033	0.003	0.00041	0.0033	0.0101
Endrin aldehyde	7421-93-4	0.000301	0.0013	0.15	0.0010	0.0033	3.2	0.0010	0.0033	0.105
Endrin ketone	53494-70-5	0.000249	0.0013	NAV	0.00025	0.0017	NAV	0.00025	0.0017	NAV
Heptachlor	76-44-8	0.000347	0.0013	0.0036	0.00019	0.0017	0.0003	0.00019	0.0017	0.00598
Heptachlor epoxide	1024-57-3	0.000247	0.0013	0.0036	0.00041	0.0017	0.005	0.00041	0.0017	0.15188
Methoxychlor	72-43-5	0.000458	0.0025	0.03	0.0019	0.017	0.00359	0.0019	0.017	0.01988
Toxaphene	8001-35-2	0.01027	0.05	0.0002	0.023	0.17	0.000109	0.023	0.17	0.11927
TAL Metals (Method 6010B/7471A)										
Aluminum	7429-90-5	1.2122	30	NAV	6	20	18000	6	20	50
Antimony	7440-36-0	0.0473	2	80	0.54	6	3	0.54	6	0.27
Arsenic	7440-38-2	0.1401	1	36	0.28	1	6	0.28	1	9.9
Barium	7440-39-3	0.0759	10	220	0.66	20	48	0.66	20	283
Beryllium	7440-41-7	0.0679	1	3.6	0.041	0.5		0.041	0.5	10
Cadmium	7440-43-9	0.1062	1	8.8	0.054	0.5	0.6	0.054	0.5	0.36

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Analyte	CAS No.	Surface Water MDL (ug/L)	Surface Water RL (ug/L)	Surface Water DQO (ug/L)	Sediment MDL (mg/kg)	Sediment RL (mg/kg)	Sediment DQO (mg/kg)	Soil MDL (mg/kg)	Soil RL (mg/kg)	Soil DQO (mg/kg)
Calcium	7440-70-2	6.2664	100	NAV	5.1	500	NAV	5.1	500	NAV
Chromium	7440-47-3	0.1113	2	42	0.074	1	26	0.074	1	1
Cobalt	7440-48-4	0.017	0.5	24	0.066	5	10	0.066	5	13
Copper	7440-50-8	0.1397	2	3.1	0.093	2.5	16	0.093	2.5	28
Iron	7439-89-6	7.3838	50	NAV	2.2	20	NAV	2.2	20	NAV
Lead	7439-92-1	0.0202	1	5.4	0.19	1	31	0.19	1	11
Magnesium	7439-95-4	3.3621	100	NAV	7.9	500	NAV	7.9	500	NAV
Manganese	7439-96-5	0.0474	0.5	NAV	0.041	1.5	260	0.041	1.5	220
Mercury (7471 or 7470)	7439-97-6	0.0384	0.2	0.77	0.007	0.034	0.15	0.007	0.034	0.00051
Nickel	7440-02-0	0.0726	1	22	0.14	4	16	0.14	4	30
Potassium	7440-09-7	5.6205	100	NAV	30	500	NAV	30	500	NAV
Selenium	7782-49-2	0.2058	5	5	0.87	3.5	1	0.87	3.5	0.21
Silver	7440-22-4	0.0772	1	0.12	0.18	1	1	0.18	1	2
Sodium	7440-23-5	6.961	100	NAV	9.4	500	NAV	9.4	500	NAV
Thallium	7440-28-0	0.0181	1	10	0.17	2.5	NAV	0.17	2.5	1
Vanadium	7440-62-2	0.0968	1	12	0.25	5	57	0.25	5	2
Zinc	7440-66-6	0.6045	5	81	0.17	2	120	0.17	2	8.5
PCBs (Method 8082A)										
Aroclor 1016	12674-11-2	0.002515	0.01	0.014	0.0014	0.017	0.007	0.0014	0.017	0.371
Aroclor 1221	11104-28-2	0.00249	0.01	0.014	0.0028	0.017	0.023	0.0028	0.017	0.371
Aroclor 1232	11141-16-5	0.002931	0.01	0.014	0.0022	0.017	0.023	0.0022	0.017	0.371
Aroclor 1242	53469-21-9	0.001857	0.01	0.014	0.0034	0.017	0.023	0.0034	0.017	0.371
Aroclor 1248	12672-29-6	0.002273	0.01	0.014	0.0012	0.017	0.03	0.0012	0.017	0.371
Aroclor 1254	11097-69-1	0.002289	0.01	0.014	0.0026	0.017	0.06	0.0026	0.017	0.371
Aroclor 1260	11096-82-5	0.001355	0.01	0.014	0.0012	0.017	0.005	0.0012	0.017	0.371
Field Parameters										
pH (surface water only)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Oxygen (DO) (surface water only)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Salinity (surface water only)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Conductivity (surface water only)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Temperature (surface water only)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other Parameters										
TOC - sediment only (Method 415.1)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size - sediment only (ASTM D442-53)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hardness - surface water only (Method 310.1)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

DQO = Data Quality Objective
MDL = Method Detection Limit
mg/kg - Milligram / kilogram
NAV = No available value
NA = Not Applicable
PCBs = Polychlorinated biphenyls
RL = Reporting Limit
TOC - Total Organic Carbon
ug/L =Micrograms / Liter
TAL - Total Analyte List

Shipment Custody, when applicable, includes time spent under the control of and tracking by the carrier. To the extent practical, only carriers that provide tracking of each package are to be used. The name of the carrier is to be entered on the COC form under "Received By" and "Relinquished By," but a signature is not required. The completed custody form is to be packaged in a plastic sealable bag taped to the inside lid of the sample cooler.

Contract Laboratory Custody is addressed in each Laboratory Quality Management Plan (LQMP). Each LQMP includes specific procedures for controlling sample receipt, logging, tracking, storage, holding, handling, preparation, digestion/extraction, analysis, and disposition. Receipt condition of sample containers and inconsistencies between COC records and sample shipment are to be identified by the laboratory sample custodian, documented on the Cooler Receipt Checklist, and brought to the attention of the Shaw Project Manager.

6.4.3 QUALITY CONTROL SAMPLES COLLECTED IN THE FIELD

This section discusses the collection of QC samples. Field activities will include the collection of several types of QC samples. These samples will include duplicates, rinse blanks/equipment blanks and trip blanks, as appropriate.

Duplicate samples will be collected from areas that are known or suspected to be contaminated and will consist of 5 percent of all field samples per matrix. Fractions for the same analytical parameters will always be collected consecutively. Volatile fractions for soil will not be homogenized before collection; however, they will be collected consecutively. The field duplicate samples will be sent to the contract laboratory separately identified. Duplicate samples will be used to assess sampling precision.

Rinse blanks will be collected when the sampling equipment is decontaminated and reused in the field. A consistent volume of rinse water [demonstrated analyte free: High Performance Liquid Chromatography (HPLC)-grade for organics, deionized for inorganics] will be poured over the equipment (i.e., rinsing the equipment) while collecting the water in a sample container. The rinse blank determines whether the decontamination procedure has been adequately performed and that there is no cross-contamination of samples occurring due to the equipment itself. Analysis of rinse blanks will be for all analytes of interest. Rinse blanks will be collected at the rate of one per type of equipment per decontamination event, not to exceed one per day.

Trip blanks are necessary when sampling VOCs. Trip blanks will be provided by the laboratory and will consist of HPLC-grade water sealed in 40 ml Teflon-lined septum vials for water samples, or purge and trap grade methanol sealed in appropriate containers for methanol preserved soil samples, and sealed En Core sample containers for soil/sediment samples collected with En Core samplers. The trip blank is used to determine if any on-site atmospheric contaminants are seeping into the sample vials, or if any cross-contamination of samples is occurring during shipment or storage of sample containers. The trip blanks will accompany the samples for VOC analysis to the laboratory.

6.4.4 FIELD DOCUMENTATION

The requisite QC records for sampling and analysis activities are to be generated and controlled as specified below. Field documentation for this project includes field logs, COC forms, sample labels, field data sheets, and photographs.

6.4.4.1 QC RECORD CONTROL PROCEDURES

The site manger is responsible for ensuring that the requisite QC records are generated and controlled. The site manager and his/her designee are to verify that these controls are implemented as follows:

- Measurements and observations are recorded at the time they are made.
- Documentation is orderly, legible, and traceable to relevant items/conditions.
- Documentation includes sufficient information to be readily interpreted by staff other than those responsible for its generation.

- Changes or revisions to a record are made in a manner that preserves the original data, such as by drawing a single line through a hard copy entry or maintaining historical records of electronic entries/files.
- Changes to records are signed (or initialed) and dated.
- As a minimum standard, changes to a record are subject to the same review and approval protocols as the original entry.
- Records adequately document digressions from specified procedures or WP and identify authorization for the digression.
- Project documents and records, including photographic and electronic records, are protected from loss, damage, misuse, or deterioration.

Photographs taken to document site conditions or otherwise support field activities are accountable documents/QC records and as such become part of the project files. When a photograph is taken, the date, time, subject, purpose of the photograph and name of person taking photograph are documented in the field logbook.

6.4.4.2 SAMPLE IDENTIFICATION

Samples will be identified with a unique alphanumeric code that will differentiate between the type of sample and location of the sample. The following sample numbering designations will be used for each environmental sample:

- Alphanumeric IRP or ECP designation followed by a hyphen.
- Two letter media designation (SS for surface soil, SD for sediment, and SW for surface water).
- Two-digit number unique for a particular IRP or ECP and media pair.

QC samples will not follow this nomenclature but will be designated as follows:

- MS/MSD samples will be collected in triplicate volume and designated on the COC.
- Field duplicate samples will be designated with “DUP” followed by a hyphen, two-letter media designation, and two-digit number designating its order in sequence of field duplicate samples for that media.
- Field blanks, or rinsate blanks, will be designated with “FB” followed by a hyphen and four-digit number designation of the month and day.

The following four examples are provided for clarification:

- M14-SD01 represents a sediment sample collected from location 01 related to the M14 Landfill.
- P43-SW01 represents a surface water sample from location 01 collected from Parcel 43.
- FB08182009 represents a field blank sample collected on August 18, 2009.
- DUP-SD05 represents the fifth field duplicate sediment sample collected for this investigation.

6.4.4.3 FIELD RECORDS

Bound logbooks shall be utilized for all recordkeeping purposes. It is assumed that the use of the bound book will result in a chronological sequence of data insertion. Pages will be numbered, but numbered pages may be limited to pages with information.

To facilitate data validation, the person making an entry must sign and date the entry. All entries must be recorded in ink. Correction to entries shall be made by drawing a line through the incorrect entry, recording the correct information, and initialing and dating the corrected entry.

Documents used or generated during the course of the project are accounted for and become a part of the project files upon completion of the task. These may include but are not limited to the following:

- Sample identification documents and field logbooks.
- COC records.
- Project deliverables.
- Analytical logbooks, laboratory data, calculations, graphs, control charts, field logs, boring logs (to include instrument ID numbers, calibration, and measurements), and software.
- Reports and correspondence material.
- Records of non-conformance.
- Photographs.

When an error is made on an accountable document, corrections are made by drawing a single line through the error and entering the correct information. The correction must also be initialed and dated. A brief explanation must be provided explaining the reason the correction was made. The marked copies of checked material shall be retained for future reference. Notes, calculations, and other information marked on documents assist in follow-up design and aid in re-checking portions of documents.

6.4.5 CALIBRATION AND MAINTENANCE

Field and laboratory measurement and test equipment are to be calibrated to the appropriate traceable standards. Records of these activities are to be generated by the individual performing the activity with copies provided to the project manager for retention in the project QC file.

6.4.6 ANALYTICAL PROCEDURES

Project samples, whether analyzed in the field or at a contract laboratory, are to be prepared, digested, extracted and analyzed per specifications of appropriate procedures. **Table 6-1** identifies the specific methods that are to be used on this project. The contract laboratory is to demonstrate achievement of the specified detection/quantitation limits and method performance criteria.

Specified methods are to be implemented as published. Modifications to approved procedures, alternate procedures, or additional procedures are to be pre-approved in writing by the Contracting Officer's Representative (COR) and the USACE QA laboratory. If non-standard methods are considered, the contract laboratory shall provide method validation data for USACE consideration. Where deemed necessary to fulfill the requirements of the project, a request for COR approval for an alternate or modified method is to be made by the site manager (or his/her designee).

6.4.7 DATA QUALITY INDICATORS

The purpose of this section is to define QA goals for precision, accuracy, sensitivity, completeness, representativeness, and comparability and provide the means to quantitatively and qualitatively evaluate the data quality.

6.4.7.1 PRECISION

Precision refers to the level of agreement among repeated measurements of the same parameter. It is usually stated in terms of standard deviation, relative standard deviation, relative percent difference, range or relative range. The overall precision of data is a mixture of sampling and analytical factors. The goals for each factor are addressed below.

For chemical data collected, sampling precision will be checked by obtaining one duplicate sample for every 20 samples collected for each type of media (5 percent). Precision will be evaluated by calculating the RPD as follows:

$$RPD = \frac{|XA - XB|}{XM} \times 100$$

where:

XA and XB are duplicate analyses, and

XM is the mean value of duplicate analysis XA and XB.

The RPD will be calculated for each analytical parameter. It is expected that the duplicates for both aqueous and solid matrices will have an RPD less than 50 percent. If these criteria are not met, a careful examination of the sampling techniques, sample media, and analytical procedure will be conducted to identify the cause of the high RPD and the usefulness of the data. The data will be qualified and the location may be re-sampled and reanalyzed based on the decision of the project manager.

Analytical precision will be addressed by analysis of matrix spike duplicates by the Contract Laboratory. Two spike standard matrix QC samples will contain all target analytes at a concentration near the upper limit of the certified range or approximately ten times the Reporting Limit. Control limits will be determined upon certification. Control charts will be maintained to track laboratory performance.

The RPD for each analytical parameter will be calculated and compared to the criteria. If these criteria are not met, an examination of the data similar to that described above will be conducted to determine the cause of the variability and usefulness of the data. The data may either be qualified or the location resampled and reanalyzed based on the decision of the project officer.

6.4.7.2 ACCURACY

Accuracy is the degree of agreement of a measurement (or an average of measurements of the same thing), X, with an accepted reference or true value, T, usually expressed as the difference between the two values, X-T, or the difference as a percentage of the reference or true value, 100 (X-T)/T, and sometimes expressed as a ratio, X/T. Accuracy is a measure of bias in a system.

For chemical data collected, accuracy will be checked quantitatively through the use of matrix and surrogate spikes, and blanks controlled by the laboratory. The accuracy is calculated based on the percent recovery of the spikes and will be reviewed through the validation of weekly control charts.

Accuracy of field measurements will be qualitatively controlled through the use of standard operating procedures (SOPs) which have been developed to standardize the collection of measurements and samples. Consistent proper calibration required of all equipment throughout the field exercises will assist in the accuracy of measurements.

6.4.7.3 SENSITIVITY

Sensitivity is to be expressed in terms of detection and quantitation limits for each type of measurement/analysis. Detection/quantitation limits should be compared to the levels proposed within the applicable methods to verify that they are attainable with the specified methodology and instrumentation.

6.4.7.4 COMPLETENESS

Completeness is to be expressed and calculated as the percentage of measurements that are judged to be valid. Also, critical samples should be identified and appropriate controls maintained to ensure that valid data are obtained in order to obtain the requisite type, quantity, and quality of data. Completeness is generally calculated for each type of measurement/analysis as follows:

$$\%C = V/N * 100\%$$

where:

C = completeness

V = number of measurements judged valid

N = number of planned measurements

6.4.7.5 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data represent the characteristics of a population of samples, parameter variations at a sampling point, or an environmental condition. Representativeness is to be ensured in the field through implementation of appropriate sample collection, preservation, and handling techniques. In the laboratory, representativeness is to be ensured by appropriate sub-sampling techniques. Representativeness is to be assessed through results of duplicate field and laboratory samples.

6.4.7.6 COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Comparability is to be assessed between existing or historical data and project data. In each case, comparability is to be ensured through use of standard sampling and analysis methodology and comparable operating conditions. Consideration is to be given to variations such as seasonal trends, depth of sample collection, and stream flow. To facilitate comparison of data sets, appropriate reporting units are to be specified and used.

6.4.8 DATA REDUCTION, ASSESSMENT, MANAGEMENT AND REPORTING

6.4.8.1 DATA REDUCTION

The conversion of raw data into reported results is to be performed as detailed in the analytical methods. Field standard quality practices and laboratory SOPs include automated or manual data reduction procedures, equations, conversion factors, significant figures, and reporting units.

Outlier data may occur at any phase of the data collection process. Outliers may occur as a consequence of an out-of-control system or through natural random variance. Once identified, outlier data are to be characterized with respect to the cause, nature, and degree of exceedances. Available information relevant to the measurement process that produced the suspect data are to be reviewed for calculation and transcription errors, clear indications of instrument malfunction, and verification that the measurement corresponds to the intended sample or measurement location.

Calculation, transcription, and sample/measurement identification errors are to be corrected and the resulting data are to be re-evaluated, as appropriate. Data generated using faulty instruments are to be evaluated for usability based on the extent and severity of the malfunction and the critical nature of the data. Corrective action measures are to be taken to resolve problems and restore proper function to the analytical system when data indicate that the analytical system is not performing adequately. Corrective action measures are to be initiated, documented, tracked, and verified. These measures may be necessary when the following occurs:

- QC data are not within the control limits for precision and accuracy.
- Blanks contain contaminants above the specified levels.
- Calibration data or instrument performance parameters are not within acceptance criteria.
- Undesirable trends are observed in the QC data or calibration data.
- There are unusual changes in instrument sensitivity or performance.
- Deficiencies are detected during inspections, audits, or from the results of performance evaluation samples.

Laboratory corrective actions are to be implemented by the laboratory QA manager in consultation with the Shaw Project Manager and may include, but are not limited to, the following:

- Re-analysis of the samples.
- Documentation of interferences or matrix effects that result in poor analytical performance.
- Evaluating and changing analytical procedures.

6.4.8.2 DATA QUALITY ASSESSMENT

Data quality is to be assessed prior to use to judge usability and determine if project objectives were met. Data quality assessment includes the laboratory's data review and a usability assessment.

Data Review (which is independent of the intended use of the data) determines the technical merit of the data by comparing the QC results to method-specified criteria. Field crews are to review their data and implement any necessary corrective actions prior to submitting the data for use. Prior to submitting data to Shaw, each contract laboratory is responsible for reviewing their data, implementing corrective actions where possible, reporting nonconformances, and implementing the corresponding corrective actions, as applicable. Laboratory data are to be reviewed as prescribed in the laboratory's LQMP.

Data usability includes a review of the quantity, type, and overall quality of the data to determine suitability for specified purposes. USEPA guidance (USEPA, 1992) for data usability (e.g., OERR 9285.7-09) is to be followed to the extent practical.

6.4.8.3 DATA MANAGEMENT

Field data collected during sampling will be filed in the Shaw document control system file. Electronic files containing laboratory generated data will be available if requested. Data will be validated according to USEPA Region II protocols. Data entries are to be checked by the site manager and/project manager to verify accuracy and integrity. The field and laboratory data will also be checked against historical results to determine if the results are representative and agree with previous data collected or literature reported values. Project data are not to be released for use until QC checks have been performed and discrepancies resolved.

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APPENDIX A

New Jersey Department of Environmental Protection Ecological Screening Criteria

NJDEP Ecological Screening Criteria

Toxic Substance	CAS Number	Surface Water (ug/L)						Sediment (mg/kg)				Soil (mg/kg)					
		Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria			Fresh Water Criteria		Saline Water Criteria		Wildlife PRGs (flora and fauna)	Terrestrial Plant Tox Benchmarks	EcoSSLs[20]			
		Aquatic		Human Health	Aquatic		Human Health	Lowest Effects Level (LEL)[1]	Severe Effects Level (SEL)[2]	Effects Range Low (ER-L)[4]	Effects Range Medium (ER-M)[5]			Plants	Soil Invertebrates	Avian	Mammalian
		Acute	Chronic		Acute	Chronic											
Acenaphthene	83-32-9		38[8]	670(h)			990(h)	See Saline Criteria[3] 0.00671[8]		0.016	0.500	20[9]					
Acenaphthylene	208-96-8		4840[8]					See Saline Criteria[3] 0.00587[8]		0.044	0.640	682[8]					
Acrolein	107-02-8		0.19[8]	6.1(h)			9.3(h)	0.00000152[8]				5.27[8]					
Acrylonitrile	107-13-1		66[8]	0.051(hc)			0.25(hc)	0.0012[8]				0.0239[8]					
Aldrin	309-00-2	3	0.017[8]	0.000049(hc)	1.3		0.000050(hc)	0.002	8	See Freshwater Criteria[6]		0.00332[8]					
Aluminum	7429-90-5							2.55%[15]			1.8%[15]		50				
Ammonia, un-ionized	7664-41-7	See N.J.A.C. 7:9B-1.14(e)			See N.J.A.C. 7:9B-												
Anthracene	120-12-7		0.035[8]	8,300(h)			40,000(h)	0.22 0.0572[8]	370	0.085	1.1	1,480[8]					
Antimony	7440-36-0		80[8]	5.6(h)(T)			640(h)(T)		3[15]		9.3[15]	5[9]	5		78		0.27
Arsenic	7440-38-2	340(d)(s)	150(d)(s)	0.017(hc)(T)	69(d)(s)	36(d)(s)	0.061(hc)(T)	6 9.9790[8]	33	8.2	70	9.9[9,10]	10	18		43	46
Asbestos	1332-21-4			7x10[6]fibers/L >10um(h)													
Barium	7440-39-3		220[8]	2,000(h)(T)							48[15]	283[11]	500		330		2,000
Benz(a)anthracene	56-55-3		0.025[8]	0.038(hc)			0.18(hc)	0.320 0.108[8]	1,480	0.261	1.6	5.21[8]					
Benzene	71-43-2		114[8] 824[16]	0.15(hc)			3.3(hc)	See Saline Criteria[3] 0.142[8]		0.34[7]		0.255[8]					
Benzidine	92-87-5			0.000086(hc)			0.00020(hc)										
3,4-Benzofluoranthene (Benzo(b)fluoranthene)	205-99-2		9.07[8]	0.038(hc)			0.18(hc)	10.4[8]			1.800[15]	59.8[8]					
Benzo(k)fluoranthene	207-08-9			0.38(hc)			1.8(hc)	0.240	1,340	See Freshwater Criteria[6]		148[8]					
Benzo(g,h,i)perylene	191-24-2		7.64[8]					0.170	320	See Freshwater Criteria[6]		119[8]					
Benzo(a)pyrene (BaP)	50-32-8		0.014[8]	0.0038(hc)			0.018(hc)	0.37 0.150[8]	1,440	0.430	1.6	1.52[8]					
Beryllium	7440-41-7		3.6[8]	6.0(h)(T)			42(h)(T)					10[9]	10		40		21
BHC (Benzohexachloride)								0.003	12	See Freshwater Criteria[6]							
alpha-BHC (alpha-HCH)	319-84-6		12.4[8]	0.0026(hc)			0.0049(hc)	0.006	10			0.0994[8]					
beta-BHC (beta-HCH)	319-85-7		0.495[8]	0.0091(hc)			0.017(hc)	0.005	21			0.00398[8]					
gamma-BHC (gamma-HCH/Lindane)	58-89-9	0.95	0.026[8]	0.98(h)	0.16		1.8(h)	0.003	1			0.00500[8]					
Biphenyl	92-52-4											60[9]					
Bis(2-chloroethyl) ether	111-44-4		1900[8]	0.030(hc)			0.53(hc)	3.520[8]				23.7[8]					
Bis(2-chloroisopropyl) ether	108-60-1			1,400(h)			65,000(h)					19.9[8]					
Bis(2-ethylhexyl) phthalate	117-81-7		0.3[8]	1.2(hc)			2.2(hc)	0.182[8]	0.750[15]	0.18216[15]	2.64651[15]	0.925[8]					
Boron	7440-42-8											0.5[9]	0.5				
Bromine	7726-95-6											10[9]	10				
Bromodichloromethane (Dichlorobromomethane)	75-27-4			0.55(hc)			17(hc)					0.540[8]					
Bromoform	75-25-2		230[8]	4.3(hc)			140(hc)	0.492[8]				15.9[8]					
Butyl benzyl phthalate	85-68-7		23[8]	150(h)			190(h)	1.970[8]			0.063[15]	0.239[8]					
Cadmium	7440-43-9	(a)	(a)	3.4(h)(T)	40(d)(s)	8.8(d)(s)	16(h)(T)	0.6 0.990[8]	10	1.2	9.6	4[9,11]	4	32	140	0.77	0.36
Carbon tetrachloride	56-23-5		240[8]	0.33(hc)			2.3(hc)	1.450[8]				2.98[8]					
Chlordane	57-74-9	2.4	0.0043	0.00010(hc)	0.09	0.004	0.00011(hc)	0.007 0.00324[8]	6	See Freshwater Criteria[6]		0.224[8]					

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Toxic Substance	CAS Number	Surface Water (ug/L)						Sediment (mg/kg)				Soil (mg/kg)					
		Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria			Fresh Water Criteria		Saline Water Criteria		Wildlife PRGs (flora and fauna)	Terrestrial Plant Tox Benchmarks	EcoSSLs[20]			
		Aquatic		Human Health	Aquatic		Human Health	Lowest Effects Level (LEL)[1]	Severe Effects Level (SEL)[2]	Effects Range Low (ER-L)[4]	Effects Range Medium (ER-M)[5]			Plants	Soil Invertebrates	Avian	Mammalian
		Acute	Chronic		Acute	Chronic											
Chloride	16887-00-6	860,000	230,000	250,000													
Chlorine Produced Oxidants (CPO)	7782-50-5	19	11		13	7.5											
3-Chloroaniline	108-42-9											20[9]	20				
Chlorobenzene	108-90-7		47[8]	210(h)			2,500(h)	0.291[8]				40[12] 13.1[8]					
Chloroform	67-66-3		140[8]	68(h)			2,100(h)	0.121[8]				1.19[8]					
2-Chloronaphthalene	91-58-7		0.396[8]	1,000(h)			1,600(h)	0.417[8]				0.0122[8]					
2-Chlorophenol	95-57-8		24[8]	81(h)			150(h)	0.0319[8]			0.008[15]	0.243[8]					
3-Chlorophenol	108-43-0											7[12]	7				
Chlorpyrifos	2921-88-2	0.083	0.041		0.011	0.0056											
Chromium	7440-47-3		42[8]	92(h)(T)			750(h)(T)	26 43.4[8]	110	81	370	0.4[12]	1				
Chromium+3	16065-83-1	(a)	(a)													26	34
Chromium+6	18540-29-9	15(d)(s)	10(d)(s)		1,100(d)(s)	50(d)(s)											130
Chrysene	218-01-9			3.8(hc)			18(hc)	0.34 0.166[8]	460	0.384	2.8	4.73[8]					
Cobalt	7440-48-4		24[8]					50[8]			10[15]	20[9] 0.14[8]	20	13		120	230
Copper	7440-50-8	(a)	(a)	1,300(h)(T)	4.8(d)(s)	3.1(d)(s)		16 31.6[8]	110	34	270	60[12] 5.4[8]	100	70	80	28	49
Cyanide (Total)	57-12-5	22(fc)	5.2(fc)	140(h)	1.0(fc)	1.0(fc)	140(h)	0.0001[8]				1.33[8]					
4,4'-DDD (p,p'-TDE)	72-54-8			0.00031(hc)			0.00031(hc)	0.008 0.00488[8]	6	0.002[15]	0.02[15]	0.758[8]					
4,4'-DDE	72-55-9		0.00000000451[8]	0.00022(hc)			0.00022(hc)	0.005 0.00316[8]	19	0.0022	0.027	0.596[8]					
4,4'-DDT	50-29-3	1.1	0.001	0.00022(hc)	0.13	0.001	0.00022(hc)	0.008 0.00416[8]	71	0.001[15]	0.007[15]	0.0035[8]					
DDT (Total)								0.007	12	0.0016	0.046					0.093[21]	0.021[21]
Demeton	8065-48-3		0.1			0.1											
Dibenz(a,h)anthracene	53-70-3			0.0038(hc)			0.018(hc)	0.06 0.033[8]	130	0.063	0.26	18.4[8]					
Dibromochloromethane (Chlorodibromomethane)	124-48-1			0.40(hc)			13(hc)					2.05[8]					
Di-n-butyl phthalate	84-74-2		9.7[8]	2,000(h)			4,500(h)	1.114[8]	0.110[15]		0.058[15]	200[9] 0.15[8]					
1,2-Dichlorobenzene	95-50-1		14[8]	2,000(h)			6,200(h)	0.294[8]			0.013[15]	2.96[8]					
1,3-Dichlorobenzene	541-73-1		38[8]	2,200(h)			8,300(h)	1.315[8]				37.7[8]					
1,4-Dichlorobenzene	106-46-7		9.4[8]	550(h)			2,200(h)	0.318[8]			0.110[15]	20[12] 0.546[8]					
3,3'-Dichlorobenzidine	91-94-1		4.5[8]	0.021(hc)			0.028(hc)	0.127[8]				0.646[8]					
1,2-Dichloroethane	107-06-2		910[8]	0.29(hc)			28(hc)	0.260[8]				21.2[8]					
1,1-Dichloroethylene	75-35-4		65[8]	4.7(h)			100(h)	0.0194[8]				8.28[8]					
trans-1,2-Dichloroethylene	156-60-5		970[8]	590(h)			43,000(h)	0.654[8]				0.784[8]					
2,4-Dichlorophenol	120-83-2		11[8]	77(h)			290(h)	0.0817[8]			0.005[15]	87.5[8]					
3,4-Dichlorophenol	95-77-2											20[9,12]	20				
1,2-Dichloropropane	78-87-5		360[8]	0.50(hc)			15(hc)	0.333[8]				32.7[8]					
1,3-Dichloropropene (cis and trans)	542-75-6			0.34(hc)			21(hc)										
Dieldrin	60-57-1	0.24	0.056	0.000052(hc)	0.71	0.0019	0.000054(hc)	0.002 0.0019[8]	91	See Freshwater Criteria[6]		0.00238[8]				0.022	0.0049
Diethyl phthalate	84-66-2		110[8]	17,000(h)			44,000(h)	0.295[8]			0.006[15]	100[9] 24.8[8]					
2,4-Dimethyl phenol	105-67-9		100[8]	380(h)			850(h)	0.304[8]				0.010[8]					
4,6-Dinitro-o-cresol	534-52-1			13(h)			280(h)										

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Toxic Substance	CAS Number	Surface Water (ug/L)						Sediment (mg/kg)				Soil (mg/kg)					
		Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria			Fresh Water Criteria		Saline Water Criteria		Wildlife PRGs (flora and fauna)	Terrestrial Plant Tox Benchmarks	EcoSSLs[20]			
		Aquatic		Human Health	Aquatic		Human Health	Lowest Effects Level (LEL)[1]	Severe Effects Level (SEL)[2]	Effects Range Low (ER-L)[4]	Effects Range Medium (ER-M)[5]			Plants	Soil Invertebrates	Avian	Mammalian
		Acute	Chronic		Acute	Chronic											
2,4-Dinitrophenol	51-28-5		19[8]	69(h)			5,300(h)	0.00621[8]				20[9] 0.0609[8]	20				
2,4-Dinitrotoluene	121-14-2		44[8]	0.11(hc)			3.4(hc)	0.0144[8]				1.28[8]					
1,2-Diphenylhydrazine	122-66-7			0.036(hc)			0.20(hc)										
Endosulfans (alpha and beta)	115-29-7	0.22	0.056	62(h)	0.034	0.0087	89(h)										
Endosulfan sulfate	1031-07-8		2.22[8]	62(h)			89(h)	0.0346[8]				0.0358[8]					
Endrin	72-20-8	0.086	0.036	0.059(h)	0.037	0.0023	0.060(h)	0.003 0.00222[8]	130	See Freshwater Criteria[6]		0.0101[8]					
Endrin aldehyde	7421-93-4		0.15[8]	0.059(h)			0.060(h)	0.480[8]				0.0105[8]					
Ethylbenzene	100-41-4		14[8] 81[16]	530(h)			2,100(h)	See Saline Criteria[3] 0.175[8]		1.4[7]		5.16[8]					
Fluoranthene	206-44-0		1.9[8]	130(h)			140(h)	0.75 0.423[8]	1,020	0.600	5.1	122[8]					
Fluorene	86-73-7		19[8]	1,100(h)			5,300(h)	0.19 0.0774[8]	160	0.019	0.54	122[8]					
Fluorine	7782-41-4											200[9]	200				
Furan	110-00-9											600[9]					
Guthion	86-50-0		0.01			0.01											
Heptachlor	76-44-8	0.52	0.0038	0.000079(hc)	0.053	0.0036	0.000079(hc)	0.0006[8]	0.010[15]		0.0003[15]	0.00598[8]					
Heptachlor epoxide	1024-57-3	0.52	0.0038	0.000039(hc)	0.053	0.0036	0.000039(hc)	0.005 0.00247[8]	5	See Freshwater Criteria[6]		0.152[8]					
Hexachlorobenzene	118-74-1		0.0003[8]	0.00028(hc)			0.00029(hc)	0.020	24	See Freshwater Criteria[6]		0.199[8]					
Hexachlorobutadiene	87-68-3		0.053[8]	0.44(hc)			18(hc)	0.0265[8]			0.0013[15]	0.0398[8]					
Hexachlorocyclopentadiene	77-47-4		77[8]	40(h)			1,100(h)	0.901[8]				10[9] 0.755[8]					
Hexachloroethane	67-72-1		8[8]	1.4(hc)			3.3(hc)	0.584[8]			0.073[15]	0.596[8]					
Indeno(1,2,3-cd)pyrene	193-39-5		4.31[8]	0.038(hc)			0.18(hc)	0.200	320	See Freshwater Criteria[6]		109[8]					
Iodine	7553-56-2											4[9]	4				
Isophorone	78-59-1		920[8]	35(hc)			960(hc)	0.432[8]				139[8]					
Lead	7439-92-1	38(d)(s)	5.4(d)(s)	5.0(h)(T)	210(d)(s)	24(d)(s)		31 35.8[8]	250	47	218	40.5[11] 0.0537[8]	50	120	1,700	11	56
Lithium	7439-93-2											2[9]	2				
Malathion	121-75-5		0.1			0.1											
Manganese	7439-96-5						100(h)(T)	630[15]	1,100[15]		260[15]		500	220	450	4,300	4,000
Mercury	7439-97-6	1.4(d)(s)	0.77(d)(s)	0.050(h)(T)	1.8(d)(s)	0.94(d)(s)	0.051(h)(T)	0.2 0.174[8]	2	0.15	0.71	0.00051[11] 0.1[8]	0.3				
Methoxychlor	72-43-5		0.03	40(h)		0.03		0.0136[8]				0.0199[8]					
Methyl bromide (bromomethane)	74-83-9		16[8]	47(h)			1,500(h)	0.00137[8]				0.235[8]					
Methyl t-butyl ether (MTBE)	1634-04-4	151,000[17]	51,450[16] 51,000[17]	70(h)	53,000[17]	18,000[17]											
Methylene chloride	75-09-2		940[8]	2.5(hc)			310(hc)	0.159[8]				4.05[8]					
2-Methylnaphthalene	91-57-6		330[8]					See Saline Criteria[3] 0.0202[8]		0.070	0.67	3.24[8]					
Mirex	2385-85-5		0.001			0.001		0.007	130	See Freshwater Criteria[6]							
Molybdenum	7439-98-7											2[9]	2				
Naphthalene	91-20-3		13[8]					See Saline Criteria[3] 0.176[8]		0.16	2.1	0.0994[8]					
Nickel	7440-02-0	(a)	(a)	500(h)(T)	64(d)(s)	22(d)(s)	1,700(h)(T)	16 22.7[8]	75	21	52	30[9] 13.6[8]	30	38	280	210	130

NJDEP Ecological Screening Criteria

Toxic Substance	CAS Number	Surface Water (ug/L)						Sediment (mg/kg)				Soil (mg/kg)					
		Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria			Fresh Water Criteria		Saline Water Criteria		Wildlife PRGs (flora and fauna)	Terrestrial Plant Tox Benchmarks	EcoSSLs[20]			
		Aquatic		Human Health	Aquatic		Human Health	Lowest Effects Level (LEL)[1]	Severe Effects Level (SEL)[2]	Effects Range Low (ER-L)[4]	Effects Range Medium (ER-M)[5]			Plants	Soil Invertebrates	Avian	Mammalian
		Acute	Chronic		Acute	Chronic											
Nitrate (as N)	14797-55-8			10,000(h)													
Nitrobenzene	98-95-3		220[8]	17(h)			690(h)	0.145[8]				1.31[8]					
4-Nitrophenol	100-02-7		60[8]					0.0133[8]				7[12] 5.12[8]					
N-Nitrosodi-n-butylamine	924-16-3			0.0063(hc)			0.22(hc)										
N-Nitrosodiethylamine	55-18-5		768[8]	0.00023(hc)			0.13(hc)	0.0228[8]				0.0693[8]					
N-Nitrosodimethylamine	62-75-9			0.00069(hc)			3.0(hc)					0.0000321[8]					
N-Nitrosodiphenylamine	86-30-6			3.3(hc)			6.0(hc)					0.545[8]					
N-Nitrosodi-n-propylamine (Di-n-propylnitrosamine)	621-64-7			0.0050(hc)			0.51(hc)										
N-Nitrosopyrrolidine	930-55-2			0.016(hc)			34(hc)					0.0126[8]					
Parathion	56-38-2	0.065	0.013					0.000757[8]				0.00034[8]					
Pentachlorobenzene	608-93-5		0.019[8]	1.4(h)			1.5(h)	0.024[8]				20[12] 0.497[8]					
Pentachlorophenol	87-86-5	(b)	(b)	0.27(hc)	13	7.9	3.0(hc)	23[8]			0.017[15]	3[9] 0.119[8]	3	5.0	31	2.1	2.8
Phenanthrene	85-01-8		3.6[8]					0.56 0.204[8]	950	0.240	1.5	45.7[8]					
Phenol	108-95-2		180[8]	10,000(h)			860,000(h)	0.0491[8]	0.048[15]		0.130[15]	30[12] 120[8]					
Phosphorous (yellow)	7723-14-0					0.1											
PCB Aroclor 1016								0.007	53	See Freshwater Criteria[6]							
PCB Aroclor 1248								0.030	150	See Freshwater Criteria[6]							
PCB Aroclor 1254								0.060	34	See Freshwater Criteria[6]							
PCB Aroclor 1260								0.005	24	See Freshwater Criteria[6]							
Polychlorinated biphenyls (PCBs)	1336-36-3		0.014	0.000064(hc)		0.03	0.000064(hc)	0.07 0.0598[8]	530	0.023	0.180	0.371[10] 0.000332[8]	40				
Pyrene	129-00-0		0.30[8]	830(h)			4,000(h)	0.490 0.195[8]	850	0.665	2.6	78.5[8]					
Selenium	7782-49-2	20(s)	5.0(s)	170(h)(T)	290(d)(s)	71(d)(s)	4,200(h)(T)				1[15]	0.21[13] 0.0276[8]	1	0.52	4.1	1.2	0.63
Silver	7440-22-4	(a)	0.12[8]	170(h)(T)	1.9(d)(s)		40,000(h)(T)	See Saline Criteria[3] 0.5[8]		1.0	3.7	2[9] 4.04[8]	2	560		4.2	14
Styrene	100-42-5		32[8]					0.254[8]				300[9] 4.69[8]	300				
Sulfide-hydrogen sulfide (undissociated)	7783-06-4		2			2											
TCDF												0.00084[14]					
Technetium	7440-26-8											0.2[9]	0.2				
tert-Butyl alcohol (TBA)	75-65-0		355,000[16]														
2,3,5,6-Tetrachloroaniline	3481-20-7											20[9]	20				
1,2,3,4-Tetrachlorobenzene	634-66-2											10[9]					
1,2,4,5-Tetrachlorobenzene	95-94-3		3[8]	0.97(h)			1.1(h)	1.252[8]				2.02[8]					
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6		0.000000003[8]	0.0000000050(hc)			0.0000000051(hc)	0.00000012[8]	0.0000088[15]		0.0000036[15]	0.00000315[10] 0.000000199[8]					
1,1,2,2-Tetrachloroethane	79-34-5		380[8]	4.7(h)			110(h)	0.850[8]				0.127[8]					
Tetrachloroethylene	127-18-4		45[8]	0.34(hc)			1.6(hc)	See Saline Criteria[3] 0.990[8]		0.45[7]		9.92[8]					
2,3,4,5-Tetrachlorophenol	4901-51-3											20[12]					
Thallium	7440-28-0		10[8]	0.24(h)(T)			0.47(h)(T)					1[9]	1				

NJDEP Ecological Screening Criteria

Toxic Substance	CAS Number	Surface Water (ug/L)						Sediment (mg/kg)				Soil (mg/kg)					
		Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria			Fresh Water Criteria		Saline Water Criteria		Wildlife PRGs (flora and fauna)	Terrestrial Plant Tox Benchmarks	EcoSSLs[20]			
		Aquatic		Human Health	Aquatic		Human Health	Lowest Effects Level (LEL)[1]	Severe Effects Level (SEL)[2]	Effects Range Low (ER-L)[4]	Effects Range Medium (ER-M)[5]			Plants	Soil Invertebrates	Avian	Mammalian
		Acute	Chronic		Acute	Chronic											
Tin	7440-31-5		180[8]								>3.4[15]	50[9]	50				
Toluene	108-88-3		253[8] 822[16]	1,300(h)			15,000(h)	See Saline Criteria[3] 1.220[8]		2.5[7]		200[9]	200				
Toxaphene	8001-35-2	0.73	0.0002	0.00028(hc)	0.21	0.0002	0.00028(hc)	0.000077[8]				0.119[8]					
2,4,5-Trichloroaniline	636-30-6											20[9]	20				
1,2,3-Trichlorobenzene	87-61-6											20[12]					
1,2,4-Trichlorobenzene	120-82-1		30[8]	21(h)			42(h)	5.062[8]			>0.0048[15]	20[12]					
1,1,1-Trichloroethane	71-55-6		76[8]	120(h)			2,600(h)	0.213[8]				29.8[8]					
1,1,2-Trichloroethane	79-00-5		500[8]	13(h)			350(h)	0.518[8]				28.6[8]					
Trichloroethylene	79-01-6		47[8]	1.0(hc)			12(hc)	See Saline Criteria[3] 0.112[8]		1.6[7]		12.4[8]					
2,4,5-Trichlorophenol	95-95-4			1,800(h)			3,600(h)				0.003[15]	9[12]	4				
2,4,6-Trichlorophenol	88-06-2		4.9[8]	0.58(hc)			1.0(hc)	0.208[8]			0.006[15]	4[9]					
Uranium	7440-61-1											5[9]	5				
Vanadium	7440-62-2		12[8]								57[15]	2[9]	2			7.8	280
Vinyl chloride	75-01-4		930[8]	0.082(hc)			8.1(hc)	0.202[8]				0.646[8]					
Xylene	1330-20-7		27[8] 296[16]					See Saline Criteria[3] 0.433[8]		>0.12[7]		10[8]					
Zinc	7440-66-6	(a)	(a)	7,400(h)(T)	90(d)(s)	81(d)(s)	26,000(h)(T)	120 121[8]	820	150	410	8.5[11] 6.62[8]	50	160	120	46	79
Low Molecular Weight PAHs[18]															29		100
High Molecular Weight PAHs[19]															18		1.1
Total PAHs								4.0	10,000	4.0	45.0						

(a) Criteria as listed at (f)3 below as formula
(b) Criteria as listed at (f)4 below as formula
(d) Criterion is expressed as a function of the Water Effect Ratio (WER). For criterion in the table, WER equates to the default value of 1.0.
(fc) Criteria expressed as free cyanide (as CN)/L
(h) Human health noncarcinogen
(hc) Human health carcinogen
(s) Dissolved criterion
(T) Total recoverable criterion

1 Lowest Effects Levels (LELs) indicate concentrations at which adverse benthic impact may begin to occur (level tolerated by most benthic organisms). Water column species and wildlife are at potential risk via bio-magnification (food chain toxicity) if site-related sediment concentrations of PCBs, organochlorine pesticides, or mercury are at or above the LEL. Other known biomagnifiers without ESC warrant case-by-case evaluation.

2. Severe Effects Levels (SELs) are also provided, but the SEL is not a BEE screening value. Contamination at this level indicates severe impacts to the benthic community in most cases studied. For non-polar organics (PAHs, organochlorine pesticides, PCBs), the SEL is calculated from a site-specific TOC level. Since the table SEL is based on 100% organic carbon, the calculated site-specific number is lower.

3. Refer to Estuarine/Marine Screening Criteria when a freshwater parameter has no corresponding value. Since the biological activity of non-polar organics is not expected to differ greatly in the estuarine/marine environment, these screens can be used as surrogates. While uncertainty associated with the use of estuarine/marine metal screens as freshwater surrogates is greater than with non-polar organics, one surrogate metal (silver) is provided.

4. Effects Range-Low (ER-L) represents a concentration at which adverse benthic impacts are found in approximately 10% of studies. Water column species and wildlife are at potential risk via biomagnification (food chain toxicity) if site-related sediment concentrations of PCBs, organochlorine pesticides, or mercury are at or above the ER-L. Other known biomagnifiers without NOAA screening numbers (dioxins, furans, other chlorinated organics, and selenium) warrant case-by-case evaluation.

5. The Effects Range-Median (ER-M) is also provided. The ER-M is not a BEE screening value. Contamination greater than the ER-M value indicates adverse benthic impacts in more than 50% of cases studied.

6. Refer to Freshwater Sediment Screening Criteria when a Estuarine/Marine parameter has no corresponding value and for individual Aroclor values. Since the biological activity of non-polar organics is not expected to differ greatly in the fresh water environment, freshwater screens can be used as surrogates.

7. Screening values were developed for the protection of marine receptors; however, for the purpose of this document they are considered surrogates for freshwater systems.

8. USEPA Region 5, RCRA Ecological Screening Levels (ESLs) represent a protective benchmark (e.g., water quality criteria, sediment quality guidelines/ criteria, and chronic no adverse effect levels) for 223 contaminants and are not intended to serve as cleanup levels, but are intended to function as screening levels. http://www.epa.gov/reg5rcra/ca/ESL.pdf

9. Wildlife Preliminary Remediation Goal based on plant study.

10. Wildlife Preliminary Remediation Goal based on shrew study.

11. Wildlife Preliminary Remediation Goal based on woodcock study.

12. Wildlife Preliminary Remediation Goal based on earthworm study.

13. Wildlife Preliminary Remediation Goal based on mouse study.

14. Wildlife Preliminary Remediation Goal based on hawk study.

15. Sediment value from NOAA Screening Quick Reference Tables (SQuiRTs).

NJDEP Ecological Screening Criteria

Toxic Substance	CAS Number	Surface Water (ug/L)						Sediment (mg/kg)				Soil (mg/kg)					
		Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria			Fresh Water Criteria		Saline Water Criteria		Wildlife PRGs (flora and fauna)	Terrestrial Plant Tox Benchmarks	EcoSSLs[20]			
		Aquatic		Human Health	Aquatic		Human Health	Lowest Effects Level (LEL)[1]	Severe Effects Level (SEL)[2]	Effects Range Low (ER-L)[4]	Effects Range Medium (ER-M)[5]			Plants	Soil Invertebrates	Avian	Mammalian
		Acute	Chronic		Acute	Chronic											

16. Westhollow Technical Center Levels were developed by Shell Oil for surface water and were approved for use by NJDEP with the following conditions: 1) the source area is removed, 2) these levels are on the fringe of the contamination area, and 3) active remediation is occurring. These levels are applicable to surface water and wetland areas.
17. USEPA Ambient Water Quality Criteria Update for Methyl Tertiary-Butyl Ether (MTBE) http://www.epa.gov/waterscience/criteria/mtbe-fs.html
18. Low Molecular Weight PAHs are defined as compounds composed of fewer than four rings.
19. High Molecular Weight PAHs are defined as compounds composed of four or more rings.
20. Guidance for Developing Ecological Soil Screening Levels, OSWER Directive 9285.7-55, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, 1200 Pennsylvania Avenue, N.W., Washington, DC 20460, November 2003, Revised February 2005, http://www.epa.gov/ecotox/ecossl/pdf/ecossl_guidance_chapters.pdf
21. Value applies to DDT and metabolites.

NOTE: See Page 7/7 (SW Calculations tab) for Surface Water Calculator for metals.

APPENDIX B
Health and Safety Plan

See included CD

SITE-SPECIFIC HEALTH AND SAFETY PLAN FOR FORT MONMOUTH BASELINE ECOLOGICAL EVALUATION

July 2009

Prepared for:

U.S. Army Corps of Engineers
Baltimore District

Contract No.
W912DR-05-D-0026

Prepared by:

Shaw Environmental, Inc.
111 Howard Blvd., Suite 110
Mt Arlington, NJ 07856

SHAW PROJECT NUMBER 135065

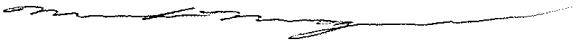
Site-Specific Safety and Health Plan Approval

I have read and approve this site-specific safety and health plan for the Fort Monmouth Baseline Ecological Evaluation with respect to project hazards, regulatory requirements, and Shaw procedures.



_____ _____23 July 2009_____

Russell Winston, CSP — Date
Health and Safety Manager



_____ _____23 July 2009_____

Mark C. Magness — Date
Project Manager

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
AHA	Activity Hazard Analysis
BEE	Baseline Ecological Evaluation
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CPR	Cardio-Pulmonary Resuscitation
CRZ	Contamination Reduction Zone
CSP	Certified Safety Professional
DBA	A-Weighted Decibel
DCE	Dichloroethene
DEET	N, N-diethyl-meta-toluamide
ECP	Environmental Condition of Property
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
ERCP	Emergency Response Contingency Plan
EZ	Exclusion Zone
f/b	flash/bang
FID	Flame Ionization Detector
FTMM	Fort Monmouth
HSM	Health and Safety Manager
LEMA	Local Emergency Management Agency
MHR	Maximum Heart Rate
mph	miles per hour
MSDS	Material Safety Data Sheet
MTBE	Methyl tert-butyl ether
NIOSH	National Institute for Occupational Safety and Health
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PE	Professional Engineer
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
ppm	parts per million
PVC	Polyvinyl Chloride
Shaw	Shaw Environmental, Inc.
SS	Site Supervisor
SSHSP	Site-Specific Health and Safety Plan
SSO	Site Safety Officer
SZ	Support Zone

LIST OF ACRONYMS AND ABBREVIATIONS

TCE	Trichloroethene
TLV	Threshold Limit Value
TWA	Time-Weighted Average
USACE	U.S. Army Corps of Engineers
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 OBJECTIVE

The U.S. Army Corps of Engineers (USACE), Baltimore District, tasked Shaw Environmental, Inc. (Shaw) to perform a Baseline Ecological Evaluation (BEE) at Fort Monmouth (FTMM) to fulfill requirements as set forth in New Jersey Department of Environmental Protection (NJDEP) Technical Requirements for Site Remediation [New Jersey Administrative Code (N.J.A.C.) 7:26E-3.11]. This Site-Specific Health and Safety Plan (SSHSP) has been prepared under the Baltimore Architectural and Engineering Services Contract Number W912DR-05-D-0026 (Task Order 40) and is based on the Scope of Work (SOW) dated June 3, 2008, and information obtained through consultation with FTMM, U.S. Army Environmental Command, and USACE personnel.

The objective of this plan is to provide a mechanism for establishing safe working conditions at the site. The safety organization, procedures, and protective equipment have been established based upon an analysis of potential hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of accident or injury.

1.2 POLICY STATEMENT

The policy of Shaw Environmental, Inc. (Shaw) is to provide a safe and healthful work environment for all employees. Shaw considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency and shortcuts. At Shaw, it is believed all accidents and injuries are preventable. Shaw will take every reasonable step to reduce the possibility of injury, illness, or accident.

This SSHSP prescribes the procedures that must be followed during the BEE site activities. Operational changes that could affect the health and safety of personnel or the community will not be made without the prior approval of the Project Manager (PM) and the Health and Safety Manager (HSM).

The provisions of this plan are mandatory for all personnel and subcontractors assigned to the project. All visitors to the work site must abide by the requirements of the plan.

1.3 REFERENCES

This SSHSP complies with applicable Occupational Safety and Health Administration (OSHA), U.S. Environmental Protection Agency (EPA), U.S Army Corps of Engineers and Shaw Health and Safety policies and procedures. This plan follows the guidelines established in the following:

- Standard Operating Safety Guides, EPA (Publication 9285.1-03, June 1992).
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, National Institute for Occupational Safety and Health (NIOSH), OSHA, U.S. Coast Guard, EPA (86-116, November 1985).

- Title 29 of the Code of Federal Regulations (CFR), Part 1910.
- Title 29 CFR, Part 1926.
- U.S. Army Corps of Engineers (USACE) Safety and Heath Requirements Manual EM 385-1-1 (current).
- USACE Safety and Heath Requirements for Hazardous, Toxic, and Reactive Waste Activities, ER 385-1-2 (2003).
- Shaw Health and Safety Procedures HS001 through HS999 (current).

1.4 DISCLAIMER

The enclosed SSHSP has been designed for the methods presently contemplated by Shaw for execution of the proposed work. Therefore, the SSHSP may not be appropriate if the work is not performed by or using the methods presently contemplated by Shaw, or if the scope of work is modified. Each company or contractor is responsible for the safety and health of their personnel, for their actions, and for the work they perform. It is highly recommended that each company or contractor working at the Fort Monmouth (FTMM) site perform their work under the guidance of their internal health and safety professionals.

2.0 SITE HISTORY/SCOPE OF WORK

2.1 BACKGROUND

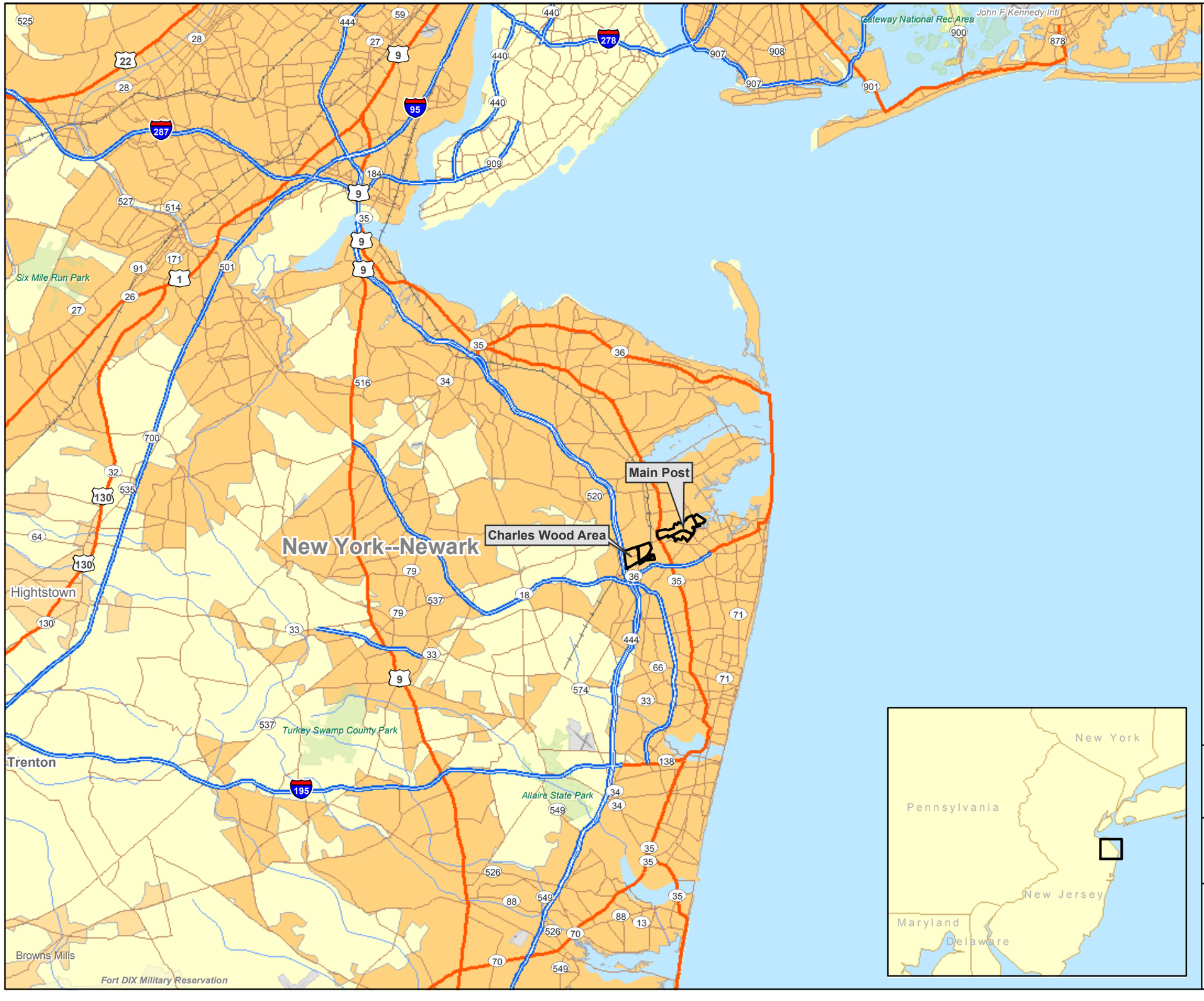
The work outlined in this SSHSP pertains to the conduct of the FTMM Baseline Ecological Evaluation (BEE) in the identified areas of concern in the corresponding work plan to which this SSHP is included as an Appendix. The reader is referenced to Section 3.0 of the Fort Monmouth Main Post and Charles Wood Area Baeline Ecological Work Plan for additional information related to the sites being investigated. **Figure 2-1** depicts the location of FTMM and **Figure 2-2** and **Figure 2-3** depict the sites to be investigated on Main Post and Charles Wood Area, respectively. The objective of the BEE at FTMM is to examine each of the 22 identified sites (8 ECP parcels and 14 IRP sites) and the sample results from sediment, surface water, soil, and groundwater at these sites for the co-occurrence of 1) contaminants of potential ecological concern (COPECs), 2) environmentally sensitive natural resources, and 3) a chemical migration pathway to these sensitive natural resources. The objective will be reached by completing these tasks: a data and literature review; a field investigation, including field sampling of surcae water, sediment, and surface soil; and data analysis and ecological hazard characterization.

2.2 SCOPE OF WORK

The principal tasks to be conducted are listed below:

- Mobilization and site preparation.
- Soil sampling (hand auger).
- Surface water/sediment sampling (hand auger).
- Site restoration/demobilization.

All site activities have been analyzed for potential hazards for which control measures are provided in **Appendix C**, Activity Hazard Analyses (AHAs). The reader is referenced to Section 4.0 of the Fort Monmouth Main Post and Charles Wood Area Baseline Ecological Work Plan for additional information related sites and locations at which the above tasks will be performed and Section 5.0 for methods, procedures, measurements, and observations required for each type of proposed field activity.



LEGEND

Installation Boundary

N

Scale:

0 2 4 8 Miles

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 2-1

FACILITY LOCATION MAP

FORT MONMOUTH
NEW JERSEY

N:\GIS\Ft_Monmouth\GIS_Documents\Project_Maps\PhaseII_Sampling_Workplan\FTMON_Fig2-1_Facility.mxd (4/19/2007 10:14:02 AM)



LEGEND

- Road Centerline
- Water Feature
- Building
- IRP Site
- ECP Parcel
- Installation Boundary

Note: Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.

N

Scale:

0 290 580 1,160 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 2-2

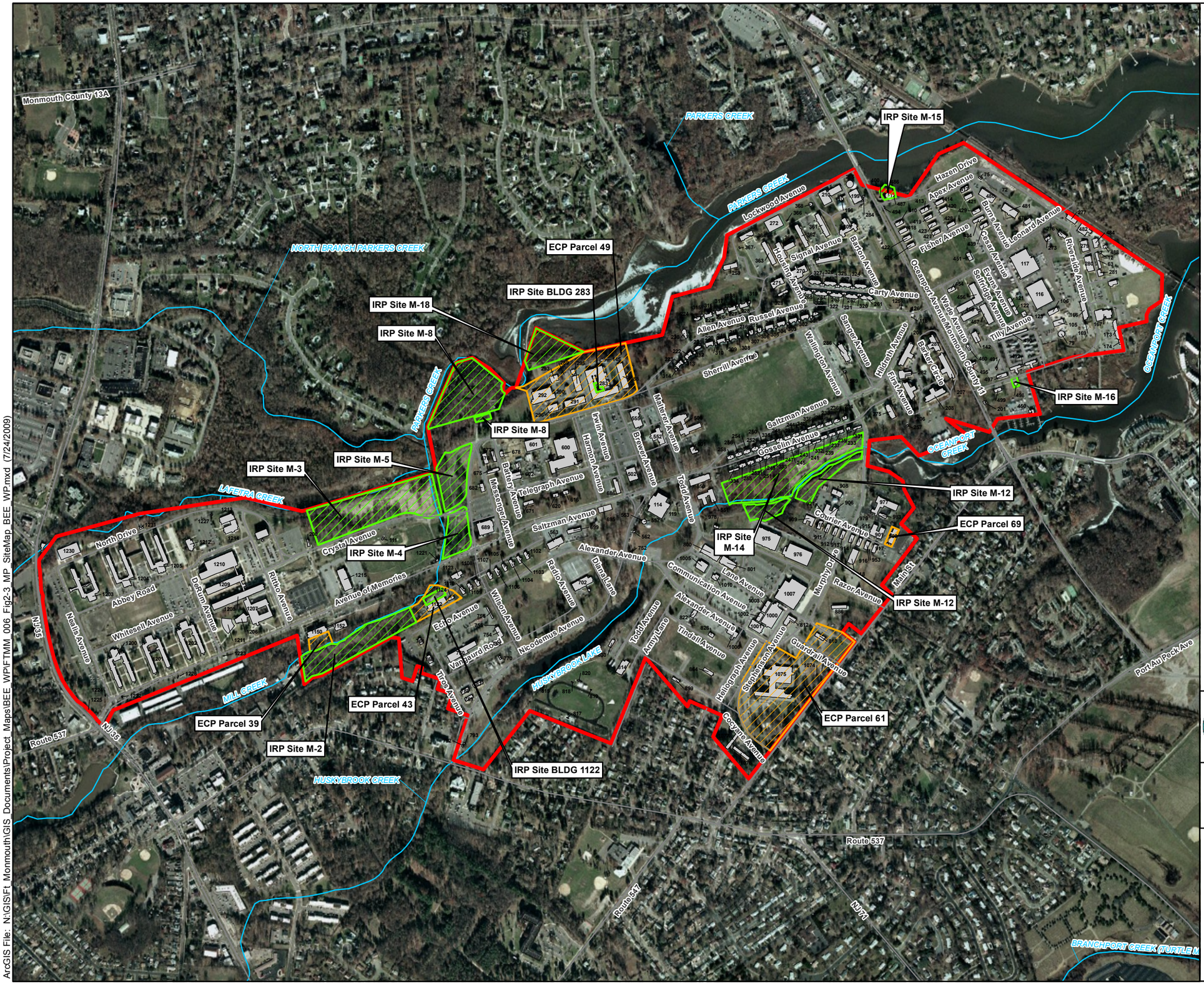
FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION WORKPLAN

CHARLES WOOD AREA
SITE MAP

FORT MONMOUTH
NEW JERSEY

ArcGIS File: N:\GIS\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_WP\FTMM_007_Fig2-2_CWA_SiteMap_BEE_WP.mxd (7/24/2009)

ArcGIS File: N:\GIS\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_WP\FTMM_006_Fig2-3_MP_SiteMap_BEE_WP.mxd (7/24/2009)



LEGEND

- Road Centerline
- IRP Site
- ECP Parcel
- Installation Boundary
- Building
- Water Feature

Note: Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.

N

Scale:

0 450 900 1,800 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 2-3
FORT MONMOUTH BASELINE ECOLOGICAL EVALUATION WORKPLAN

MAIN POST SITE MAP

FORT MONMOUTH
NEW JERSEY

3.0 KEY PERSONNEL AND MANAGEMENT

The PM, Site Supervisor/Site Safety Officer (SS/SSO), and HSM are responsible for formulating and enforcing health and safety requirements, and for implementing this SSHSP. The following summarizes the health and safety responsibilities of the site management.

3.1 PROJECT SAFETY RESPONSIBILITES

The PM has the overall responsibility for the project and to assure that the requirements of the contract are attained in a manner consistent with the SSHSP requirements. The PM will coordinate with the SS/SSO to assure that the work is completed in a manner consistent with the SSHSP. The SS/SSO is responsible for field implementation of the SSHSP. The SS/SSO will be the main contact in any on-site emergency situation and will insure off-site emergency agencies have been contacted prior to the start of work. The PM, HSM, and SS/SSO are authorized to administer this SSHSP. All site personnel are authorized to stop work when an imminent health or safety risk exists. The PM and HSM are responsible for reviewing the SSHSP and ensuring that the SSHSP is complete and accurate. Each employee is responsible for personal safety as well as the safety of others in the work area.

3.2 KEY SAFETY PERSONNEL

The following individuals share responsibility for health and safety at the site:

Project Manager	**Mark C. Magness** (973) 770-5302 (office) Redacted - Privacy Act (cellular)
Site Supervisor/Site Safety Officer	**Dan Duh** (732) 346-2921 (office) Redacted - Privacy Act (cellular)
Health and Safety Manager	**Winston (Doug) Russell** (865) 692-3584 (office) Redacted - Privacy Act (cellular)
Client Reps	**John Buck, USACE Baltimore District** (410) 962-6735 (office)
	Wanda Green, Fort Monmouth DPW (732) 532-8341 (office)

4.0 ACTIVITY HAZARDS

It is not anticipated that site personnel will be in direct contact with site contaminants. The primary concern will be potential dermal exposure. For discussions of activities and site locations that the SSHSP addresses, see **Sections 2.0 and 3.0** of the Fort Monmouth Main Post and Charles Wood Area Baseline Ecological Work Plan, respectively (work plan to which this SSHSP is appended.

4.1 CHEMICAL HAZARDS

Potential chemical hazards include those substances identified as contaminants of concern at each of the sites as well as materials and substances brought on-site and used during the project.

Based on site history and previous investigations, the primary contaminants that may be encountered during this project include those in the contaminated soil, groundwater, soil gas, and sediment at FTMM. The chemical compounds identified as contaminants of concern for FTMM are as follows:

Surface Water – Volatile organic compounds (VOCs), primarily benzene and other fuel-related compounds; the chlorinated ethenes – tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE); vinyl chloride due to former use of solvents in electronics labs and vehicle maintenance areas; metals (primarily lead, mercury, silver); and cyanide due to former use in electronics laboratories.

Soil and sediment – Total petroleum hydrocarbons, VOCs, polychlorinated biphenyls (PCBs), metals (primarily lead, copper, mercury, silver), cyanide, and semivolatile organic compounds primarily due to use in electronics laboratories and vehicle maintenance areas and possible former disposal practices in on-site landfills.

A brief summary of the contaminants of concern is provided in **Table 4-1**.

The following general symptoms may indicate exposure to a hazardous chemical. Personnel will be removed from the work site and provided immediate medical attention if the following symptoms occur:

- Loss of appetite.
- Weakness in wrists or ankles.
- Dizziness or stupor.
- Nausea, headaches, or cramps.
- Irritation of the eyes, nose, or throat.
- Chest pains and coughing.
- Rashes or burns.

4.2 HAZARD COMMUNICATION

The purpose of hazard communication (Employee Right-to-Know) is to ensure that the hazards of all chemicals located at this field project site are transmitted (communicated) according to 29 CFR 1926.59 to all personnel and subcontractors. Physical and Chemical Properties and Potential Health Hazards of Hazardous Materials are summarized in **Table 4-1**; container labeling is discussed in **Section 4.2.1**, material Safety Data Sheets are discussed in **Section 4.2.2**, and employee information and training is discussed in **Section 4.2.3**.

Table 4-1
Physical and Chemical Properties and Potential Health Hazards of Hazardous Materials

Contaminant (Synonym)	Exposure Limits (TWA unless noted otherwise)	Physical Description	Chemical & Physical Properties	Incompatibilities	Target Organs	Symptoms of Exposure
Benzene	NIOSH REL: (carcinogen) • TWA 0.1 ppm • STEL 1 ppm OSHA PEL: • TWA 1 ppm • STEL 5 ppm	Colorless to light-yellow liquid with an aromatic odor.	BP: 176°F VP: 75 Sol: 0.07% FP: 12°F LEL: 1.2% UEL: 7.8% IP: 9.24 eV	Strong oxidizers, many fluorides & perchlorates, nitric acid	Eyes, skin, respiratory system, blood, central nervous system, bone marrow	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; potential occupational carcinogen.
Benzo[a]pyrene (properties are for coal tar pitch volatiles since properties are not listed for this specific compound)	NIOSH REL: (carcinogen) • TWA 0.1 mg/m^3 OSHA PEL: • TWA 0.2 mg/m^3	Black or dark-brown amorphous residue	BP: NA VP: NA Sol: NA FP: NA LEL: NA UEL: NA IP: NA	Strong oxidizers	Respiratory system, skin, bladder, kidneys	Dermatitis, bronchitis, potential occupational carcinogen
1,2-Dichloroethane	NIOSH REL: • TWA 1 ppm (4 mg/m^3) • STEL 2 ppm (8 mg/m^3) OSHA PEL: • TWA 50 ppm • Ceiling 100 ppm • 200 ppm 5-minute maximum peak in any 3 hours	Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.].	BP: 182°F VP: 64 mmHg Sol: 0.9% FP: 56°F LEL: 6.2% UEL: 16% IP: 11.05 eV	Strong oxidizers & caustics; chemically-active metals such as magnesium or aluminum powder, sodium & potassium; liquid ammonia [Note: Decomposes to VC & HCl above 1112°F.]	Eyes, skin, kidneys, liver, central nervous system, cardiovascular system [in animals: forestomach, mammary gland & circulatory system cancer]	Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]

Table 4-1 (Continued)
Physical and Chemical Properties and Potential Health Hazards of Hazardous Materials

Contaminant (Synonym)	Exposure Limits (TWA unless noted otherwise)	Physical Description	Chemical & Physical Properties	Incompatibilities	Target Organs	Symptoms of Exposure
1,1-Dichloroethene	NIOSH REL: (carcinogen) OSHA PEL: • None	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor.	BP: 89°F VP: 500 mmHg Sol: 0.04% FP: -2°F LEL: 6.5% UEL: 15.5% IP: 10.00 eV	Aluminum, sunlight, air, copper, heat [Note: Polymerization may occur if exposed to oxidizers, chlorosulfonic acid, nitric acid, or oleum. Inhibitors such as the monomethyl ether of hydroquinone are added to prevent polymerization.]	Eyes, skin, respiratory system, central nervous system, liver, kidneys [in animals: liver & kidney tumors]	Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]
Carbon Tetrachloride	NIOSH REL: (carcinogen) • STEL 2 ppm (12.6 mg/m^3) [60 minute] OSHA PEL: • TWA 10 ppm • Ceiling 25 ppm • 200 ppm 5-minute maximum peak in any 4 hours	Colorless liquid with a characteristic ether-like odor.	BP: 170°F VP: 91 mmHg Sol: 0.05% FP: NA LEL: NA UEL: NA IP: 11.47 eV	Chemically-active metals such as sodium, potassium & magnesium; fluorine; aluminum [Note: Forms highly toxic phosgene gas when exposed to flames or welding arcs.]	Central nervous system, eyes, lungs, liver, kidneys, skin	Irritation eyes, skin; central nervous system depression; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoordination; potential occupational carcinogen.
1,2-DCE (properties are for 1,2-DCE since the properties are not listed for the isomers)	NIOSH REL: • TWA 200 ppm (790 mg/m^3) OSHA PEL • TWA 200 ppm (790 mg/m^3)	Colorless liquid (usually a mixture of the *cis* and trans isomers) with a slightly acrid, chloroform-like odor.	BP: 118-140°F VP: 182 mmHg Sol: 0.4% FP: 36-39°F LEL: 5.6% UEL: 12.8% IP: 9.65 eV	Strong oxidizers, strong alkalis, potassium hydroxide, copper.	Eyes, respiratory system, central nervous system.	Irritation to eyes, respiratory system; central nervous system depressant.

Table 4-1 (Continued)
Physical and Chemical Properties and Potential Health Hazards of Hazardous Materials

Contaminant (Synonym)	Exposure Limits (TWA unless noted otherwise)	Physical Description	Chemical & Physical Properties	Incompatibilities	Target Organs	Symptoms of Exposure
Copper (properties are for dusts and mists – does not apply to copper fumes)	NIOSH REL: • TWA 1 mg/m^3 OSHA PEL • TWA 1 mg/m^3	A reddish, lustrous, malleable, odorless solid	BP: 4703°F VP: 0 mmHg Sol: insoluble FP: NA LEL: NA UEL: NA IP: NA	Oxidizers, alkalis, sodium azide, acetylene	Eyes, respiratory system, skin, liver, kidneys, increased risk with Wilson's disease	Irritation of the nasal mucus membrane, pharynx; nasal perforation; eye irritation; metallic taste; dermatitis
Ethyl benzene	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 125 ppm (545 mg/m^3) OSHA PEL†: TWA 100 ppm (435 mg/m^3)	Colorless liquid with an aromatic odor.	BP: 277°F VP: 7 mmHg Sol: 0.01% FP: -139°F LEL: 0.8% UEL: 6.7% IP: 8.76 eV	Strong oxidizers	Eyes, skin, respiratory system, central nervous system	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma
Lead	NIOSH REL: • TWA 0.050 mg/m^3 OSHA PEL • TWA 0.050 mg/m3	A heavy, ductile, soft, gray solid.	BP: 3164°F VP: 0 mmHg Sol: insoluble FP: NA LEL: NA UEL: NA IP: NA	Strong oxidizers, hydrogen peroxide, acids	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension

Table 4-1 (Continued)
Physical and Chemical Properties and Potential Health Hazards of Hazardous Materials

Contaminant (Synonym)	Exposure Limits (TWA unless noted otherwise)	Physical Description	Chemical & Physical Properties	Incompatibilities	Target Organs	Symptoms of Exposure
Mercury	NIOSH REL: • TWA 0.01 mg/m^3 • STEL 0.03 mg/m^3 OSHA PEL • TWA 0.01 mg/m^3 • Ceiling 0.04 mg/m^3	Silver-white, heavy, odorless liquid	BP: 674°F VP: 0.0012 mmHg Sol: insoluble FP: NA LEL: NA UEL: NA IP: ?	Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper	Skin, respiratory system, central nervous system, kidneys, eyes	Cough, chest pain, dyspnea, bronchitis, pneumonitis; tremor, insomnia; irritability, indecision; headache, fatigue, weakness; stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria; irritation of the eyes, skin
Silver (metal dust and soluble compounds as Ag)	NIOSH REL: • TWA 0.01 mg/m^3 OSHA PEL • TWA 0.01 mg/m3	White, lustrous solid	BP: 3632°F VP: 0 mmHg Sol: insoluble FP: NA LEL: NA UEL: NA IP: NA	Acetylene, ammonia, hydrogen peroxide, bromoazide, chlorine trifluoride, ethyleneimine, oxalic acid, tartaric acid	Nasal septum, skin, eyes	Blue-gray eyes, nasal septum, throat, skin; skin irritation, ulceration; gastrointestinal disturbance
Toluene	NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3) OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)	Colorless liquid with a sweet, pungent, benzene-like odor	BP: 232°F VP: 21 mmHg Sol: (74°F): 0.07% FP: -139°F LEL: 1.1% UEL: 7.1% IP: 8.82eV	Strong oxidizers	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage

Table 4-1 (Continued)
Physical and Chemical Properties and Potential Health Hazards of Hazardous Materials

Contaminant (Synonym)	Exposure Limits (TWA unless noted otherwise)	Physical Description	Chemical & Physical Properties	Incompatibilities	Target Organs	Symptoms of Exposure
Cyanide	NIOSH REL: • Ceiling 5 mg/m^3 (4.7 ppm) [10 minute] OSHA PEL • TWA5 mg/m^3 Note: Exposure limits apply to other cyanides (as CN) except hydrogen cyanide	White granular or crystalline solids with a faint almond-like odor (KCN, NaCN)	BP: 2957°F VP: 0/0 mmHg Sol: 72/58% (77°F) FP: NA/NA LEL: NA/NA UEL: NA/NA IP: NA/NA	Strong oxidizers, such as acids, acid salts, chlorates and nitrates	Cardiovascular system, central nervous system, liver, kidneys, skin	Asphyxiation and death can occur; weakness, headache, confusion; nausea, vomiting; increased respiratory rate; slow gasping respiration, irritation of eyes, skin
PCB	NIOSH REL: (carcinogen) • TWA 0.001 mg/m^3 OSHA PEL (Aroclor 1254) • TWA 0.5 mg/m^3 (skin)	Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor.	BP: 689-734°F VP: 0.00006 Sol: mmHg FP: insoluble LEL: NA UEL: NA IP: NA NA	Strong oxidizers	Skin, eyes, liver, reproductive system [in animals: tumors of the pituitary gland & liver, leukemia]	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]
PCE	NIOSH REL: (carcinogen) Minimize workplace exposure concentrations OSHA PEL • TWA 100 ppm • Ceiling 200 ppm • 300 ppm 5-minute maximum peak in any 3-hours	Colorless liquid with a mild, chloroform-like odor.	BP: 250°F VP: 14 mmHg Sol: 0.02% FP: NA LEL: NA UEL: NA IP: 9.32 eV	Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash	Eyes, skin, respiratory system, liver, kidneys, central nervous system	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]

Table 4-1 (Continued)
Physical and Chemical Properties and Potential Health Hazards of Hazardous Materials

Contaminant (Synonym)	Exposure Limits (TWA unless noted otherwise)	Physical Description	Chemical & Physical Properties	Incompatibilities	Target Organs	Symptoms of Exposure
TCE	NIOSH REL: (carcinogen) • 2 ppm (as a 60-minute ceiling) for use as anesthetic agent • 25 ppm (10-hour TWA) for all other exposures OSHA PEL • TWA 100 ppm • Ceiling 200 ppm 300 ppm 5-minute maximum peak in any 2-hours	Colorless liquid (unless dyed blue) with a chloroform-like odor.	BP: 189 VP: 58 mmHg Sol: 0.1% FP: Unknown LEL: (77°F): 8% UEL: (77°F): 10.5% IP: 9.45 eV	Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium & beryllium)	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; potential occupational carcinogen.
VC	NIOSH REL: (carcinogen) OSH PEL: • TWA 1 ppm • Ceiling 5 ppm [15-minute]	Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations.	BP: 7°F VP: 3.3 Sol: atmospheres FP: At 77°F: 0/1% LEL: NA UEL: 3.6% IP: 33.0% 9.99eV	Copper, oxidizers, aluminum, peroxides, iron, steel (Polymerizes in air, sunlight, or heat unless stabilized by inhibitors such as phenol. Attacks iron and steel in presence of moisture).	Liver, central nervous system, blood, repertory system, lymphatic system (liver cancer).	Weak; abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; it is a carcinogen.
Xylenes	NIOSH REL: TWA 100 ppm (435 mg/m3) ST 150 ppm (655 mg/m3) OSHA PEL†: TWA 100 ppm (435 mg/m3)	Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]	BP: 281°F VP: 9 mmHg Sol: 0.02% FP: 56°F LEL: 1.1% UEL: 7.0% IP: 8.44eV	Strong oxidizers, strong acids	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Notes:

Table 4-1 (Continued)
Physical and Chemical Properties and Potential Health Hazards of Hazardous Materials

BP	–	Boiling Point	mmHg	–	millimeters of mercury	OSHA	–	Occupational Safety and Health Administration
˚C	–	Centigrade	NA	–	Not Applicable	PEL	–	Permissible Exposure Limit
eV	–	Electrovolt	%	–	Percent	REL	–	Recommended Exposure Limits
°F	–	Degrees Fahrenheit	Sol	–	Solubility	STEL	–	Short-Term Exposure Limit (15-minute)
FP	–	Flash Point	UEL	–	Upper Explosive Limit	TWA	–	Time Weighted Average (10-hour day, 40-hour work week)
IP	–	Ionization Potential	VP	–	Vapor Pressure			
KOH	–	potassium chloride						
LEL	–	Lower Explosive Limit						

Reference: National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, June 2007.

4.2.1 Container Labeling

Shaw personnel will ensure that all containers are labeled according to contents. These drums and containers will include those from manufacturers and those produced on site by operations, such as gasoline and diesel safety cans. All incoming and outgoing labels shall be checked for identity, hazard warning, and name and address of responsible party.

4.2.2 Material Safety Data Sheets

There will be a Material Safety Data Sheet (MSDS) located on site for all site contaminants and each hazardous chemical known to be used on site. MSDSs are located in **Appendix A** of the SSHSP.

4.2.3 Employee Information and Training

Training employees on chemical hazards is accomplished through an ongoing corporate training program. All site employees shall maintain their HAZWOPER training, in accordance with 29 CFR 1910.120. Additionally, chemical hazards are communicated to employees through daily safety meetings held at Shaw field projects and by an initial site orientation program.

At a minimum, Shaw and related subcontractor employees will be instructed on the following:

- An in-depth review of the soil and surface contaminants of concern identified and listed in Section 4.1.
- OSHA-regulated chemicals and their hazards in the work area.
- How to prevent exposure to these hazardous chemicals.
- What the company has done to prevent workers' exposure to these chemicals.
- Procedures to follow if they are exposed to these chemicals.
- How to read and interpret labels and MSDSs for hazardous substances found on site.
- Emergency spill procedures.
- Proper storage and labeling.

Before any new hazardous chemical is introduced on site, each Shaw and related subcontractor employee will be given information in the same manner as during the safety class. The SS/SSO will be responsible for seeing that the MSDS on the new chemical is available for review by on site personnel. The information pertinent to the chemical hazards will be communicated to project personnel.

Morning safety meetings will be held and the hazardous materials used on site will be discussed. Attendance is mandatory for all on-site employees.

4.3 PHYSICAL HAZARDS

To minimize physical hazards, Shaw has developed standard safety protocols that will be followed at all times. AHAs, located in **Appendix C**, have been developed for each principal activity and identify all major hazards to which employees may be exposed.

The SS/SSO will observe the general work practices of each crewmember and equipment operator, and enforce safe procedures. The crew leaders and SS/SSO will inspect the work areas. All hazards will be corrected in a timely manner. A variety of physical hazards may be encountered during work activities at this site. Hard hats, safety glasses and steel-toe safety boots are required in all areas of the site. Site-specific hazards and all necessary precautions will be discussed at the daily safety meetings. Failure to follow safety protocols will result in removal of an employee from the site and appropriate disciplinary actions.

4.4 ENVIRONMENTAL HAZARDS

Environmental factors such as weather, wild animals, insects, and irritant plants may pose a hazard when performing outdoor tasks. The SS/SSO will take necessary actions to alleviate these hazards should they arise.

4.4.1 Heat Stress

The combination of warm ambient temperature and protective clothing increases the potential for heat stress. Heat stress disorders include:

- Heat rash.
- Heat cramps.
- Heat exhaustion.
- Heat stroke.

Heat stress prevention is outlined in Shaw Health and Safety procedure HS400, Working in Hot Environments. This information will be reviewed during safety meetings. Workers are encouraged to increase consumption of water and electrolyte-containing beverages (e.g., Gatorade®). Heat stress can be prevented by assuring an adequate work/rest schedule. Guidelines are presented below and will be used in conjunction with HS400.

In addition, workers are encouraged to take rests and report symptoms whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased based on worker recommendation to the SS/SSO. Heat stress can be prevented by assuring an adequate work/rest schedule and adequate fluid consumption. A guide for work/rest schedules for various protection levels are given below in **Table 4-2**. The number of hours before a work/rest period is based on experience with similar work. The time periods should be considered maximum. It must also be remembered that individual physical variability's and differences in physical work activities may require revisions to site plans. This table should be used as a guide. Professional judgment of the SS/SSO is necessary to assure a fully protective plan to prevent heat stress disorders.

Table 4-2
Guidelines for Work-Rest Periods
Protection Level
Number of Hours Before Rest Period

Temperature	Level D	Level C	Level B	Level A
90+ F*	2.0	1.5	1.0	0.5
87.5 F	2.5	2.0	1.5	1.0
82.5 F	3.0	2.5	2.0	1.5
77.5 F	3.5	3.0	2.5	1.5
72.5	4.0	3.5	2.5	1.5

**Work above 100°F will be reviewed with the Project HSM to determine specific requirements.*

Alternately, the work/rest schedule can be calculated based on heat stress monitoring results. Each individual will count his/her radial (wrist) pulse as early as possible during each rest period. If the heart rate exceeds 75 percent of their calculated maximum heart rate (MHR = 200 – age) at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work until his/her sustained heart rate is below 75 percent of their calculated maximum heart rate.

Body temperature, measured orally or through the ear canal, may also be monitored to assess heat stress. Workers should not be permitted to continue work when their body temperature exceeds 100.4°F (degrees Fahrenheit) or 38°C (degrees Celsius). Monitoring should be conducted at the beginning of each break period as noted above.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 70°F when wearing chemical protective clothing (Levels C, B, A), or 80°F for site activities performed with no chemical protective clothing (Level D). Monitoring will include pulse rate, weight loss, oral or ear canal temperature, signs and symptoms of heat stress and fluid intake.

4.4.2 Noise

Hearing protection is required for workers operating or working near heavy equipment, where the noise level is greater than 85 A-weighted decibel (dBA) (Time-Weighted Average [TWA]) as well as personnel working around heavy equipment. The SS/SSO will determine the need and appropriate testing procedures (i.e., sound level meter and/or dosimeter) for noise measurement in accordance with Shaw Health and Safety Procedure HS402 Hearing Conservation Program.

Noise monitoring should be conducted during the beginning of each activity, as well as any time modifications lead to increased noise levels (e.g., adding additional equipment). A sound level meter will be used to measure noise levels at selected locations in the work area and on the site perimeter when treatment equipment is operating normally. When used, noise-monitoring equipment must be calibrated before and after each shift.

If continuous noise levels are found to exceed 85 dBA at any location within the work area, warning signs will be posted. Workers and visitors will be notified that hearing protection is required. Appropriate hearing protection (e.g., ear plugs) will be worn whenever personnel are working or visitors are present in that location. A supply of earplugs will be maintained on site.

Action levels in the following table will trigger the use of appropriate hearing protection (plugs or muffs). Hearing protection must be able to attenuate noise below 90 dBA (8-hour TWA). Each hearing protection or device has a Noise Reduction Rating (NRR) assigned by the EPA. The calculation for a hearing protection device's effectiveness is: noise reading dBA – (NRR – 7dB) < 90 dBA.

Instrument	Measurement	Action
Type I or Type II Sound Level Meter or dosimeter	>80 dBA → 85 dBA	Hearing protection recommended. Limit work duration to 8-hour shifts.
	>85 dBA → 90 dBA	Hearing protection required. Limit work duration to 8-hour shifts.
	>90 dBA → 115 dBA	Hearing protection required. Investigate use of engineering controls. Limit work duration to 8 hour shifts.
	>115 dBA	Stop work. Consult Project HSM.

4.4.3 Biological Hazards

Poison Ivy (Rhus Radicans)

Poison Ivy may be found at the site. It is highly recommended that all personnel entering into an area with poison ivy wear a minimum of a Tyvek® coverall, to avoid skin contact.

The majority of skin reactions following contact with offending plants are allergic in nature and characterized by:

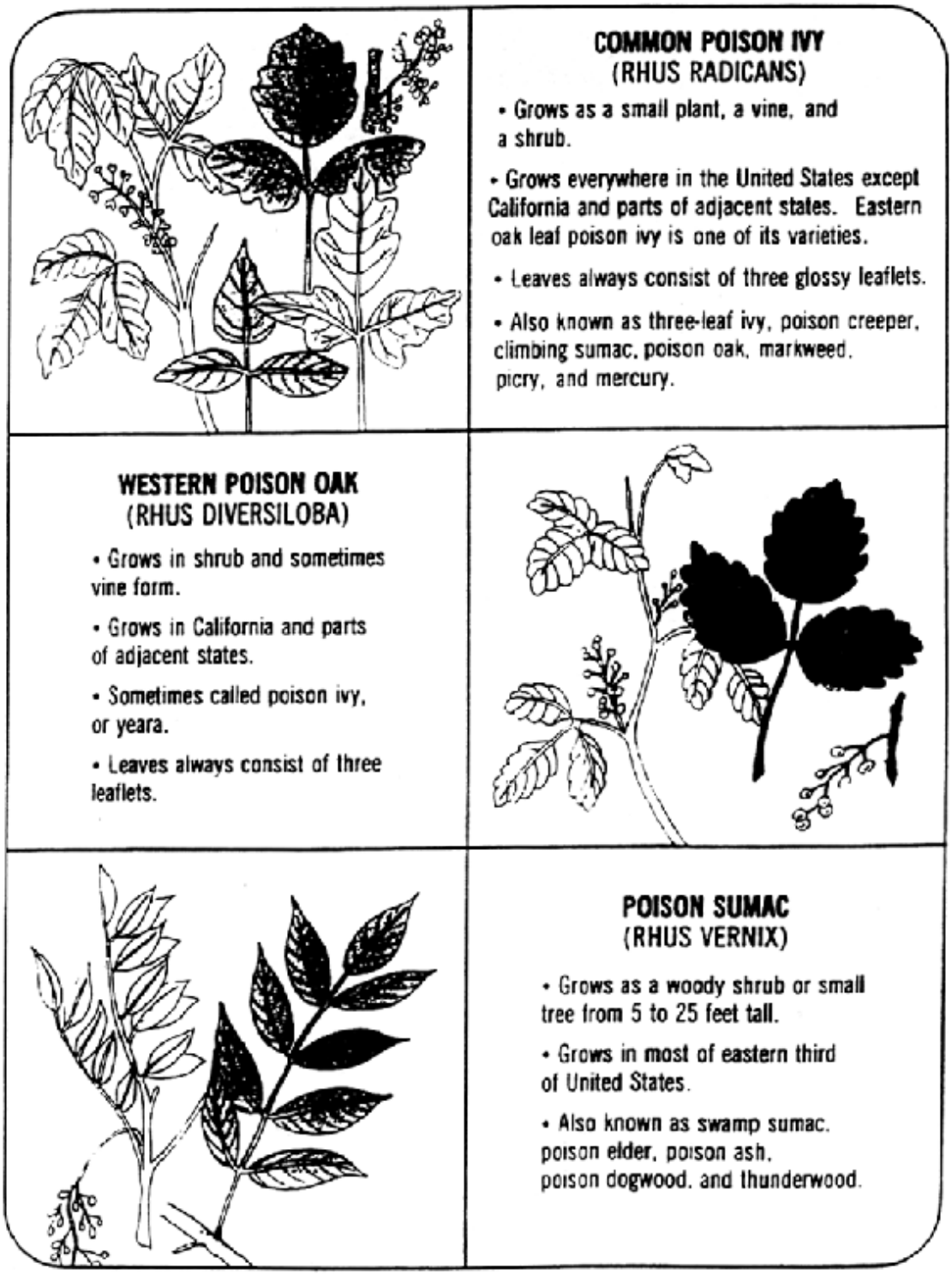
- General symptoms of headache and fever.
- Itching.
- Redness.
- A rash.

Some of the most common and most severe allergic reactions result from contact with plants of the poison ivy group, including poison oak and poison sumac. Such plants produce severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim may develop a high fever and feel very ill. Ordinarily, the rash begins within a few hours after exposure, but may be delayed 24-48 hours.

A barrier cream (e.g., IvyBlock, Stockhousen, Inc., 1-800-334-0242) should be applied to the exposed skin before entering and working in areas with possible poisonous plants.

Distinguishing Features of Poison Ivy Group Plants. The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each (see **Figure 4-1**). Both plants have greenish-white flowers and berries that grow in clusters.

Figure 4-1. Poisonous Plants



First Aid

- Remove contaminated clothing; wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol. A one percent hydrocortisone cream (over-the-counter) will aid in healing and reducing itch.
- Apply calamine or other soothing lotion if rash is mild.
- Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

Contaminated Clothing. The irritating substances emitted by poison ivy group plants will remain on clothing for prolonged periods of time (up to weeks or months) if not washed thoroughly. It may be necessary to wash contaminated clothing separately and more than once before reusing.

Ticks

Heavily vegetated areas of a site may have ticks. It is highly recommended that all personnel walking through such areas wear a minimum of a Tyvek® and latex boot covers. The ticks will stand out against the light colors. A tick repellent containing DEET (N, N-diethyl-meta-toluamide) is also recommended as well as permethrin applied to clothing.

Ticks can transmit several diseases, including Rocky Mountain spotted fever, a disease that occurs in the eastern portion of the United States as well as the western portion, and Lyme disease. Ticks adhere tenaciously to the skin or scalp. There is some evidence that the longer an infected tick remains attached, the greater is the chance that it will transmit disease.

If you have been bitten, place the tick in a jar labeled with the date, location of the bite, and the location acquired. If any symptom appears, such as an expanding red rash, contact a physician immediately.

First Aid

- Carefully (slowly and gently) remove the tick with tweezers, taking care that all parts are removed.
- With soap and water, thoroughly, but gently, scrub the area from which the tick has been removed, because disease germs may be present on the skin; also wipe the bite area with an antiseptic.

Lyme Disease. Lyme disease may cause a number of medical conditions, including arthritis that can be treated if you recognize the symptoms early and see your doctor. Early signs may include a flu-like illness, an expanding skin rash, and joint pain. If left untreated, Lyme disease can cause serious nerve and heart problems as well as a disabling type of arthritis.

You are more likely to spot early signs of Lyme disease rather than see the tick or its bite. This is because the tick is so small (about the size of the head of a common pin or a period on this

page and a little larger after they fill with blood), you may miss it or signs of a bite. However, it is also easy to miss the early symptoms of Lyme disease.

In its early stage, Lyme disease may be a mild illness with symptoms like the flu. It can include a stiff neck, chills, fever, sore throat, headache, fatigue, and joint pain. But this flu-like illness is usually out of season, commonly happening between May and November when ticks bite.

Most people develop a large, expanding skin rash around the area of the bite. Some people may get more than one rash. The rash may feel hot to the touch and may be painful. Rashes vary in size, shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. It's easy to miss the rash and the connection between the rash and the tick bite. The rash develops from three days to as long as a month after the tick bite. Almost one third of those with Lyme disease never get the rash.

Joint or muscle pain may be another early sign of Lyme disease. These aches and pains may be easy to confuse with the pain that comes from other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint. In later stages, Lyme disease may be confused with other medical problems. These problems can develop months to years after the first tick bite.

Early treatment of Lyme disease symptoms with antibiotics can prevent the more serious medical problems of later stages. If you suspect that you have symptoms of Lyme disease, report it to your supervisor and seek medical attention.

Lyme disease can cause problems with the nervous system that look like other diseases. These include symptoms of stiff neck, severe headache, and fatigue usually linked to meningitis. They may also include pain and drooping of the muscles on the face, called Bell's Palsy. Lyme disease can also mimic symptoms of multiple sclerosis or other types of paralysis.

Lyme disease can also cause serious but reversible heart problems such as irregular heartbeat. Finally, Lyme disease can result in a disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Researchers think these more serious problems may be linked to how the body's defense or immune system responds to the infection.

West Nile Virus and West Nile Encephalitis

West Nile Virus/West Nile Encephalitis is rapidly becoming a health concern in the United States. West Nile Virus was first identified in the U.S. in the New York area in 1999 and is closely related to the St. Louis Encephalitis Virus, which is routinely found in the United States.

"Encephalitis" means an inflammation of the brain and it can be caused by viral and bacterial infections. West Nile Encephalitis can be a serious or even fatal illness although this is rare in humans. This illness develops in approximately one of every 150 infections and is generally confined to older and physically compromised individuals.

West Nile Encephalitis is a viral infection of the brain transmitted through the bite of a mosquito, which has previously fed on birds and/or horses that were infected with West Nile Virus. Dead birds in an area may mean that West Nile Virus is circulating between the birds and the mosquitoes in that area. West Nile Virus is not transmitted from one person to another. Human illness from West Nile Virus is rare, even in areas where the virus has been reported.

Symptoms of Exposure. Most people who become infected with West Nile Virus will have either no symptoms or only mild ones. Symptoms of West Nile Encephalitis include high fever, headache, confusion, muscle aches and weakness, seizures, or paralysis. At its most serious, the infection can result in coma, permanent neurological damage, and death. Symptoms usually occur five to 15 days following the bite of an infected mosquito. Because West Nile Encephalitis is a viral infection, antibiotics are not effective and there is no specific treatment available other than general support therapy.

Protective Measures at Projects. There is no vaccine to protect humans against West Nile Virus. Individuals at project sites can reduce their risk from being infected with West Nile Virus by taking the following actions to protect against mosquito bites:

- Review the hazards of West Nile Virus periodically in morning safety meetings.
- Increase protective measures when working at dawn, dusk, and in the early evening.
- Reduce the area of exposed skin when working outdoors. Long-sleeved shirts with sleeves rolled down are recommended. Understand that mosquitoes may bite through thin clothing, so personnel should evaluate the actual Level D clothing worn, e.g., heavy long sleeve work shirts and heavy jeans may be indicated. Also, the risk or threat of mosquito bites is reduced for those activities that require the use of disposable coveralls.
- For activities where only Level D Personal Protective Equipment (PPE) is specified, consider using disposable coveralls when working in wooded, highly vegetated, or swampy areas.
- Use an insect repellent containing approximately 25% DEET. DEET in concentrations greater than 25% provides no additional protection but repel insects longer. However, at some point there is no direct correlation between concentration and repellency. For example, 50% DEET provides about four hours of protection against mosquitoes, but increasing the concentration to 100% provides only one additional hour of protection. Use the repellent according to the manufacturer's directions provided on the container. Use just enough repellent to cover exposed skin and clothing. Do not treat unexposed skin. Frequent re-application is unnecessary for effectiveness. Avoid prolonged and excessive use of DEET.
- After returning from outdoor field activities, wash treated skin with soap and water.
- Personnel should report flu-like symptoms to the SSO.

DEET is safe for pregnant and lactating women and is generally safe for children. You should avoid applying it to open wounds and irritated skin as it may further irritate the skin or cause discomfort.

Sweating, perspiration and getting wet may wash away the repellent and may require that DEET containing repellent be re-applied.

To remove mosquito breeding places and prevent mosquito bites (or prevent exposure to mosquitoes) on this project, the following precautions will be followed as practical:

- Cut tall grass and weeds.
- Drain accumulated water in such items as drums, buckets, pools and plastic containers.
- Repair holes in door and window screens.
- Eliminate stagnate water puddles as practical.
- Limit outdoor activities at dawn, dusk and early evening, when mosquitoes are most active, as practical.

4.4.4 Lightning

The procedures provided below will be used to protect site personnel from lightning related injuries.

Training. A tailgate safety meeting will be conducted to increase awareness to the hazards and prevention of lightning related incidents.

Detection of Lightning. The SS/SSO will be proactive in monitoring conditions that may produce thunderstorms and lightning. A daily and weekly weather forecast will be tracked and communicated to site personnel. When signs of impending storms, i.e., increasing wind, darkening skies, or lightning appear, local weather monitoring will be increased. The National Weather Service (www.nws.noaa.gov/) should be consulted frequently. Personnel will be notified when thunderstorms may impact the site.

The "flash/bang" (f/b) technique of measuring the distance to lightning will be reviewed with all personnel. The f/b technique is defined as: for each 5 seconds from the time of observing the lightning flash to hearing the associated thunder, the lightning is one mile away.

Suspension/Resumption of Activities. All outside activities will be suspended when a lightning flash is immediately in the area or a f/b of 30 seconds (6 miles away) is noted. Personnel may continue indoor work activities. Outdoor activities will resume when 30 minutes has passed since the last observable f/b of 30 seconds or greater.

Lightning Protection. When notification is given, all outside work activities will stop and personnel will gather in the Support Zone (SZ) for a head count and further instructions. Indoor work will continue, except for the use of electrical equipment, telephones and computers. When a safe location is not present and personnel are caught by a sudden lightning event, employees should seek the lowest possible area, away from large objects which might attract lightning or fall over, e.g., trees, utility poles. The employee should assume a crouching position with their head lowered and hands over their ears. AVOID: WATER, HIGH GROUNDS, HEAVY EQUIPMENT AND TALL, ISOLATED OBJECTS.

First Aid. An employee that is struck by lightning needs immediate assistance (call 911). The body will not carry an electrical charge, but receives an electrical shock and may be burned. Personnel certified in first-aid/Cardio-Pulmonary Resuscitation (CPR) should inspect for shock and burns around fingers, toes, buckles and jewelry. Stay with the injured employee until medical help arrives.

4.5 VEHICLE AND HEAVY EQUIPMENT SAFETY MANAGEMENT

4.5.1 Vehicle Safety

Motor vehicle incidents are the number one cause of occupational fatalities, accounting for one in three deaths. Fifty percent or more of vehicle safety incidents occur while backing up. Shaw employees involved in the operation and use of Shaw and/or leased or rented vehicles will comply with the Shaw Health and Safety Procedures HS800 Motor Vehicle Operation: General Requirements and HS810 Commercial Vehicle Operation and Maintenance. Shaw requires employees to use seat belts at all times when traveling in Shaw owned or leased/rented vehicles. The SS/SSO will develop a parking area plan, including backing vehicles into parking spaces, using spotters for backing vehicles and policy mandated vehicle inspections.

Shaw employees are expected to incorporate safe actions and preparations to avoid vehicle accidents and personal injury during work and off-hours. Breaks should be planned into lengthy job mobilizations and demobilizations, including rotation of drivers at regular intervals. If parking areas are busy or crowded and more than one worker is traveling in the same vehicle, one worker should remain outside the vehicle as it leaves the parking space to assist the driver with traffic observation. Vehicles traveling before dawn and at dusk in rural or wooded areas should be prepared to brake for wildlife, e.g., deer crossing roadways.

Shaw employees arriving at work areas should park vehicles away from delivery, heavy equipment and vehicle loading/unloading locations to prevent parked vehicles from damage by various deliveries. Heavy equipment operators should inspect areas and request vehicles to be moved or spotters used, if necessary, to maneuver equipment in tight areas. Employees who observe near misses or potential risks to parked or moving vehicles must report these to the SS/SSO immediately.

Shaw employees are expected to use the vehicle inspection form and check/test the safety systems on the vehicle on a daily basis. Check the following: brakes, mirrors, seat belts, tires, leakage from the undercarriage, lights, and turn signals. Vehicles with safety deficiencies must be reported immediately and not driven until properly repaired. Vehicles running errands from different project sites should have telephone numbers of the job site in the vehicle in case calls for assistance are required.

Because of the different ways alcohol can affect behavior, even in very small amounts, the best and safest course is not to drink before driving. At Shaw, a driver with blood alcohol concentration over 0.04 percent is considered to be under the influence and subject to disciplinary action. Personnel involved in motor vehicle incidents are subject to drug and alcohol testing.

Weather conditions can have a profound effect on driving. On slippery roads, drive more slowly. Stop and turn with care. Keep several car lengths from other vehicles. At speeds in excess of 35 miles per hour (mph), the chances of hydroplaning increase with speed. In general, keep back 1 car length for every 10 mph to prevent striking the car ahead.

Vehicles will be operated in accordance with the requirements listed below:

- Seatbelt use is mandatory for all passengers.
- Personnel may not ride in the back of cargo vehicles.
- The driver must make a 360 degree walk around the assigned vehicle prior to vehicle movement.
- A ground guide is used to back up any vehicle.
- Vehicle speed is limited to the posted speed limits for developed roadways, 25 mph maximum on dirt roads and 10 mph maximum off-road (based on conditions).
- Vehicle driven in four wheel low and low gear when on dirt roads or off road driving where steep grades dictate.
- All operators must possess a valid drivers license.
- Fuel or gasoline are not to be transported inside the passenger compartment.
- No vehicle is left running when unattended.
- Parking brakes are used when vehicles are parked.

In the event of a vehicle incident, notify your PM ***immediately*** and complete all required reports.

4.5.2 Heavy Equipment Safety

Forklifts, excavators, loaders other material handling equipment present various physical hazards on remediation sites. The following critical safety practices shall be followed to prevent safety incidents during heavy equipment operation.

- All equipment will be inspected prior to each use.
- All operators will have training or equivalent experience to be permitted to operate heavy equipment.
- Spotters will be used to back-up equipment and direct traffic in all “blind” areas.
- Standard hand signals will be used to communicate between operators and ground crew.
- All heavy equipment will have operable back-up alarms.
- Heavy equipment will be parked in areas where operators will not be exposed to strains or slip/trip/fall hazards during mounting and dismounting of equipment
- All heavy equipment will be equipped with operable seat belts; belts will be used by all operators.
- Written lifting plans will be developed and reviewed for all critical lifts.

4.6 MANUAL MATERIAL LIFTING

Many different types of objects may be handled manually during site operations. Care should be taken when lifting and handling heavy or bulky items because they are the cause of many back injuries. The following fundamentals address the proper lifting techniques that are essential in preventing back injuries:

- The size, shape, and weight of the object to be lifted must first be considered. No individual employee is permitted to lift any object that weighs more than 60 pounds. Multiple employees or the use of mechanical lifting devices are required for objects over the 60-pound limit.
- The anticipated path to be taken by the lifter should be inspected for the presence of slip, trip, and fall hazards.
- The feet shall be placed far enough apart for good balance and stability (typically shoulder width). THE FOOTING SHALL BE SOLID.
- The worker shall get as close to the load as possible. The legs shall be bent at the knees.
- The back shall be kept as straight as possible and abdominal muscles should be tightened.
- To lift the object, the legs are straightened from their bending position.
- A worker shall never carry a load that cannot be seen over or around.
- When placing an object down, the stance and position are identical to that for lifting. The legs are bent at the knees and the object lowered.

When two or more workers are required to handle the same object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each worker, if possible, shall face the direction in which the object is being carried. In handling bulky or heavy items, the following guidelines shall be followed to avoid injury to the hands and fingers:

- A firm grip on the object is essential; leather gloves shall be used if necessary.
- The hands and object shall be free of oil, grease, and water that might prevent a firm grip, and the fingers shall be kept away from any points that could cause them to be pinched or crushed, especially when setting the object down.
- The item shall be inspected for metal slivers, jagged edges, burrs, and rough or slippery surfaces prior to being lifted.

4.7 ACTIVITY HAZARD ANALYSES

Appendix C contains AHAs for primary site tasks. They contain detailed information on physical and chemical hazards, and provide control measures for these hazards. The AHAs will be field checked by the SS/SSO on an ongoing basis and revised as necessary. All revisions will be communicated to the work crew. In addition to the AHAs, Job Safety Analyses will be completed daily in accordance with HS045 – Job Safety Analyses (see **Appendix B**).

5.0 WORK AND SUPPORT AREAS

Work zones will be established if site activities in the ambient work area experience air monitoring readings above the action levels as outlined in Section 8.1. When necessary, each work area will be clearly identified using signs or physical barriers.

5.1 SUPPORT ZONE

The uncontaminated SZ, or clean zone, will be located upwind, in an area outside the Exclusion Zone (EZ) and Contamination Reduction Zone (CRZ) and within the geographic perimeters of the site. The area is used for material staging, vehicle parking, office facilities, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the EZ. All personnel arriving in the SZ will, upon arrival, report to the SS/SSO and sign the site visitor log.

5.2 CONTAMINATION REDUCTION ZONE

Personnel and equipment decontamination will be performed in the CRZ that is adjacent to the EZ. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination and for the purpose of accountability. Personal protective outer garments and respiratory protection will be removed in the CRZ and properly labeled. All water generated from equipment and personal decontamination will be contained on site and disposed of in an appropriate manner.

5.3 EXCLUSION ZONE

The EZ will be the area around exposed landfill material, areas with elevated air monitoring readings and proposed work areas. This area has the highest potential for exposure to contamination by contact, ingestion, or inhalation. All employees will use proper PPE when working in these areas. The location of the EZ will be identified by fencing or other appropriate means primarily around the excavation areas and the stockpiles. A daily entry log records the time of entry and exit from the EZ for each person.

A log of all personnel visiting, entering or working on the site shall be maintained by the SS/SSO. Visitors will attend a site orientation given by the SS/SSO and sign the SSHSP.

The following are standard safe work practices that apply to all site personnel and will be discussed in the safety briefing prior to initiating work on the site:

- Eating, drinking, chewing gum or tobacco, and smoking is prohibited in the EZ/CRZs.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco and smoking.
- A buddy system will be used. Hand signals will be established to maintain communication.
- During site operations, each worker will consider himself as a safety backup to his partner. Off-site personnel provide emergency assistance.

- Visual contact will be maintained between buddies on site when performing hazardous duties.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the SS/SSO, will be immediately dismissed from the site.
- Proper decontamination procedures must be followed before leaving the site.
- All employees and visitors must sign in and out of the site.

6.0 PROTECTIVE EQUIPMENT

This section specifies the level of PPE, which is required for each principal activity performed at this site. All site personnel must be trained in the use of all PPE utilized. The PPE procedures outlined in Shaw Health and Safety Procedures HS600 – Personal Protective Equipment and HS601 – Respiratory Protection Program will be applied to project activities.

6.1 ANTICIPATED PROTECTION LEVELS

The following protection levels have been established for the site work activities. Protection levels for the Radiation Survey are stipulated in the Radiation Control Plan in **Appendix L**.

Table 6-1
Anticipated Protection Levels

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
All site preparation and breakdown activities (no air monitoring levels are detected above the action levels noted in Section 8.1)	Level D	Modified Level D	Leather-work gloves. Tyvek® coverall as necessary to protect against biological hazards	None	Hard-hat, steel-toe work boots, safety glasses and hearing protection >85 dBA. Goggles/face shield when in contact with liquid contamination or flying debris.
Any BEE work activities in direct contact with the suspect contaminated materials (air monitoring readings are below the action levels)	Modified Level D	Level C	Tyvek® coverall, inner latex or nitrile sample gloves, outer nitrile sample gloves and latex boot covers	Initial: None Upgrade: Air Purifying full face respirator with combination	Hard-hat, steel-toe work boots, safety glasses and hearing protection >85 dBA. Goggles/face shield when there is a potential for splash hazards.

6.2 PROTECTION LEVELS DESCRIPTIONS

This section lists the minimum requirements for each protection level. Modification to these requirements may have been noted above.

6.2.1 Level D

Level D consists of the following:

- Safety glasses with side shields.
- Hard hat.
- Steel-toed work boots.

- Work clothing as prescribed by weather.
- Leather work gloves.
- Cut resistant gloves when handling sharp objects.
- Reflective vests for ground personnel working around heavy equipment or roadways.
- Hearing protection in areas >85 dBA.

6.2.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields.
- Hard hat.
- Steel-toed work boots.
- Tyvek® coverall (when handling dry materials).
- Poly-coated Tyvek® coverall or polyvinyl chloride (PVC) rain suit (when handling wet materials).
- Latex over-boots.
- Inner latex sample gloves.
- Outer nitrile gloves.
- Hearing protection in areas >85 dBA.
- Full-face shield when splash hazards are present.
- Metatarsal and shin guard for pressure sprayer operations.

6.2.3 Level C

Level C protection consists of the following:

- Full face air purifying respirator.
- Hooded Coverall (Tyvek® is typically used when handling dry materials).
- Hooded Poly-coated Tyvek® coverall or PVC rain suit (Typically used when handling wet materials).
- Hard hat.
- Steel-toed work boots.
- Inner sample gloves.
- Outer gloves.
- Chemical resistant boot covers.
- Hearing protection in areas >85 dBA.
- Metatarsal and shin guards are required for pressure washing operations.

- Cut resistant gloves when handling sharp objects or broken glass.

6.3 RESPIRATORY PROTECTION

6.3.1 Air Purifying Respirators

If air monitoring shows that Level C protection is needed, personnel will wear Survivair air purifying respirators with combination organic vapor and high efficiency particulate air cartridges.

6.3.2 Inspection and Cleaning

Respirators shall be checked periodically by a qualified individual and inspected before each use by the wearer. All respirators and associated equipment will be decontaminated and hygienically cleaned after each use.

6.3.3 Fit Testing

Annual respirator fit tests are required of all personnel wearing negative-pressure respirators. The fit test must be for the style and size of the respirator to be used. Quantitative fit-testing is required for use of respirators in chemical environments where the respirator effective use limit exceeds 10 (exposure of 1 part per million [ppm] inside the respirator for 10 ppm outside the respirator). Therefore, quantitative fit-testing is dependent on the permissible exposure limit/ threshold limit value (PEL/TLV) of the chemical substance involved. Quantitative fit-testing is required for potential exposure to airborne particulate levels that exceed 10 times the established PEL/TLV.

6.3.4 Facial Hair

No personnel who have facial hair which interferes with the respirator's sealing surface will be permitted to wear a respirator and will not be permitted to work in areas requiring respirator use.

6.3.5 Corrective Lenses

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided. Contact lenses are permitted to be used with full-face respirators based on a decision by OSHA.

6.3.6 Medical Certification

Only workers who have been certified by a physician, as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees will receive a written physicians opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7).

6.4 SITE- SPECIFIC PPE

The primary objective of the PPE program is to ensure employee protection and to prevent employee exposure to site contaminants during site operations. Engineering controls are not feasible for many tasks and, therefore, require the use of PPE.

The SS/SSO will be responsible for monitoring all aspects of the PPE program. This includes donning and doffing, temperature related stress monitoring, inspection, and decontamination. PPE selection is identified in **Table 6-1** for each specified task. The SS/SSO, in consultation with the HSM, will direct changes in PPE based on changing conditions. The site-specific SSHSP will serve as written certification that the workplace was evaluated concerning PPE requirements.

7.0 DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

7.1 PERSONNEL DECONTAMINATION

Decontamination procedures will ensure that PPE that may have been contaminated in the EZ does not result in personal exposure and does not contaminate clean areas of the site. This sequence describes the general decontamination procedure. The specific stages will vary depending on the site, the task, the protection level, etc.

7.1.1 Modified Level D Decontamination

1. Go to end of EZ.
2. Remove and discard latex booties.
3. Remove outer gloves and discard.
4. Remove protective suit.
5. Remove inner sample gloves and discard.
6. Wash face and hands.

7.1.2 Level C Decontamination

1. Go to end of EZ.
2. Step into the 1st decontamination pool.
3. Wash outer boots and outer gloves.
4. Step into 2nd decontamination pool.
5. Wash exterior of suit with copious amounts of water until all apparent contamination is removed.
6. Step into 3rd decontamination pool.
7. Decontamination assistant will inspect suit to determine if decontamination was effective and/or assist with final decontamination.
8. Step out of the 3rd pool.
9. a. Remove outer boots and stage to let dry.
   b. Remove and discard latex booties.
10. Remove outer gloves and discard.
11. Cross into CRZ.
12. Remove outer suit.
13. Move to respirator wash area, and wash egress mask and related hose line.

a. Soap and water solution.
b. First rinse.
c. Disinfect respirator (with solution of 1 cap full of bleach to 1 gallon of water).
d. Final rinse.

14. Hang respirator (upside down) and line to dry.
15. Remove inner sample gloves and discard.
16. Wash face, hands and neck.

7.1.3 Suspected Contamination

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination facility. Here, the worker will remove clothing, shower, don clean clothing, and immediately be taken to the first-aid station. Medical attention will be provided as necessary based on the degree of injury.

7.1.4 Personal Hygiene

Before eating, smoking, or drinking, personnel will wash hands, arms, neck and face.

7.2 EQUIPMENT DECONTAMINATION

All contaminated equipment will be decontaminated before leaving the site. Decontamination procedures will vary depending upon the contaminant involved, but may include sweeping, wiping, scraping, hosing, or steaming the exterior of the equipment. Personnel performing this task will wear the proper PPE as prescribed by the SS/SSO.

7.3 DISPOSAL

All decontamination liquids and disposable clothing will be treated as contaminated waste unless determined otherwise by accepted testing methods. Wastes will be disposed of according to state and federal regulations.

8.0 AIR MONITORING

Air monitoring will be conducted in order to characterize potential personnel exposures and fugitive emissions from site contaminants. The principal contaminants of concern are VOCs, primarily BTEX, MTBE, inorganics and chlorinated ethenes.

8.1 WORK AREA AIR MONITORING

Work area air monitoring at the FTMM site will be conducted by using direct reading methods. A photoionization detector/flame ionization detector (PID/FID) will be used to monitor work activities. Air monitoring results will be used to determine the proper PPE levels as specified in **Table 8-1**.

Table 8-1
Direct Reading Air Monitoring Requirements

Monitoring Device	Monitoring Location/ Personnel	Monitoring Frequency	Action Level	ACTION
PID/FID	All sampling and intrusive activities	Periodic (Minimum every 10 minutes) during sampling and intrusive activities	< 1 ppm	Level D+
			≥ 1 ppm < 5 ppm	Upgrade to Level C
			> 5 ppm	Cease work activity. Contact HSM

8.2 INSTRUMENTATION

A Photovac MicroFID flame ionization detector or equivalent, and a Photovac 2020 PID or equivalent, equipped with a 10.8-electron volt lamp, will be used to determine the concentration of VOCs in the breathing zone of personnel during intrusive investigative activities. This monitoring will be performed:

- A minimum of once per sampling event at each location (soil or water).
- At any time in any work location when personnel observe odors.

8.2.1 Real-Time Air Monitoring Action Levels

The following action levels are established for the collected air monitoring data:

- PID readings of 5 ppm above background concentrations sustained for 5 minutes in the breathing zone of personnel shall necessitate ceasing work activities and contacting the HSM for possible upgrade to Level C PPE. This may also trigger the implementation of time-integrated air sampling for volatile organic chemicals, such as benzene and vinyl chloride.
- FID readings of 5 ppm above background concentrations sustained for 5 minutes in the breathing zone of personnel shall necessitate ceasing work activities and contacting the

HSM for possible upgrade to Level C PPE.. This may also trigger the implementation of time-integrated air sampling for VOCs such as benzene and vinyl chloride.

Unexpected instrument readings at or above action levels generally warrant the following:

- All personnel will stop work in the area and assemble upwind.
- Additional monitoring shall be performed to substantiate previous readings, if it is safe to perform additional monitoring (contact the Shaw HSM/Certified Safety Professional [CSP] or CIH – see **Section 3.2** for contact information).

If previous readings are substantiated, controls (engineering/administrative) shall be implemented to maintain air quality within specified levels or personnel shall upgrade to the appropriate level of protection. All anomalous instrument readings shall be reported to the Shaw HSM to determine the appropriate course of action. Time-integrated sampling may be performed to verify upgrade decision or to downgrade level of protection, at the discretion of the Shaw HSM or CIH.

Instrument calibration shall be checked at the beginning and end of each shift . The HSC and/or SS/SSO will record and log such calibration information into an air monitoring notebook.

8.3 AIR MONITORING LOG

The SS/SSO will ensure that all air-monitoring data is logged into a project notebook. Data will include instrument used, wind direction, work process, etc. The HSM will periodically review this data.

8.4 CALIBRATION AND MAINTENANCE REQUIRMENTS

The PID/FID will be calibrated and maintained periodically as per the manufacturer's instructions. A separate log will be kept by the SS/SSO detailing date, time, span gas, or other standard, and name of person performing the calibration.

8.5 AIR MONITORING RESULTS

Air monitoring results will be available for personnel inspection and will be discussed during morning safety meetings.

9.0 EMERGENCY RESPONSE

9.1 PRE-EMERGENCY PLANNING

Prior to engaging in remediation activities at the site, Shaw will plan for possible emergency situations and have available adequate supplies and manpower to respond. In addition, site personnel will receive training during the site orientation concerning proper emergency response procedures.

The following situations would warrant implementation of the Emergency Response Contingency Plan (ERCP):

Fire/Explosion	• The potential for human injury exists. • Toxic fumes or vapors are released. • The fire could spread on-site or off-site and possibly ignite other flammable materials or cause heat-induced explosions. • The use of water and/or chemical fire suppressants could result in contaminated run-off.
Spill or Release of Hazardous Materials	• The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard. • The spill could cause the release of toxic liquids or fumes in sufficient quantities or in a manner that is hazardous to or could endanger human health.
Natural Disaster	• A rainstorm exceeds the flash flood level. • The facility is in a projected tornado path or a tornado has damaged facility property. • Severe wind gusts are forecasted or have occurred and have caused damage to the facility. • Hurricanes.
Medical Emergency	• Overexposure to hazardous materials. • Trauma injuries (broken bones, severe lacerations/bleeding, burns). • Eye/skin contact with hazardous materials. • Loss of consciousness. • Heat stress (heat stroke). • Heart attack. • Respiratory failure. • Allergic reaction.

Note – See **Appendix D** of this SSHSP for route maps and directions to medical facilities.

The following measures will be taken to assure the availability of adequate equipment and manpower resources:

- Sufficient equipment and materials will be kept on site and dedicated for emergencies only. The inventory will be replenished after each use.
- On-site emergency responders will be current in regards to training and medical surveillance programs. Copies of all applicable certificates will be kept on file for on-site personnel required to respond.

- It will be the responsibility of the SS to brief the on-site response team on anticipated hazards at the site. The Emergency Coordinator shall also be responsible for anticipating and requesting equipment that will be needed for response activities.
- Emergency response activities will be coordinated with the Local Emergency Management Agency (LEMA) in compliance with Superfund Amendments and Reauthorization Act Title III requirements.

Communications will be established prior to commencement of any activities at the work site. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. The primary communication device will be air horns.

9.2 EMERGENCY RECOGNITION AND PREVENTION

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the SS and the SSO, through daily site inspections and employee feedback (Safety Observation Program, daily safety meetings, and AHAs) to recognize and identify all hazards that are found at the site. These may include:

Chemical Hazards	• Materials at the site • Materials brought to the site
Physical Hazards	• Fire/explosion • Slips/trips/falls • Excessive noise
Mechanical Hazards	• Pinch points • Vehicle traffic
Environmental Hazards	• Electrical storms • High winds • Heavy rain/snow • Temperature extremes (heat stress) • Poisonous plants/animals

Once a hazard has been recognized, the SS/SSO will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Daily safety meeting.
- Task-specific training prior to commencement of activity.
- PPE selection/use.
- Following all Shaw standard operating procedures.

9.3 PERSONNEL ROLES, LINES OF AUTHORITY AND COMMUNICATIONS

This section of the ERCP describes the various roles, responsibilities, and communication procedures that will be followed by personnel involved in emergency responses.

The primary Emergency Coordinator for this site is the SS. In the event an emergency occurs and the Emergency Coordinator is not on site, the SS/SSO or the highest-ranking employee on site will serve as the Emergency Coordinator until he arrives. The Emergency Coordinator will determine the nature of the emergency and take appropriate action as defined by this ERCP.

The Emergency Coordinator will implement the ERCP immediately as required. The decision to implement the plan will depend upon whether the actual incident threatens human health or the environment. Immediately after being notified of an emergency incident, the Emergency Coordinator or his designee will evaluate the situation to determine the appropriate action.

9.3.1 Responsibilities and Duties

This section describes the responsibilities and duties assigned to the Emergency Coordinator.

It is recognized that the structure of the "Incident Command System" will change as additional response organizations are added. Shaw will follow procedures as directed by the Fire Department, state and federal agencies, as required. Shaw will defer to the local Fire Department Chief to assume the role of Incident Commander upon arriving on site. Additional on-site personnel may be added to the Site Emergency Response Team as required to respond effectively.

9.3.2 On-Site Emergency Coordinator Duties

The on-site Emergency Coordinator is responsible for implementing and directing the emergency procedures. All emergency personnel and their communications will be coordinated through the Emergency Coordinator. Specific duties are as follows:

- Identify the source, nature, and extent of the incident, as well as the type and quantity of any release. Assess possible hazards to human health or the environment that may result directly from the problem or its control.
- Discontinue operations in the vicinity of the incident if necessary to ensure that fires, explosions, or spills do not recur or spread to other parts of the site.
- Notify the Client Representative. The Client Representative will contact the local Emergency Response Teams if their help is necessary to control the incident. **Table 9-1** provides telephone numbers for emergency assistance.
- Direct on-site personnel to control the incident until outside help arrives.
- Ensure that the building or area where the incident occurred and the surrounding area are evacuated, and shut off possible ignition sources, if appropriate. The Emergency Response Team is responsible for directing site personnel such that they avoid the area of the incident and leave emergency control procedures unobstructed.
- If fire or explosion is involved, notify facility Fire Department.
- Notify Shaw PM.
- Notify Client Representative.
- Have protected personnel, in appropriate PPE, on standby for rescue.

Table 9-1
Emergency Telephone Numbers and Project Contacts

Fire Department: Monmouth County Fire Department	Emergency – 911
Emergency Medical Care: Riverview Medical Center 1 Riverview Plaza Red Bank, NJ 07701	Emergency – 911 (732) 741-2700
Police: Fort Monmouth Military Police	(732) 532-1112
Non Emergency Medical Care: Concerta Medical Center 135 Raritan Center Parkway Edison, NJ 08837	(732) 225-5454
New Jersey Poison Control	(800) 222-1222
National Response Center Environmental Emergencies	(800) 424-8802
Fort Monmouth Environmental Program Manager	Joe Fallon (732) 532-6223 (office) Redacted - Privacy Act (cellular)
Fort Monmouth Fire Department	(732) 532-3084
Shaw Contacts **PM:** **SS/SSHO:** **HSM:** **CIH:**	 Mark C. Magness (973) 770-5302 Redacted - Privacy Act (cell) Dan Duh (732) 346-2921 Redacted - Privacy Act (cell) Winston (Doug) Russell (865) 692-3584 Redacted - Privacy Act (cell) David Mummert (419) 425-6129 Redacted - Privacy Act (cell)
USACE – Baltimore District Contracting Officer Representative	 John Buck (410) 962-6735 (office)

If the incident may threaten human health or the environment outside of the site, the Emergency Coordinator should immediately determine whether evacuation of area outside of the site maybe necessary and, if so, notify the Client Representative. The Client Representative will contact the local Police Department and the Office of Emergency Management.

If hazardous waste has been released or produced through control of the incident, ensure that:

- Waste is collected and contained.
- Containers of waste are removed or isolated from the immediate site of the emergency.

- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided.
- Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.
- Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.

9.3.3 Safe Distances and Places of Refuge

The Emergency Coordinator for all activities will be the SS/SSO. No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies that could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous material releases (small spills of low toxicity), workers in the affected area will report initially to the CRZ. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the Emergency Coordinator or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The Emergency Coordinator, or his designee, will inform the proper agencies in the event that this is necessary. Telephone numbers are listed in **Table 9-1**.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release.
- Fire/explosion.
- Medical emergency.
- Hazardous weather.

In general, evacuation will be made to the main entrance to the Shaw site, unless the Emergency Coordinator determines otherwise. It is the responsibility of the Emergency Coordinator to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the Emergency Coordinator.

9.3.4 Evacuation Routes and Procedures

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations, the Emergency Coordinator may deviate from the procedures to provide a more effective plan for bringing the situation under control. The Emergency Coordinator is responsible for determining which situations require site evacuation.

9.3.5 Evacuation Signals and Routes

Cellular phone communication and an air horn will be used to notify employees of the necessity to evacuate an area or building involved in a release/spill of a hazardous material. The crew supervisor will have a cellular phone. Only the Emergency Coordinator will initiate total site evacuation. However, in his absence, the decision to preserve the health and safety of employees will take precedence.

9.3.6 Evacuation Procedures

In the event evacuation is necessary, the following actions will be taken:

- The emergency signal will be activated.
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.
- Shut off all machinery if safe to do so.
- ALL on-site personnel, visitors, and contractors in the SZ will assemble at the entrance to the site for a head count and await further instruction from the Emergency Coordinator.
- ALL persons in the EZ and CRZ will be accounted for by their immediate crew leaders (e.g., foreman). Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.
- During exit, the crew leader should try to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.
- Upon completion of the head count, the crew leader will provide the information to the Emergency Coordinator.
- Contract personnel and visitors will also be accounted for.
- The names of emergency response team members involved will be reported to the emergency spill control coordinator.
- The Emergency Coordinator, or designee, will make a final tally of persons. No attempt to find persons not accounted for will involve endangering lives of Shaw or other employees by re-entry into emergency areas.

In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the responsibility of the SS.

- Personnel will be assigned by the Emergency Coordinator to be available to direct and brief emergency responders.
- Re-entry into the site will be made only after the Emergency Coordinator gives clearance. At his direction, a signal or other notification will be given for re-entry into the facility.
- Drills will be held annually, at a minimum, to practice all of these procedures and will be treated with the same seriousness as an actual emergency.

9.4 EMERGENCY SPILL RESPONSE PROCEDURES AND EQUIPMENT

In the event of an emergency involving a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation. Emergency contacts found in **Table 9-1** provide a quick reference guide to follow in the event of a major spill.

9.4.1 Notification Procedures

If an employee discovers a chemical spill or process upset resulting in a vapor or material release, he or she will immediately notify the on-site Emergency Coordinator.

The on-site Emergency Coordinator will obtain information pertaining to the following:

- The material spilled or released.
- Location of the release or spillage of hazardous material.
- An estimate of quantity released and the rate at which it is being released.
- The direction in which the spill, vapor or smoke release is heading.
- Any injuries involved.
- Fire and/or explosion or possibility of these events.
- The area and materials involved and the intensity of the fire or explosion.

This information will help the on-site Emergency Coordinator to assess the magnitude and potential seriousness of the spill or release.

9.4.2 Procedure for Containing/Collecting Spills

The initial response to any spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment and disposal assessment will be the secondary response.

The on-site Emergency Coordinator will initiate and direct containment activities such as the following after assessing a spill or discharge:

- Construction of a temporary containment berm utilizing on-site clay absorbent earth.
- Digging a sump, installing a polyethylene liner.
- Diverting the spill material into the sump placing drums under the leak to collect the spilling material before it flows over the ground.
- Transferring the material from its original container to another container.

The Emergency Coordinator will notify the Client Representative of the spill and steps taken to institute clean up. Emergency response personnel will clean up all spills following the spill clean-up plan developed by the Emergency Coordinator. Supplies necessary to clean up a spill will be immediately available on-site. Such items may include, but are not limited to:

- Shovel, rake.
- Sorbent materials.
- Personal safety equipment.
- Steel drums.
- Miscellaneous hand tools.

As called for in regulations developed under the Comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), Shaw is to report a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or Toxic Substances Control Act. Shaw also follows the same practice for any substances not listed in the Acts noted above, but which can be classified as a hazardous waste under Resource Conservation Recovery Act.

Clean-up personnel will take the following measures:

1. Make sure all unnecessary persons are removed from the hazard area.
2. Put on protective clothing and equipment.
3. If a flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment for recovery of material.
4. Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.
5. If wastes reach a storm sewer, try to dam the outfall by using sand, earth, sandbags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.
6. Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.
7. Spray the spill area with foam, if available, to help prevent possible volatile emissions.
8. Apply appropriate spill control media (e.g., clay, sand, lime, etc.) to absorb discharged liquids.

9. For large spills, establish diking around leading edge of spill using booms, sand, clay or other appropriate material. If possible, use a diaphragm pump to transfer discharged liquid to drums or holding tank.

9.4.3 Emergency Response Equipment

The following equipment will be staged in the SZ and throughout the site, as needed, to provide for safety and first aid during emergency responses.

- ABC-type fire extinguisher.
- First-aid kit, industrial size.
- Eyewash.
- Emergency signal horn.

9.4.4 Emergency Spill Response Clean-Up Materials and Equipment

A sufficient supply of appropriate emergency response clean-up and PPE will be maintained on site, inventoried, and inspected visually on a weekly basis.

The materials listed below may be kept on site for spill control, depending on the types of hazardous materials present on site. The majority of this material will be located in the SZ. Small amounts will be placed on pallets and located in the active work areas.

- Appropriate solvents (e.g., CITRIKLEEN, for decontamination of structures or equipment).
- Sand or clay to solidify/absorb liquid spills.

9.5 MEDICAL EMERGENCY CONTINGENCY MEASURES

The procedures listed below will be used to respond to medical emergencies. The SS/SSO will contact the local hospital and inform them of the site hazards and potential emergency situations. A minimum of two first-aid/CPR trained personnel will be maintained on site.

9.5.1 Response

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the on-site Emergency Coordinator to alert him of a medical emergency situation. The supervisor will advise the following information:

- Location of the victim at the work site.
- Nature of the emergency.
- Whether the victim is conscious.
- Specific conditions contributing to the emergency, if known.

The Emergency Coordinator will notify the SSO. The following actions will then be taken depending on the severity of the incident:

Life-Threatening Incident. If an apparent life-threatening condition exists, the crew supervisor will inform the Emergency Coordinator by radio, and the local Emergency Medical Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim. Any injury within the EZ will be evacuated by Shaw personnel to a clean area for treatment by EMS personnel. No one will be able to enter the EZ without showing proof of training, medical surveillance and site orientation.

An accident/injury/illness report will be completely and properly filled out and submitted to the HSM, in accordance with Shaw reporting procedures.

A list of emergency telephone numbers is given in **Table 9-1**.

Non Life-Threatening Incident. All injuries, no matter how small, will be reported to the SS/SSO. If it is determined that no threat to life is present, the SS/SSO will direct the injured person through decontamination procedures appropriate to the nature of the illness or accident. Appropriate first-aid or medical attention will then be administered.

*NOTE: The area surrounding an accident site must not be disturbed until the scene has been cleared by the SS.

9.5.2 Notification

The following personnel/agencies will be notified in the event of a medical emergency:

- Local Fire Department or EMS.
- On-site Emergency Coordinator.
- Workers in the affected areas.
- Shaw PM.
- Shaw HSM
- Shaw business line manager
- Client Representative.

9.6 FIRE CONTINGENCY MEASURES

Shaw personnel and subcontractors are not trained professional firefighters. Therefore, if there is any doubt that a fire can be quickly contained and extinguished, personnel will notify the Emergency Coordinator by radio and vacate the structure or area. The Emergency Coordinator will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from where flammable materials are handled or stored.
- “No smoking” signs will be conspicuously posted in areas where flammable materials are present and throughout the EZ and CRZ.

- Fire extinguishers will be located in all Shaw site dedicated vehicles and placed in all areas where a fire hazard may exist.
- Before workers begin operations in an area, the foreman will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

The following procedures will be used in the event of a fire:

- Anyone who sees a fire will notify his or her supervisor who will then contact the Emergency Coordinator by radio. The Emergency Coordinator will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.
- When a worker has extinguished a small fire, the Emergency Coordinator will be notified.

9.7 HAZARDOUS WEATHER CONTINGENCY MEASURES

Operations will not be started or continued when the following hazardous weather conditions are present:

- Lightning.
- Heavy Rains.
- High Winds.

9.7.1 Response

- All equipment will be shut down and secured to prevent damage.
- Personnel will be moved to safe refuge. The Emergency Coordinator will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police, and other agencies.

9.7.2 Notification

The Emergency Coordinator will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include:

- Shaw employees and subcontractors.
- Shaw PM.
- Client Representative.

10.0 TRAINING REQUIRMENTS

All personnel entering the work areas will be trained in the provisions of this site safety plan and be required to sign the Site Safety Plan Acknowledgment in **Appendix H**.

Site-specific training for activities at the FTMM BEE sites will include training on potential site contaminants; Hazard Communication, as per 29 CFR 1926.59; site physical and environmental hazards; and emergency response and evacuation procedures. Emergency telephone numbers will be placed and made available on site by the SS/SSO before any site work activities begin.

Outlines of the orientation for Shaw personnel and subcontract personnel and visitors are presented below:

Shaw/SUBCONTRACTORS	**VISITOR ORIENTATION**
• SSHSP sign off • Sign in/out procedures • Site background • Chain of command • Rules and regulations • Hours of work • Absences • Equipment • Emergency Information • Emergency signal • Gathering point • Responsibilities/roles • Emergency phone numbers • Work Zones • Contaminants, MSDSs [Hazard Communication Program] • AHAs (Activity Hazard Analyses) • Forms, site-specific Incident Reporting	• SSHSP signoff • Review of Site map • Work Zones in progress • Hazard Communication • Emergency plan/signals • Training/medical requirements • Zones/areas open to visitors

11.0 MEDICAL SURVEILLANCE PROGRAM

All Shaw personnel participate in a medical and health monitoring program. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. A listing of Shaw's worker medical profile is shown below. This program was developed in conjunction with a consultant toxicologist and Shaw's occupational health physician. Other medical consultants are retained when additional expertise is required.

All field personnel performing activities in a designated EZ or CRZ shall within the past 12 months, or as otherwise determined by Shaw's Medical Director, have completed a comprehensive medical examination. The medical examination includes the following elements:

- Medical and occupational history questionnaire.
- Physical examination.
- Complete blood count, with differential.
- Liver enzyme profile.
- Chest x-ray, once every 3 years, for non-asbestos workers.
- Pulmonary function test.
- Audiogram.
- Electrocardiogram for persons older than 35 years of age, or if indicated during the physical examination.
- Visual acuity.
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

The medical surveillance program meets the requirements of the OSHA Standard 29 CFR 1910.120/1926.65(f).

The following information is provided in the event that medical attention is necessary.

The Shaw Medical Director is:

Dr. Jerry H. Berke
MD, MPH
Health Resources
600 West Cumming Park
Suite 3400
Woburn, Mass 01801-6350
781-935-8581 (direct dial)
800-350-4511 (toll free)

The Health Resource clinic to be used for all non-life threatening injuries is:

Concerta Medical Center
135 Raritan Center Parkway
Edison, NJ 08837
(732) 225-5454

The Shaw Medical Director and the HSM will be immediately notified of any suspected exposures to hazardous materials/wastes.

APPENDIX A
MATERIAL SAFETY DATA SHEETS

1. Alconox
2. Diesel
3. Gasoline
4. Engine Oil
5. Liquinox
6. Methane
7. Hydrochloric Acid
8. Hydrogen Gas
9. Isobutylene
10. Nitric Acid

ALCONOX
ALCONOX Revised: 02/25/2005

MSDS Contents

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TRADE:ALCONOX

VENDOR CODE:36.1
3M ID:28-9025-3219-2
GROUP_NUM:22-3540-6

VENDOR CODE:36.1
3M ID:26-1016-0697-3
GROUP_NUM:18-3119-7

START_MSDS

MSDS_ALCONOX_ENGLISH_ANSI

ALCONOX

MSDS

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

CHEMICAL FAMILY: DETERGENT.

PRODUCT NAME: ALCONOX

MANUFACTURER:
ALCONOX, INC.
30 GLENN ST.
SUITE 309
WHITE PLAINS, NY 10603.

MANUFACTURER EMERGENCY: 800-255-3924.

PHONE NUMBER: 813-248-0585 (OUTSIDE OF THE UNITED STATES).

SUPPLIER: SAME AS MANUFACTURER.

SECTION 2: INGREDIENT INFORMATION

C.A.S.	CONCENTRATION %	INGREDIENT NAME
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE
497-19-8	7-13	SODIUM CARBONATE
7722-88-5	10-30	TETRASODIUM PYROPHOSPHATE
7758-29-4	10-30	SODIUM PHOSPHATE

INGREDIENT NAME	T.L.V.	LD/50	LC/50
SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE
SODIUM CARBONATE	NOT AVAILABLE	4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL	2300 MG/M3/2H RAT INHALATION: 1200 MG/M3/2H MOUSE INHALATION
TETRASODIUM PYROPHOSPHATE	5 MG/M3	4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL	NOT AVAILABLE
SODIUM PHOSPHATE	NOT AVAILABLE	3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL >4640 MG/KG RABBIT DERMAL	NOT AVAILABLE

SECTION 2A: ADDITIONAL INGREDIENT INFORMATION

NOTE: (SUPPLIER).

CAS# 497-19-8:
LD50: 4020 MG/KG - RAT ORAL.

CAS# 7758-29-4:
LD50: 3100 MG/KG - RAT ORAL.

SECTION 3: HAZARD IDENTIFICATION

ROUTE OF ENTRY: SKIN CONTACT, EYE CONTACT, INHALATION AND INGESTION.

EFFECTS OF ACUTE EXPOSURE:

EYE CONTACT: MAY CAUSE IRRITATION.

SKIN CONTACT: PROLONGED CONTACT MAY CAUSE IRRITATION.

INHALATION: AIRBORNE PARTICLES MAY CAUSE IRRITATION.

INGESTION:
MAY CAUSE VOMITING AND DIARRHEA.
MAY CAUSE ABDOMINAL PAIN.
MAY CAUSE GASTRIC DISTRESS.

EFFECTS OF CHRONIC EXPOSURE: CONTAINS AN INGREDIENT WHICH MAY BE CORROSIVE.

SECTION 4: FIRST AID MEASURES

SKIN CONTACT:
REMOVE CONTAMINATED CLOTHING.
WASH THOROUGHLY WITH SOAP AND WATER.
SEEK MEDICAL ATTENTION IF IRRITATION PERSISTS.

EYE CONTACT:
CHECK FOR AND REMOVE CONTACT LENSES.
FLUSH EYES WITH CLEAR, RUNNING WATER FOR 15 MINUTES WHILE HOLDING

EYELIDS OPEN: IF IRRITATION PERSISTS, CONSULT A PHYSICIAN.

INHALATION:
REMOVE VICTIM TO FRESH AIR.
SEEK MEDICAL ATTENTION IF SYMPTOMS PERSIST.

INGESTION:
DILUTE WITH TWO GLASSES OF WATER.
NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.
DO NOT INDUCE VOMITING, SEEK IMMEDIATE MEDICAL ATTENTION.

ADDITIONAL INFORMATION:
THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. THIS COMPANY SHALL NOT BE HELD LIABLE FOR ANY INACCURACIES.

SECTION 5: FIRE FIGHTING MEASURES

FLAMMABILITY: NOT FLAMMABLE.

CONDITIONS OF FLAMMABILITY: SURROUNDING FIRE.

EXTINGUISHING MEDIA:
CARBON DIOXIDE, DRY CHEMICAL, FOAM. WATER. WATER FOG.

SPECIAL PROCEDURES:
SELF-CONTAINED BREATHING APPARATUS REQUIRED.
FIREFIGHTERS SHOULD WEAR THE USUAL PROTECTIVE GEAR.

AUTO-IGNITION TEMPERATURE: NOT AVAILABLE.

FLASH POINT (DEG. C), METHOD: NONE

LOWER FLAMMABILITY LIMIT (% VOL): NOT APPLICABLE.
UPPER FLAMMABILITY LIMIT (% VOL): NOT APPLICABLE.

EXPLOSION DATA:
SENSITIVITY TO STATIC DISCHARGE: NOT AVAILABLE.
SENSITIVITY TO MECHANICAL IMPACT: NOT APPLICABLE.

HAZARDOUS COMBUSTION PRODUCTS:
OXIDES OF CARBON (COx).
HYDROCARBONS.

RATE OF BURNING: NOT AVAILABLE.

EXPLOSIVE POWER: NONE

SECTION 6: ACCIDENTAL RELEASE MEASURES

LEAK/SPILL:
CONTAIN THE SPILL.

RECOVER UNCONTAMINATED MATERIAL FOR RE-USE.

WEAR APPROPRIATE PROTECTIVE EQUIPMENT.

CONTAMINATED MATERIAL SHOULD BE SWEPT OR SHOVELED INTO APPROPRIATE WASTE CONTAINER FOR DISPOSAL.

SECTION 7: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT:
PROTECT AGAINST PHYSICAL DAMAGE.
AVOID BREATHING DUST.
WASH THOROUGHLY AFTER HANDLING.
KEEP OUT OF REACH OF CHILDREN.
AVOID CONTACT WITH SKIN, EYES AND CLOTHING.
LAUNDER CONTAMINATED CLOTHING PRIOR TO REUSE.

STORAGE REQUIREMENTS:
KEEP CONTAINERS CLOSED WHEN NOT IN USE.
STORE AWAY FROM STRONG ACIDS OR OXIDIZERS.
STORE IN A COOL, DRY AND WELL VENTILATED AREA.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

PRECAUTIONARY MEASURES:

GLOVES/TYPE: NEOPRENE OR RUBBER GLOVES.

RESPIRATORY/TYPE:
IF EXPOSURE LIMIT IS EXCEEDED, WEAR A NIOSH APPROVED RESPIRATOR.

EYE/TYPE: SAFETY GLASSES WITH SIDE-SHIELDS.

FOOTWEAR/TYPE: SAFETY SHOES PER LOCAL REGULATIONS.

CLOTHING/TYPE: AS REQUIRED TO PREVENT SKIN CONTACT.

OTHER/TYPE:
EYE WASH FACILITY SHOULD BE IN CLOSE PROXIMITY.
EMERGENCY SHOWER SHOULD BE IN CLOSE PROXIMITY.

VENTILATION REQUIREMENTS: LOCAL EXHAUST AT POINTS OF EMISSION.

EXPOSURE LIMIT OF MATERIAL:
NOT AVAILABLE FOR MIXTURE, SEE THE INGREDIENTS SECTION.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: SOLID

APPEARANCE & ODOR:
ALMOST ODORLESS.
WHITE GRANULAR POWDER.

ODOR THRESHOLD (PPM): NOT AVAILABLE.

VAPOR PRESSURE (MMHg): NOT APPLICABLE.

VAPOR DENSITY (AIR=1): NOT APPLICABLE.

BY WEIGHT: NOT AVAILABLE.

EVAPORATION RATE (BUTYL ACETATE = 1): NOT APPLICABLE.

BOILING POINT (DEG. C): NOT APPLICABLE.

FREEZING POINT (DEG. C): NOT APPLICABLE.

Ph:
(1% AQUEOUS SOLUTION).
9.5

SPECIFIC GRAVITY @ 20 DEG. C (WATER = 1).: 0.85 - 1.10

SOLUBILITY IN WATER (%): 100 - >10% W/W

COEFFICIENT OF WATER\OIL DIST.: NOT AVAILABLE.

VOC: NONE

CHEMICAL FAMILY: DETERGENT.

SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY: STABLE UNDER NORMAL CONDITIONS.

CONDITIONS OF INSTABILITY: NONE KNOWN.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

INCOMPATIBLE SUBSTANCES:
STRONG ACIDS.
STRONG OXIDIZERS.

HAZARDOUS DECOMPOSITION PRODUCTS: SEE HAZARDOUS COMBUSTION PRODUCTS.

SECTION 11: TOXICOLOGICAL INFORMATION

LD50 OF PRODUCT, SPECIES & ROUTE: >5000 MG/KG RAT ORAL.

LC50 OF PRODUCT, SPECIES & ROUTE:
NOT AVAILABLE FOR MIXTURE, SEE THE INGREDIENTS SECTION.

SENSITIZATION TO PRODUCT: NOT AVAILABLE.

CARCINOGENIC EFFECTS: NOT LISTED AS A CARCINOGEN.

REPRODUCTIVE EFFECTS: NOT AVAILABLE.

TERATOGENICITY: NOT AVAILABLE.

MUTAGENICITY: NOT AVAILABLE.

SYNERGISTIC MATERIALS: NOT AVAILABLE.

SECTION 12: ECOLOGICAL INFORMATION

ENVIRONMENTAL TOXICITY: NO DATA AT THIS TIME.

ENVIRONMENTAL FATE: NO DATA AT THIS TIME.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL:
IN ACCORDANCE WITH MUNICIPAL, PROVINCIAL AND FEDERAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

D.O.T. CLASSIFICATION: NOT REGULATED.

SPECIAL SHIPPING INFORMATION: NOT REGULATED.

SECTION 15: REGULATORY INFORMATION

CANADIAN REGULATORY INFORMATION:

WHMIS CLASSIFICATION: D2B
D2 - MATERIALS CAUSING OTHER TOXIC EFFECTS

DSL STATUS:
THE SUPPLIER HAS CERTIFIED THAT ALL SUBSTANCES IN THIS PRODUCT APPEAR ON THE DOMESTIC SUBSTANCES LIST.

USA REGULATORY INFORMATION:

SARA HAZARD CATEGORIES SECTIONS 311/312:
IMMEDIATE (ACUTE) HEALTH HAZARD: YES.
DELAYED (CHRONIC) HEALTH HAZARD: NO.
FIRE HAZARD: NO.
SUDDEN RELEASE OF PRESSURE: NO.
REACTIVE: NO.

SARA SECTION 313: NONE

TSCA INVENTORY:
ALL COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY.

NFPA:

HEALTH HAZARD	1
FLAMMABILITY	0
PHYSICAL HAZARD	0

HMIS:

HEALTH HAZARD	1
FLAMMABILITY	0
PHYSICAL HAZARD	0
PPE	B

SECTION 16: OTHER INFORMATION

SUPPLIER MSDS DATE: 2005/02/25

DATA PREPARED BY:
GLOBAL SAFETY MANAGEMENT
3340 PEACHTREE ROAD, #1800
ATLANTA, GA 30326

PHONE: 877-683-7460

FAX: (877) 683-7462

WEB: WWW.GLOBALSAFETYNET.COM

EMAIL: INFO@GLOBALSAFETYNET.COM.

GENERAL NOTE:
THIS MATERIAL SAFETY DATA SHEET WAS PREPARED FROM INFORMATION OBTAINED FROM VARIOUS SOURCES, INCLUDING PRODUCT SUPPLIERS AND THE CANADIAN CENTER FOR OCCUPATIONAL HEALTH AND SAFETY.

MS 01.10.01.01.06.1

AGWAY
DIESEL FUEL **Revised: 10/09/2002**

MSDS Contents

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II. SUMMARY OF HAZARDS
III. EMERGENCY FIRST AID PROCEDURES
IV. FIRE AND EXPLOSION
V. HEALTH HAZARDS
VI. PHYSICAL AND CHEMICAL DATA
VII. PROTECTION AND PRECAUTIONS
VIII. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION
IX. ENVIRONMENTAL INFORMATION

AGWAY ENERGY PRODUCTS(R*)

MATERIAL SAFETY DATA SHEET

AGWAY ENERGY PRODUCTS,
PO BOX 4852,
SYRACUSE, NY 13221

DATE ISSUED: 10/09/02

I. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME: DIESEL FUEL

CAS NUMBER: 68476-34-6

OTHER NAMES: #2 FUEL OIL, LOW SULFUR DIESEL, PREMIUM GOLD DIESEL

FORMULA: #2 FUEL OIL (PETROLEUM DISTILLATE) - 100%

PRODUCT APPEARANCE AND ODOR:
AMBER COLORED LIQUID WITH PETROLEUM ODOR. MAY BE DYED RED FOR IDENTIFICATION OF TAX STATUS.

CLASSIFICATION:
FLAMMABLE OR COMBUSTIBLE LIQUID: NA 1993
DOT HAZARD CLASS: 3
PACKING GROUP: III

DISTRIBUTOR:
AGWAY ENERGY PRODUCTS
PO BOX 4852
SYRACUSE, NY 13221

PRODUCT INFORMATION: 315-449-7427

EMERGENCY PHONE NUMBER:
CHEMTREC: 800-424-9300

II. SUMMARY OF HAZARDS

COMPONENTS CAS NUMBER CONCENTRATION

#2 FUEL OIL 68476-34-6 100%

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS):
HEALTH 1
FLAMMABILITY 2
REACTIVITY 0

0 - MINIMAL
1 - SLIGHT
2 - MODERATE
3 - SERIOUS
4 - SEVERE

OCCUPATIONAL EXPOSURE LIMIT: TWA 400 PPM 8 HOURS

III. EMERGENCY FIRST AID PROCEDURES

INHALATION:
REMOVE FROM FURTHER EXPOSURE. IF RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, OR UNCONSCIOUSNESS OCCURS, SEEK IMMEDIATE MEDICAL ASSISTANCE AND CALL A PHYSICIAN. IF BREATHING HAS STOPPED, USE MOUTH TO MOUTH RESUSCITATION.

EYE CONTACT:
FLUSH THOROUGHLY WITH WATER. IF IRRITATION OCCURS, CALL A PHYSICIAN.

SKIN CONTACT:
DRY-WIPE THE SKIN. CLEANSE THE AREA WITH WATERLESS HAND CLEANER, AND FOLLOW BY WASHING THOROUGHLY WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. LAUNDER CLOTHING BEFORE REUSE. DISCARD SHOES IF MATERIAL HAS PENETRATED TO INSIDE SURFACE.

INGESTION:
DO NOT INDUCE VOMITING. GIVE 1 TO 2 GLASSES OF WATER. GET MEDICAL ATTENTION.

NOTE TO PHYSICIAN:
MATERIAL IF ASPIRATED INTO THE LUNGS MAY CAUSE CHEMICAL PNEUMONITIS. TREAT APPROPRIATELY.

IV. FIRE AND EXPLOSION

FLASH POINT: 125 DEG. F

AUTOIGNITION TEMPERATURE: 500 DEG. F

FLAMMABLE LIMITS (% AT NORMAL ATMOS. TEMP. AND PRESSURE):
LOWER: 0.6
UPPER: 7.4

EXTINGUISHING MEDIA: WATER FOG, DRY CHEMICAL, CO2 OR CHEMICAL FOAM

FIRE AND EXPLOSION HAZARDS:
FLOWING OIL CAN BE IGNITED BY SELF-GENERATED STATIC ELECTRICITY; CHECK FOR COMBUSTIBLE VAPORS PRIOR TO AND DURING WELDING AND TORCH CUTTING ON TANKS AND VESSELS.

SPECIAL FIREFIGHTING PROCEDURES:
USE A WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS. USE A SMOTHERING TECHNIQUE FOR EXTINGUISHING FIRE OF THIS COMBUSTIBLE LIQUID. DO NOT USE A FORCED WATER STREAM DIRECTLY ON OIL FIRES AS THIS WILL SCATTER THE FIRE. FIREFIGHTERS SHOULD WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.

V. HEALTH HAZARDS

	PRIMARY ROUTE
INHALATION: VAPORS OR MIST MAY CAUSE IRRITATION OF THE NOSE AND THROAT, HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, EUPHORIA, LOSS OF COORDINATION, AND DISORIENTATION. IN POORLY VENTILATED AREAS OR CONFINED SPACES, UNCONSCIOUSNESS AND ASPHYXIATION MAY RESULT.	YES
EYE CONTACT: MAY CAUSE IRRITATION, EXPERIENCED AS MILD DISCOMFORT AND SEEN AS SLIGHT EXCESS REDNESS OF THE EYE.	YES
SKIN IRRITATION: PROLONGED OR WIDESPREAD SKIN CONTACT MAY RESULT IN THE ABSORPTION OF POTENTIALLY HARMFUL AMOUNTS OF MATERIAL.	YES
INGESTION: IF MORE THAN SEVERAL MOUTHFULS ARE SWALLOWED, ABDOMINAL DISCOMFORT, NAUSEA, AND DIARRHEA MAY OCCUR. ASPIRATION MAY OCCUR DURING SWALLOWING OR VOMITING RESULTING IN LUNG DAMAGE.	N/A

CHRONIC:
NIOSH HAS RECOMMENDED THAT WHOLE DIESEL EXHAUST BE REGARDED AS A POTENTIAL OCCUPATIONAL CARCINOGEN BASED ON FINDINGS OF CARCINOGENIC RESPONSES IN LABORATORY ANIMALS EXPOSED TO WHOLE DIESEL EXHAUST. THE EXCESS CANCER RISK FOR WORKERS EXPOSED TO DIESEL EXHAUST HAS NOT BEEN CALCULATED; THE PROBABILITY OF DEVELOPING CANCER SHOULD BE DECREASED BY MINIMIZING EXPOSURE TO THE LOWEST FEASIBLE LIMITS.

REPEATED SKIN CONTACT MAY CAUSE A PERSISTENT IRRITATION OR DERMATITIS.

OTHER REMARKS:
THIS PRODUCT MAY CONTAIN BENZENE. PROLONGED AND REPEATED EXPOSURE TO BENZENE HAS BEEN ASSOCIATED WITH ANEMIA AND LEUKEMIA IN HUMANS.

VI. PHYSICAL AND CHEMICAL DATA

THE FOLLOWING DATA ARE APPROXIMATE OR TYPICAL VALUES AND SHOULD NOT BE USED FOR PRECISE DESIGN PURPOSES.

BOILING RANGE: 340-700 DEG. F

SPECIFIC GRAVITY: 0.85

VAPOR PRESSURE (MM HG @ 20 DEG. C): <0.5

VAPOR DENSITY: >4

SOLUBILITY IN WATER: INSOLUBLE

pH: N/A

VOLATILE CHARACTERISTICS: N/A

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: NOT EXPECTED TO OCCUR

APPEARANCE AND ODOR:
AMBER COLORED LIQUID. MAY BE DYED RED FOR IDENTIFICATION OF TAX STATUS.

CONDITIONS TO AVOID:
STRONG OXIDIZING AGENTS, HEAT, SPARK, FLAME AND BUILD-UP OF STATIC ELECTRICITY.

HAZARDOUS DECOMPOSITION PRODUCTS: CO, CO2, SO2, REACTIVE HYDROCARBONS

VII. PROTECTION AND PRECAUTIONS

HANDLING:

EYE PROTECTION:
REMOVE CONTACT LENSES AND WEAR CHEMICAL SAFETY GLASSES, GOGGLES OR FACESHIELD WHERE CONTACT WITH LIQUID OR MIST MAY OCCUR.

SKIN PROTECTION:
WEAR IMPERVIOUS GLOVES, CLOTHING AND BOOTS WHEN CONTACT WITH SKIN MAY OCCUR. WASH WITH SOAP AND WATER BEFORE EATING, DRINKING AND SMOKING. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

INHALATION:
USE APPROVED RESPIRATORY PROTECTIVE EQUIPMENT FOR CLEANING LARGE SPILLS OR ENTRY INTO LARGE TANKS, VESSELS AND OTHER CONFINED SPACES, OR IN ANY SITUATION WHERE AIRBORNE CONCENTRATIONS MAY EXCEED OCCUPATIONAL EXPOSURE LIMITS.

VENTILATION:
PROVIDE ADEQUATE GENERAL AND LOCAL EXHAUST VENTILATION:
(1) TO MEET OCCUPATIONAL EXPOSURE LIMITS
(2) TO PREVENT THE FORMATION OF EXPLOSIVE ATMOSPHERES AND
(3) TO PREVENT OXYGEN DEFICIENT ATMOSPHERES, ESPECIALLY IN CONFINED SPACES.

SPECIAL PRECAUTIONS AND COMMENTS:

STORAGE REQUIREMENTS:
STORE IN TIGHTLY CLOSED CONTAINERS IN A DRY, COOL PLACE, AWAY FROM SOURCES OF HEAT OR IGNITION AND INCOMPATIBLE SUBSTANCES. GROUND AND BOND ALL TRANSFER AND STORAGE EQUIPMENT TO PREVENT STATIC SPARKS AND EQUIP WITH SELF CLOSING VALVES, PRESSURE VACUUM BUNGS AND FLAME ARRESTERS. EMPTY CONTAINERS MAY CONTAIN RESIDUE (LIQUID AND/OR VAPOR) AND CAN BE DANGEROUS. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

VIII. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION

TRANSPORTATION INCIDENT INFORMATION:
FOR FURTHER INFORMATION RELATIVE TO SPILLS RESULTING FROM TRANSPORTATION INCIDENTS, REFER TO LATEST DEPARTMENT OF TRANSPORTATION EMERGENCY RESPONSE GUIDEBOOK FOR HAZARDOUS MATERIALS INCIDENTS, DOT P 5800.3.

DOT IDENTIFICATION NUMBER:
#2 DIESEL FUEL (A/K/A FUEL OIL) FLAMMABLE OR COMBUSTIBLE LIQUID/NA 1993/HAZARD CLASS 3

OSHA REQUIRED LABEL INFORMATION:
THE FOLLOWING HAZARD WARNING SHOULD BE FOUND ON A LABEL, BILL OF LADING OR INVOICE ACCOMPANYING THIS SHIPMENT:
DANGER!
HARMFUL IF INHALED
MAY BE HARMFUL IF ABSORBED THROUGH SKIN
MAY CAUSE DIZZINESS AND DROWSINESS
ASPIRATION HAZARD IF SWALLOWED-CAN ENTER LUNGS AND CAUSE DAMAGE
COMBUSTIBLE LIQUID AND VAPOR
USE ONLY AS FUEL

ATTENTION!
POSSIBLE CANCER HAZARD
CONTAINS MIDDLE DISTILLATES WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA

IX. ENVIRONMENTAL INFORMATION

EPA INFORMATION FOR HAZARDOUS CHEMICAL REPORTING:

EPA HAZARD CLASSIFICATION CODE:
ACUTE HAZARD (XXX)
CHRONIC HAZARD (XXX)
FIRE HAZARD (XXX)
PRESSURE HAZARD ( )
REACTIVE HAZARD ( )

REPORTABLE QUANTITY (RQ), EPA REGULATION 40 CFR 302 (CERCLA SECTION 102):
NONE

THRESHOLD PLANNING QUANTITY (TPQ), EPA REGULATION 40 CFR 355 (SARA SECTIONS 301-304): NONE

TOXIC CHEMICAL RELEASE REPORTING, EPA REGULATION 40 CFR 372 (SARA SECTION 313): NONE

PRECAUTIONS IF MATERIAL IS SPILLED OR RELEASED:
REMOVE SOURCES OF HEAT OR IGNITION INCLUDING INTERNAL COMBUSTION ENGINES AND POWER TOOLS. REMOVE SPILL WITH VACCUM TRUCKS OR PUMP AND SOAK UP RESIDUE WITH AN INERT ABSORBENT. DO NOT FLUSH TO SEWER OR SURFACE WATER. VENTILATE AREA AND AVOID BREATHING VAPORS OR MISTS.

WASTE DISPOSAL METHODS:
PRODUCT IS SUITABLE FOR BURNING FOR FUEL VALUE IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.

RCRA INFORMATION:
DISPOSAL OF UNUSED PRODUCT MAY BE SUBJECT TO RCRA REGULATIONS (40 CFR 261) DUE TO THE CHARACTERISTIC(S)/CHEMICAL(S) LISTED BELOW. DISPOSAL OF THE USED PRODUCT MAY ALSO BE REGULATED DUE TO IGNITABILITY OR TOXICITY AS DETERMINED BY THE TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP).

FLASH: 125 DEG. F

A EMPTY@ CONTAINER WARNING:
DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY OR OTHER SOURCES OF IGNITION.

THE INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE A COMPLLATION OF DATA PROVIDED BY VARIOUS SUPPLIERS AND, TO THE BEST OF AGWAY ENERGY PRODUCTS (AEP) KNOWLEDGE AND BELIEF, ACCURATE AND RELIABLE AS OF THE DATE ISSUED. AEP DOES NOT WARRANT OR GUARANTEE THEIR ACCURACY OR RELIABILITY, AND AEP SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE ARISING OUT OF THE USE THEREOF. THE INFORMATION AND RECOMMENDATIONS ARE OFFERED FOR THE USER=S CONSIDERATION AND EXAMINATION, AND IT IS THE USER=S RESPONSIBILITY TO SATISFY ITSELF THAT THEY ARE SUITABLE AND COMPLETE FOR ITS PARTICULAR USE. IF BUYER REPACKAGES THIS PRODUCT, LEGAL COUNSEL SHOULD BE CONSULTED TO INSURE PROPER HEALTH, SAFETY, AND OTHER NECESSARY INFORMATION IS INCLUDED ON THE CONTAINER.

THE ENVIRONMENTAL INFORMATION INCLUDED UNDER SECTION IX HEREOF AS WELL AS THE HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS) AND NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS HAVE BEEN INCLUDED BY AEP IN ORDER TO PROVIDE ADDITIONAL HELP AND HAZARD CLASSIFICATION INFORMATION. THE RATINGS RECOMMENDED ARE BASED UPON THE CRITERIA SUPPLIED BY THE DEVELOPERS OF THESE RATING SYSTEMS, TOGETHER WITH AEP=S INTERPRETATION OF THE AVAILABLE DATA.

DIESEL

AMOCO
UNLEADED GASOLINES **Revised: 07/18/1983**

MSDS Contents

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AMOCO

INDUSTRIAL HYGIENE AND TOXICOLOGY DATA SHEET

INDUSTRIAL HYGIENE AND TOXICOLOGY DIVISION

ENVIRONMENTAL CONSERVATION AND TOXICOLOGY DEPARTMENT

UNLEADED GASOLINES

AMOCO
AMOCO PREMIUM LEAD-FREE GASOLINE
AMOCO SUPER LEAD-FREE GASOLINE
INDOLENE MOTOR FUEL
INDOLENE H.O. MOTOR FUEL III
AMOCO 940 GASOLINE

FORM U-1967-A (8-78)

SECTION I

TRADE NAME AND SYNONYMS
SEE TRADE NAMES LISTED ABOVE

MANUFACTURER'S NAME: AMOCO OIL COMPANY

ADDRESS
200 EAST RANDOLPH DRIVE, CHICAGO, ILLINOIS 60601

PRODUCT IDENTIFICATION
GASOLINE

CAS NUMBER 8006-61-9

FORMULA: - - -

EPA NUMBER: - - -

EMERGENCY PHONE NUMBER: (312) 856-5371

WARNING STATEMENT
DANGER! EXTREMELY FLAMMABLE
USE AS A MOTOR FUEL ONLY.
VAPOR HARMFUL.
HARMFUL IF SWALLOWED AND/OR ASPIRATED INTO LUNGS.
CAN PRODUCE SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT.

DOT CLASSIFICATION: FLAMMABLE LIQUID

SECTION II - IMPORTANT COMPONENTS

GASOLINE

PERMISSIBLE EXPOSURE CONCENTRATION
ACGIH TWA TLV 300 PPM (900 MG/M3)

SECTION III - HEALTH EFFECTS OF EXPOSURE

EYE
PRIMARY EYE IRRITATION SCORE OF 0.0/110.0 (RABBITS). ACUTE EXPOSURE TO HUMANS IS EXPECTED TO PRODUCE MINIMAL IRRITATION.

SKIN
SLIGHTLY IRRITATING FOR ACUTE EXPOSURES.
PRIMARY DERMAL IRRITATION SCORE 1.1/8.0 (RABBITS).
PROLONGED OR REPEATED CONTACT IS LIKELY TO CAUSE SKIN IRRITATION THROUGH DEFATTING.
ACUTE DERMAL LD50 GREATER THAN 5 ML/KG (RABBITS); PRACTICALLY NON-TOXIC FOR ACUTE EXPOSURES BY THIS ROUTE.

INHALATION:
ACUTE LC50 20.7 MG/L (RATS). MODERATELY TOXIC FOR ACUTE EXPOSURES BY THIS ROUTE. EXCESSIVE EXPOSURE TO VAPORS WILL PRODUCE SYMPTOMS OF INTOXICATION.

SEE SECTION XI FOR ADDITIONAL INFORMATION.

INGESTION
LOW VISCOSITY PRODUCT - HARMFUL OR FATAL IF SWALLOWED AND/OR ASPIRATED INTO LUNGS. ACUTE ORAL LD50 18.8 ML/KG (RATS). PRACTICALLY NON-TOXIC FOR ACUTE EXPOSURES BY THIS ROUTE.

SECTION IV - EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
FLUSH WITH PLENTY OF WATER.

SKIN CONTACT
WASH EXPOSED SKIN WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING, INCLUDING SHOES, AND THOROUGHLY CLEAN AND DRY BEFORE REUSE.

INHALATION

IF ADVERSE EFFECTS OCCUR, REMOVE TO UNCONTAMINATED AREA. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

INGESTION
DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL ATTENTION.

SECTION V - PERSONAL PROTECTION INFORMATION

EYE
NOT REQUIRED.

SKIN
IF CONTACT IS LIKELY, WEAR PROTECTIVE CLOTHING AND GLOVES.

RESPIRATORY
AVOID BREATHING VAPORS.

VENTILATION (TYPE REQUIRED) GENERAL AREA.

SECTION VI - FIRE PROTECTION INFORMATION

FLASH POINT (METHOD): -45 DEG. F

AUTO IGNITION TEMPERATURE: 495 DEG. F

FLAMMABLE LIMITS (BY VOLUME IN AIR): UPPER: 7.6% LOWER: 1.3%

EXTINGUISHING MEDIA: DRY CHEMICAL (B-C), CARBON DIOXIDE, WATER FOG, FOAM (WATER MAY BE INEFFECTIVE).

UNUSUAL FIRE AND EXPLOSION HAZARDS:
EXTREMELY FLAMMABLE VAPOR/AIR MIXTURES FORM AND MAY FLASH BACK TO SOURCE OF IGNITION.

SECTION VII - PHYSICAL PROPERTIES AND REACTIVITY DATA

BOILING POINT (DEG. F): RANGE APPROX. 80-430

VAPOR PRESSURE: 9-15 LB. RVP (ASTM D-323.)

MELTING POINT (DEG. F): - - -

VAPOR DENSITY (AIR=1): 3.0-4.0

PH: NOT APPLICABLE

SPECIFIC GRAVITY (WATER = 1): 0.75

SOLUBILITY IN WATER: NEGLIGIBLE

VISCOSITY: N/A

APPEARANCE AND ODOR: CLEAR, BRIGHT LIQUID

HAZARDOUS POLYMERIZATION: OCCURS DOES NOT OCCUR X

PRODUCTS FORMED WHEN SUBJECTED TO HIGH TEMPERATURE OR COMBUSTION:
COMBUSTION - CARBON, CARBON MONOXIDE, CARBON DIOXIDE, VARIOUS HYDROCARBONS AND HYDROCARBON DERIVATIVES.

MATERIALS TO AVOID: STRONG OXIDIZERS.

SECTION VIII - STORAGE AND ENVIRONMENTAL PROTECTION

STORAGE REQUIREMENTS
STORE IN A FLAMMABLE LIQUIDS STORAGE AREA.

PROCEDURES IN CASE OF BREAKAGE OR LEAKAGE
SHUT OFF ALL SOURCES OF IGNITION; USE WATER SPRAY TO DISPERSE VAPORS; INCREASE VENTILATION IF POSSIBLE.

WASTE DISPOSAL:
CONTROLLED INCINERATION; CONSULT LOCAL ORDINANCES FOR COMPLIANCE.

BIODEGRADABILITY (X) YES ( ) NO ( ) UNKNOWN

BIOACCUMULATION ( ) ( ) NO ( ) UNKNOWN

SECTION IX - MARKETING AND USE REGULATED BY

(SPECIFIC REGULATIONS)

( ) FDA - - - ( ) USDA - - - ( ) OTHER (SPECIFY)

SECTION X - COMMENTS

LABEL COPY:
DANGER! EXTREMELY FLAMMABLE! USE AS A MOTOR FUEL ONLY! VAPOR HARMFUL! HARMFUL OR FATAL IF SWALLOWED AND/OR ASPIRATED INTO LUNGS! CAN PRODUCE SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT! LONG-TERM EXPOSURE TO VAPORS HAS CAUSED CANCER IN LABORATORY ANIMALS.

KEEP AWAY FROM HEAT, SPARKS AND FLAME. AVOID BREATHING VAPORS. USE WITH ADEQUATE VENTILATION. AVOID PROLONGED OR REPEATED SKIN CONTACT. IF CONTACT IS LIKELY, WEAR PROTECTIVE CLOTHING AND GLOVES. REMOVE CONTAMINATED CLOTHING, INCLUDING SHOES & THOROUGHLY CLEAN & DRY BEFORE REUSE. NEVER SIPHON BY MOUTH.

FOR INHALATION: IF ADVERSE EFFECTS OCCUR, REMOVE TO UNCONTAMINATED AREA. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

FOR SKIN: IN CASE OF CONTACT, WASH EXPOSED SKIN WITH SOAP AND WATER.

FOR INGESTION: IF SWALLOWED, DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL ATTENTION.

N/A - DATA NOT AVAILABLE

SEE SECTION XI FOR ADDITIONAL INFORMATION

INFORMATION SUPPLIED BY
STEPHEN A. ELBERT

SIGNATURE

TITLE
DIRECTOR, PRODUCT SAFETY (USA)

DATE REVISED
JULY 18, 1983

ALCONOX
LIQUINOX **Revised: 07/14/2006**

MSDS Contents

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TRADE:LIQUINOX

VENDOR CODE:36.1
3M ID:31-0000-9490-9
GROUP_NUM:08-8662-2

VENDOR CODE:36.2
3M ID:11-0025-2472-3
GROUP_NUM:21-9373-8

VENDOR CODE:36.2
3M ID:28-9003-4537-3
GROUP_NUM:21-9203-7

START_MSDS

MSDS_LIQUINOX_ENGLISH_ANSI

LIQUINOX

MSDS

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

CHEMICAL FAMILY: DETERGENT.

MANUFACTURER:
ALCONOX, INC.
30 GLENN ST.
SUITE 309
WHITE PLAINS, NY 10603.

MANUFACTURER EMERGENCY: 800-255-3924.

PHONE NUMBER: 813-248-0585 (OUTSIDE OF THE UNITED STATES).

SUPPLIER: SAME AS MANUFACTURER.

PRODUCT NAME: LIQUINOX

SECTION 2: INGREDIENT INFORMATION

C.A.S.	CONCENTRATION %	INGREDIENT NAME	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENE-SULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE

SECTION 3: HAZARD IDENTIFICATION

ROUTE OF ENTRY: SKIN CONTACT, EYE CONTACT, INHALATION AND INGESTION.

EFFECTS OF ACUTE EXPOSURE:

EYE CONTACT: MAY CAUSE IRRITATION.

SKIN CONTACT: PROLONGED AND REPEATED CONTACT MAY CAUSE IRRITATION.

INHALATION: MAY CAUSE HEADACHE AND NAUSEA.

INGESTION:
MAY CAUSE VOMITING AND DIARRHEA.
MAY CAUSE GASTRIC DISTRESS.

EFFECTS OF CHRONIC EXPOSURE: SEE EFFECTS OF ACUTE EXPOSURE

SECTION 4: FIRST AID MEASURES

SKIN CONTACT:
REMOVE CONTAMINATED CLOTHING.
WASH THOROUGHLY WITH SOAP AND WATER.
SEEK MEDICAL ATTENTION IF IRRITATION PERSISTS.

EYE CONTACT:
CHECK FOR AND REMOVE CONTACT LENSES.

FLUSH EYES WITH CLEAR, RUNNING WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN: IF IRRITATION PERSISTS, CONSULT A PHYSICIAN.

INHALATION:
REMOVE VICTIM TO FRESH AIR.

IF IRRITATION PERSISTS, SEEK MEDICAL ATTENTION.

INGESTION:
DO NOT INDUCE VOMITING, SEEK MEDICAL ATTENTION.
DILUTE WITH TWO GLASSES OF WATER.
NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

SECTION 5: FIRE FIGHTING MEASURES

FLAMMABILITY: NOT FLAMMABLE.

CONDITIONS OF FLAMMABILITY: SURROUNDING FIRE.

EXTINGUISHING MEDIA:
CARBON DIOXIDE, DRY CHEMICAL, FOAM.
WATER
WATER FOG.

SPECIAL PROCEDURES:
SELF-CONTAINED BREATHING APPARATUS REQUIRED.
FIREFIGHTERS SHOULD WEAR THE USUAL PROTECTIVE GEAR.
USE WATER SPRAY TO COOL FIRE EXPOSED CONTAINERS.

AUTO-IGNITION TEMPERATURE: NOT AVAILABLE.

FLASH POINT (DEG. C), METHOD: NONE

LOWER FLAMMABILITY LIMIT (% VOL): NOT APPLICABLE.
UPPER FLAMMABILITY LIMIT (% VOL): NOT APPLICABLE.

EXPLOSION DATA:
SENSITIVITY TO STATIC DISCHARGE: NOT AVAILABLE.
SENSITIVITY TO MECHANICAL IMPACT: NOT AVAILABLE.

HAZARDOUS COMBUSTION PRODUCTS:
OXIDES OF CARBON (COx).
HYDROCARBONS.

RATE OF BURNING: NOT AVAILABLE.

EXPLOSIVE POWER: CONTAINERS MAY RUPTURE IF EXPOSED TO HEAT OR FIRE.

SECTION 6: ACCIDENTAL RELEASE MEASURES

LEAK/SPILL:
CONTAIN THE SPILL.
PREVENT ENTRY INTO DRAINS, SEWERS, AND OTHER WATERWAYS.
WEAR APPROPRIATE PROTECTIVE EQUIPMENT.
SMALL AMOUNTS MAY BE FLUSHED TO SEWER WITH WATER.
SOAK UP WITH AN ABSORBENT MATERIAL.
PLACE IN APPROPRIATE CONTAINER FOR DISPOSAL.
NOTIFY THE APPROPRIATE AUTHORITIES AS REQUIRED.

SECTION 7: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT:
PROTECT AGAINST PHYSICAL DAMAGE.
AVOID BREATHING VAPORS/MISTS.
WEAR PERSONAL PROTECTIVE EQUIPMENT APPROPRIATE TO TASK.
WASH THOROUGHLY AFTER HANDLING.
KEEP OUT OF REACH OF CHILDREN.
AVOID CONTACT WITH SKIN, EYES AND CLOTHING.
AVOID EXTREME TEMPERATURES.
LAUNDER CONTAMINATED CLOTHING PRIOR TO REUSE.

STORAGE REQUIREMENTS:
STORE AWAY FROM INCOMPATIBLE MATERIALS.
KEEP CONTAINERS CLOSED WHEN NOT IN USE.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

PRECAUTIONARY MEASURES:

GLOVES/TYPE: WEAR APPROPRIATE GLOVES.

RESPIRATORY/TYPE: NONE REQUIRED UNDER NORMAL USE.

EYE/TYPE: SAFETY GLASSES RECOMMENDED.

FOOTWEAR/TYPE: SAFETY SHOES PER LOCAL REGULATIONS.

CLOTHING/TYPE: AS REQUIRED TO PREVENT SKIN CONTACT.

OTHER/TYPE:
EYE WASH FACILITY SHOULD BE IN CLOSE PROXIMITY.
EMERGENCY SHOWER SHOULD BE IN CLOSE PROXIMITY.

VENTILATION REQUIREMENTS: LOCAL EXHAUST AT POINTS OF EMISSION.

EXPOSURE LIMIT OF MATERIAL: NOT AVAILABLE.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: LIQUID.

APPEARANCE & ODOR:
ODORLESS.
PALE YELLOW.

ODOR THRESHOLD (PPM): NOT AVAILABLE.

VAPOR PRESSURE (MMHg): @ 20 DEG. C (68 DEG. F). 17

VAPOR DENSITY (AIR=1): >1

VOLATILES (%) BY VOLUME: NOT AVAILABLE.

EVAPORATION RATE (BUTYL ACETATE = 1): <1.

BOILING POINT (DEG. C): 100 (212F)

FREEZING POINT (DEG. C): NOT AVAILABLE.

pH: 8.5

SPECIFIC GRAVITY @ 20 DEG. C (WATER = 1).: 1.083

SOLUBILITY IN WATER (%): COMPLETE.

COEFFICIENT OF WATER\OIL DIST.: NOT AVAILABLE

VOC: NONE

CHEMICAL FAMILY: DETERGENT.

SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY:
PRODUCT IS STABLE UNDER NORMAL HANDLING AND STORAGE CONDITIONS.

CONDITIONS OF INSTABILITY: EXTREME TEMPERATURES.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

INCOMPATIBLE SUBSTANCES:
STRONG ACIDS.
STRONG OXIDIZING AGENTS.

HAZARDOUS DECOMPOSITION PRODUCTS: SEE HAZARDOUS COMBUSTION PRODUCTS.

SECTION 11: TOXICOLOGICAL INFORMATION

LD50 OF PRODUCT, SPECIES & ROUTE: >5000 MG/KG RAT ORAL.

LC50 OF PRODUCT, SPECIES & ROUTE: NOT AVAILABLE.

SENSITIZATION TO PRODUCT: NOT AVAILABLE.

CARCINOGENIC EFFECTS: NOT LISTED AS A CARCINOGEN.

REPRODUCTIVE EFFECTS: NOT AVAILABLE.

TERATOGENICITY: NOT AVAILABLE.

MUTAGENICITY: NOT AVAILABLE.

SYNERGISTIC MATERIALS: NOT AVAILABLE.

SECTION 12: ECOLOGICAL INFORMATION

ENVIRONMENTAL TOXICITY: NO DATA AT THIS TIME.

ENVIRONMENTAL FATE: NO DATA AT THIS TIME.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: IN ACCORDANCE WITH LOCAL AND FEDERAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

D.O.T. CLASSIFICATION: NOT REGULATED.

SPECIAL SHIPPING INFORMATION: NOT REGULATED.

SECTION 15: REGULATORY INFORMATION

CANADIAN REGULATORY INFORMATION:

WHMIS CLASSIFICATION: NOT CONTROLLED.

DSL STATUS: NOT AVAILABLE.

USA REGULATORY INFORMATION:

SARA HAZARD CATEGORIES SECTIONS 311/312:
IMMEDIATE (ACUTE) HEALTH HAZARD: NO.
DELAYED (CHRONIC) HEALTH HAZARD: NO.
FIRE HAZARD: NO.
SUDDEN RELEASE OF PRESSURE: NO.
REACTIVE: NO.

SARA SECTION 313: NONE

TSCA INVENTORY:
ALL COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY.

NFPA:
HEALTH HAZARD 1
FLAMMABILITY 0
REACTIVITY 0

HMIS:
HEALTH HAZARD 1
FLAMMABILITY 0
PHYSICAL HAZARD 0
PPE A

SECTION 16: OTHER INFORMATION

SUPPLIER MSDS DATE: 2006/07/14

DATA PREPARED BY:
GLOBAL SAFETY MANAGEMENT
3340 PEACHTREE ROAD, #1800
ATLANTA, GA 30326

PHONE: 877-683-7460

FAX: (877) 683-7462

WEB: WWW.GLOBALSAFETYNET.COM

EMAIL: INFO@GLOBALSAFETYNET.COM.

GENERAL NOTE:
THIS MATERIAL SAFETY DATA SHEET WAS PREPARED FROM INFORMATION OBTAINED FROM VARIOUS SOURCES, INCLUDING PRODUCT SUPPLIERS AND THE CANADIAN CENTER FOR OCCUPATIONAL HEALTH AND SAFETY.

MS 01.40.01.01.06.1

ACCURATE GAS
METHANE Revised:

MSDS Contents

HEALTH HAZARD DATA
PHYSICAL DATA
FIRE AND EXPLOSION HAZARD DATA
REACTIVITY DATA
SPILL OR LEAK PROCEDURES
SPECIAL PROTECTION INFORMATION
SPECIAL PRECAUTIONS*

ACCURATE GAS, INC.

A SUBSIDIARY OF SHELTON INDUSTRIAL EQUIPMENT, INC
P.O. BOX 800
JACKSONVILLE, AL 36265

SPECIALTY GAS

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: METHANE

TELEPHONE (205) 435-4680
EMERGENCY RESPONSE INFORMATION AT END OF DOCUMENT

ACCURATE GAS, INC.
110 NORTH CHINABEE STREET
P.O. BOX 800
JACKSONVILLE, AL 36265
ISSUE DATE AND REVISIONS:

TRADE NAME AND SYNONYMS: METHANE
CHEMICAL NAME AND SYNONYMS: METHANE, METHYL HYDRIDE, MARSH GAS
FORMULA: CH4
MOLECULAR WEIGHT: 16.01

CAS NUMBER 74-82-8
CHEMICAL FAMILY: ALIPHATIC HYDROCARBON

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT:
METHANE IS DEFINED AS A SIMPLE ASPHYXIANT. OXYGEN LEVELS SHOULD BE MAINTAINED AT GREATER THAN 18 MOLAR PERCENT AT NORMAL ATMOSPHERIC PRESSURE WHICH IS EQUIVALENT TO A PARTIAL PRESSURE OF 135 MM HG. (ACGIH 1984-1985).

SYMPTOMS OF EXPOSURE
INHALATION:
HIGH CONCENTRATIONS OF METHANE SO AS TO EXCLUDE AN ADEQUATE SUPPLY OF OXYGEN TO THE LUNGS CAUSES DIZZINESS, DEEPER BREATHING DUE TO AIR HUNGER, POSSIBLE NAUSEA AND EVENTUAL UNCONSCIOUSNESS.

SKIN CONTACT:

CONTACT WITH CRYOGENIC LIQUID METHANE CAUSES CRYOGENIC "BURNS" OR FROSTBITE OF DERMAL TISSUE.

TOXICOLOGICAL PROPERTIES
METHANE IS INACTIVE BIOLOGICALLY AND ESSENTIALLY NONTOXIC; THEREFORE, THE MAJOR PROPERTY IS THE EXCLUSION OF AN ADEQUATE SUPPLY OF OXYGEN TO THE LUNGS.

FROSTBITE EFFECTS ARE A CHANGE IN COLOR OF THE SKIN TO GRAY OR WHITE POSSIBLY FOLLOWED BY BLISTERING.

LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN

NATIONAL TOXICOLOGY PROGRAM:	YES	( )
	NO	(X)
I.A.R.C. MONOGRAPHS:	YES	( )
	NO	(X)
OSHA:	YES	( )
	NO	(X)

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO METHANE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF EXTREME FIRE AND EXPLOSION HAZARD.

INHALATION:
CONSCIOUS PERSONS SHOULD BE ASSISTED TO AN UNCONTAMINATED AREA AND INHALE FRESH AIR. QUICK REMOVAL FROM THE CONTAMINATED AREA IS MOST IMPORTANT. UNCONSCIOUS PERSONS SHOULD BE MOVED TO AN UNCONTAMINATED AREA, GIVEN MOUTH-TO-MOUTH RESUSCITATION AND SUPPLEMENTAL OXYGEN. MEDICAL ASSISTANCE SHOULD BE SOUGHT IMMEDIATELY.

DERMAL CONTACT OR FROSTBITE:
REMOVE CONTAMINATED CLOTHING AND FLUSH AFFECTED AREAS WITH LUKEWARM WATER. DO NOT USE HOT WATER. A PHYSICIAN SHOULD SEE THE PATIENT PROMPTLY IF THE CRYOGENIC "BURN" HAS RESULTED IN BLISTERING OF THE DERMAL SURFACE OR DEEP TISSUE FREEZING.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES
FORMS EXPLOSIVE OR FLAMMABLE MIXTURES WITH MOST OXIDIZERS (OXYGEN, CHLORINE, FLUORIDE, ETC).

IS FLAMMABLE OVER A WIDE RANGE IN AIR.

PHYSICAL DATA

BOILING POINT
-258.74 DEG. F (-161.52 DEG. C)

LIQUID DENSITY AT BOILING POINT
26.383 LB/FT3 (422.62 KG/M3)

VAPOR PRESSURE
@ 70 DEG F (21.1 DEG C) ABOVE THE CRITICAL TEMPERATURE
OF -116.6 DEG. F (-82.6 DEG. C)

GAS DENSITY AT 70 DEG. F, 1 ATM
.041 LB/FT3 (.657 KG/M3)

SOLUBILITY IN WATER @ 68 DEG. F (20 DEG. C): BUNSEN COEFFICIENT = .035

FREEZING POINT: -296.45 DEG. F (-182.47 DEG. C)

APPEARANCE AND ODOR: COLORLESS, ODORLESS GAS, LIQUID IS WATER WHITE.

SPECIFIC GRAVITY @ 70 DEG. F (AIR = 1.0) IS .55.

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): -306 DEG. F (-188 DEG. C) CLOSED CUP

AUTO IGNITION TEMPERATURE: 1076 DEG. F (580 DEG. C)

FLAMMABLE LIMITS % BY VOLUME: LEL = 5 UEL = 15

EXTINGUISHING MEDIA: WATER, CARBON DIOXIDE, DRY CHEMICAL

ELECTRICAL CLASSIFICATION: CLASS 1, GROUP D

SPECIAL FIRE FIGHTING PROCEDURES: IF POSSIBLE, STOP THE FLOW OF METHANE. USE WATER SPRAY TO COOL SURROUNDING CONTAINERS.

UNUSUAL FIRE AND EXPLOSION HAZARDS: SHOULD FLAME BE EXTINGUISHED AND FLOW OF GAS CONTINUE, INCREASE VENTILATION TO PREVENT FLAMMABLE OR EXPLOSIVE MIXTURE FORMATION.

REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID:
UNSTABLE	
STABLE X	

INCOMPATIBILITY (MATERIALS TO AVOID): OXIDIZERS

HAZARDOUS DECOMPOSITION PRODUCTS: NONE

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
MAY OCCUR	
WILL NOT OCCUR X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
EVACUATE ALL PERSONNEL FROM AFFECTED AREA. USE APPROPRIATE PROTECTIVE EQUIPMENT. IF LEAK IS IN USER'S EQUIPMENT, BE CERTAIN TO PURGE PIPING WITH AN INERT GAS PRIOR TO ATTEMPTING REPAIRS. IF LEAK IN THE CONTAINER OR VALVE, CONTACT ACCURATE GAS, INC.

WASTE DISPOSAL METHOD:
DO NOT ATTEMPT TO DISPOSE OF WASTE OR UNUSED QUANTITIES. FOR EMERGENCY DISPOSAL, CONTACT ACCURATE GAS, INC.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE):
POSITIVE PRESSURE AIR LINE WITH MASK OR SELF-CONTAINED BREATHING APPARATUS SHOULD BE AVAILABLE FOR EMERGENCY USE.

VENTILATION
HOOD WITH FORCED VENTILATION

LOCAL EXHAUST
TO PREVENT ACCUMULATION ABOVE THE LEL

SPECIAL

MECHANICAL (GEN.)
IN ACCORDANCE WITH ELECTRICAL CODES

OTHER

PROTECTIVE GLOVES
PLASTIC OR RUBBER

EYE PROTECTION
SAFETY GOGGLES OR GLASSES

OTHER PROTECTIVE EQUIPMENT
SAFETY SHOES, SAFETY SHOWER, EYEWASH "FOUNTAIN"

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION

DOT SHIPPING NAME: METHANE DOT HAZARD CLASS: FLAMMABLE GAS
DOT SHIPPING LABEL: FLAMMABLE GAS ID NO.: UN 1971

FOR CRYOGENIC LIQUID METHANE:

DOT SHIPPING NAME: METHANE, REFRIGERATED LIQUID
DOT SHIPPING LABEL: FLAMMABLE GAS
DOT HAZARD CLASS: FLAMMABLE GAS
I.D. NO.: UN1972

SPECIAL HANDLING RECOMMENDATIONS:
USE ONLY IN WELL-VENTILATED AREAS. VALVE PROTECTION CAPS MUST REMAIN IN PLACE UNLESS CONTAINER IS SECURED WITH VALVE OUTLET PIPED TO USE POINT. DO NOT DRAG, SLIDE OR ROLL CYLINDERS. USE A SUITABLE HAND TRUCK FOR CYLINDER MOVEMENT. USE A PRESSURE REDUCING REGULATOR WHEN CONNECTING CYLINDER TO LOWER PRESSURE (<3,000 PSIG) PIPING OR SYSTEMS. DO NOT HEAT CYLINDER BY ANY MEANS TO INCREASE THE DISCHARGE RATE OF PRODUCT FROM THE CYLINDER. USE A CHECK VALVE OR TRAP IN THE

DISCHARGE LINE TO PREVENT HAZARDOUS BACK FLOW INTO THE CYLINDER.

FOR ADDITIONAL HANDLING RECOMMENDATIONS, CONSULT L'AIR LIQUIDE'S ENCYCLOPEDIA DE GAZ OR COMPRESSED GAS ASSOCIATION PAMPHLET P-1

SPECIAL STORAGE RECOMMENDATIONS:
PROTECT CYLINDERS FROM PHYSICAL DAMAGE. STORE IN COOL, DRY, WELL-VENTILATED AREA OF NON-COMBUSTIBLE CONSTRUCTION AWAY FROM HEAVILY TRAFFICKED AREAS AND EMERGENCY EXITS. DO NOT ALLOW THE TEMPERATURE WHERE CYLINDERS ARE STORED TO EXCEED 130F (54C). CYLINDERS SHOULD BE STORED UPRIGHT AND FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED OVER. FULL AND EMPTY CYLINDERS SHOULD BE SEGREGATED. USE A "FIRST IN-FIRST OUT" INVENTORY SYSTEM TO PREVENT FULL CYLINDERS BEING STORED FOR EXCESSIVE PERIODS OF TIME. POST "NO SMOKING OR OPEN FLAMES" SIGNS IN THE STORAGE OR USE AREA. THERE SHOULD BE NO SOURCES OF IGNITION IN THE STORAGE OR USE AREA.

FOR ADDITIONAL STORAGE RECOMMENDATIONS CONSULT L'AIR LIQUIDE'S ENCYCLOPEDIA DE GAZ OR COMPRESSED GAS ASSOCIATION'S PAMPHLETS P-1.

SPECIAL PACKAGING RECOMMENDATIONS
METHANE IS NONCORROSIVE AND MAY BE USED WITH ANY COMMON STRUCTURAL MATERIAL.

OTHER RECOMMENDATIONS OR PRECAUTIONS
EARTH-GROUND AND BOND ALL LINES AND EQUIPMENT ASSOCIATED WITH THE METHANE SYSTEM. ELECTRICAL EQUIPMENT SHOULD BE NON-SPARKING OR EXPLOSION PROOF. COMPRESSED GAS CYLINDERS SHOULD NOT BE REFILLED EXCEPT BY QUALIFIED PRODUCERS OF COMPRESSED GASES. SHIPMENT OF A COMPRESSED GAS CYLINDER WHICH HAS NOT BEEN FILLED BY THE OWNER OR WITH HIS (WRITTEN) CONSENT IS A VIOLATION OF FEDERAL LAW (49 CFR).

*VARIOUS GOVERNMENT AGENCIES (I.E., DEPARTMENT OF TRANSPORTATION, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, FOOD AND DRUG ADMINISTRATION AND OTHERS) MAY HAVE SPECIFIC REGULATIONS CONCERNING THE TRANSPORTATION, HANDLING, STORAGE OR USE OF THIS PRODUCT WHICH MAY NOT BE CONTAINED HEREIN. THE CUSTOMER OR USER OF THIS PRODUCT SHOULD BE FAMILIAR WITH THESE REGULATIONS.

EMERGENCY RESPONSE INFORMATION
IN CASE OF EMERGENCY INVOLVING THIS MATERIAL, CALL DAY OR NIGHT (205) 435-4680

JUDGEMENTS AS TO THE SUITABILITY OF INFORMATION HEREIN FOR PURCHASER'S PURPOSES ARE NECESSARILY PURCHASER'S RESPONSIBILITY. THEREFORE, ALTHOUGH REASONABLE CARE HAS BEEN TAKEN IN THE PREPARATION OF SUCH INFORMATION, ACCURATE GAS, INC. EXTENDS NO WARRANTIES, MAKES NO REPRESENTATIONS, AND ASSUMES NO RESPONSIBILITY AS TO THE ACCURACY OR SUITABILITY OF SUCH INFORMATION FOR APPLICATION TO PURCHASER'S INTENDED PURPOSES OR CONSEQUENCES OF ITS USE. SINCE ACCURATE GAS, INC. HAS NO CONTROL OVER THE USE OF THIS PRODUCT, IT ASSUMES NO LIABILITY FOR DAMAGE OR LOSS OF PRODUCT RESULTING FROM PROPER (OR IMPROPER) USE OR APPLICATION OF THE PRODUCT. DATA SHEETS MAY BE CHANGED FROM TIME TO TIME. BE SURE TO CONSULT THE LATEST EDITION.

ALL PURE CHEMICAL
HYDROCHLORIC ACID **Revised: 12/01/1992**

MSDS Contents

I. PRODUCT IDENTIFICATION
II. PHYSICAL DATA
III. FIRE AND EXPLOSION DATA
IV. SPILL OR LEAK HANDLING
V. PROTECTIVE EQUIPMENT REQUIREMENTS
VI. HANDLING AND STORAGE
VII. TOXICOLOGY
VIII. FIRST AID
IX. REACTIVITY DATA
X. TRANSPORTATION DATA
XI. DISPOSAL
XII. ADDITIONAL REGULATORY STATUS INFORMATION
XIII. ADDITIONAL INFORMATION
XIV. SOURCE OF REFERENCES

MATERIAL SAFETY DATA SHEET

ALL PURE CHEMICAL COMPANY
1660 W. LINNE ROAD
TRACY, CALIFORNIA 95376

HYDROCHLORIC ACID

THIS INFORMATION IS REQUIRED TO BE DISCLOSED FOR SAFETY IN THE WORKPLACE. THIS MSDS HAS BEEN PREPARED WITHIN THE GUIDELINES OF THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD, 29CFR 1910.1200. HYDROCHLORIC ACID MAY BE A HAZARDOUS CHEMICAL UNDER THESE STANDARDS.

I. PRODUCT IDENTIFICATION

REVISED: DECEMBER 1992

FORMULA: HCl

SYNONYMS/COMMON NAMES: MURIATIC ACID, HYDROGEN CHLORIDE

CAS NUMBER: 7647-01-0

DOT PROPER SHIPPING NAME: HYDROCHLORIC ACID

DOT HAZARD CLASS: CORROSIVE MATERIAL

DOT I.D. NUMBER: UN1789

DOT HAZARDOUS SUBSTANCE: RQ = 5,000 LBS.

ANSI/NSF STANDARD 60 MAXIMUM USE: 40 MG/L

II. PHYSICAL DATA

APPEARANCE AND ODOR: CLEAR, SLIGHTLY YELLOW LIQUID; SHARP PENETRATING, IRRITATING ORDER

FREEZING POINT: -49.3 DEG F 20 DEG Be 1 (-45 DEG C); -29.2 DEG F (-34 DEG C) 22 DEG Be 1

BOILING POINT: 230 DEG F (110 DEG C) (20-25%HCl)

VAPOR PRESSURE: (32% HCl) 5.7 mmHg AT 32 DEG F (0 DEG C)
25.8 MM HG AT 70 DEG. F (21.1 DEG.C); 72.6 MM HG AT 99.9 DEG. F (37.7 DEG.C)

WATER SOLUBILITY: SOLUBLE IN ALCOHOLS & ALDEHYDES. MISCIBLE WITH WATER IN ALL PROPORTIONS.

MOLECULAR WEIGHT: 36.46 (SOLUTE)

SPECIFIC GRAVITY: (H2O = 1) 20 Be1; 1.18 22 Be1

pH : LESS THAN 1

III. FIRE AND EXPLOSION DATA

FLASH POINT: N/A

AUTOIGNITION TEMPERATURE: N/A

EXTINGUISHING MEDIA: N/A

THE ACID ITSELF IS NOT FLAMMABLE. HOWEVER, HIGHER CONCENTRATIONS MAY CAUSE NEARBY COMBUSTIBLE LIQUIDS AND SOLIDS TO IGNITE UPON CONTACT.

CONTACT WITH COMMON METALS WILL EVOLVE FLAMMABLE AND POTENTIALLY EXPLOSIVE HYDROGEN GAS. THE RATE OF HYDROGEN GENERATION INCREASES WITH DECREASING ACID CONCENTRATION.

CONCENTRATED VAPORS OF HYDROCHLORIC ACID ARE EXTREMELY IRRITATING TO THE RESPIRATORY TRACT AND MAY CAUSE BREATHING DIFFICULTY AND PULMONARY EDEMA.

PREVENT HUMAN EXPOSURE TO FIRE, SMOKE, FUMES OR PRODUCT OF COMBUSTION. EVACUATE NON-ESSENTIAL PERSONNEL FROM THE FIRE AREA. MAINTAIN A SAFE DISTANCE FROM THE FIRE AND STORAGE AREA BECAUSE EXCESSIVE HEAT MAY CAUSE TANK OR VESSEL TO RUPTURE.

WEAR FULL-FACE, SELF-CONTAINED BREATHING APPARATUS AND IMPERVIOUS CLOTHING (SUCH AS GLOVES, HOODS, SUITS, AND RUBBER BOOTS).

USE WATER SPRAY TO COOL CONTAINERS EXPOSED TO FIRE. USE WATER WITH EXTREME CAUTION. UNDER NO CIRCUMSTANCES SHOULD WATER OR OTHER LIQUID BE INTRODUCED INTO ACID TANKS. TAKE CARE NOT TO IGNITE HYDROGEN GAS WHICH CAN ACCUMULATE INSIDE METAL TANKS CONTAINING ACID.

ANY CONTAMINATED EQUIPMENT, BUILDINGS, OR AREAS MUST BE PROPERLY DECONTAMINATED BEFORE USAGE.

IV. SPILL OR LEAK HANDLING

IN CASE OF AN EMERGENCY, CALL CHEMTREC (800) 424-9300

REPORTABLE QUANTITY PER 40 CFR 302.4 IS 5,000 LBS.

ANY PERSON ENTERING EITHER A SIGNIFICANT SPILL AREA OR AN UNKNOWN CONCENTRATION OF A VAPOR OR MIST, SHOULD USE A POSITIVE-PRESSURE, SELF CONTAINED BREATHING APPARATUS OR A POSITIVE-PRESSURE, SUPPLIED-AIR RESPIRATOR WITH ESCAPE PACK.

SMALL SPILLS CAN BE HANDLED ROUTINELY. USE ADEQUATE VENTILATION AND/OR WEAR A NIOSH-APPROVED MIST FILTER, ACID GAS CARTRIDGE RESPIRATOR TO PREVENT INHALATION EXPOSURE. WEAR PROTECTIVE CLOTHING TO PREVENT SKIN AND EYE CONTACT. USE THE FOLLOWING PROCEDURES.

ANY LEAK OCCURRING IN PIPELINES OR EQUIPMENT SHOULD BE CONSIDERED AN ACID LEAK AND TREATED WITH EXTREME CAUTION UNTIL THE LEAK IS PROVEN NOT TO BE AN ACID LEAK. ALL CONTAMINATED AREAS SHOULD BE IMMEDIATELY ZONED OFF TO AVOID PERSONNEL EXPOSURE TO THE ACID SPRAY OR STREAM. ADJUST ALL APPROPRIATE VALVES TO ISOLATE THE SYSTEM AND STOP FURTHER LEAKAGE.

THE CONTAMINATED AREA SHOULD BE COVERED WITH SODIUM BICARBONATE, SODA ASH, OR LIME, TAKING CARE TO AVOID ANY FOAMING OR SPLATTERING THAT MAY OCCUR FROM THE NEUTRALIZATION REACTION OF THE ACID WITH THESE MATERIALS. DIKING MAY BE ADVISABLE TO HELP CONTAIN THE LIQUID SPILL. MAKE SURE ALL LIQUID HAS BEEN THOROUGHLY CONTACTED AND ABSORBED BY THE DRY MATERIALS. TRANSFER ABSORBED SPILL MATERIAL AND ANY CONTAMINATED UNDERLYING SOIL TO A SUITABLE CHEMICAL WASTE CONTAINER. DISPOSE OF CONTAINER AND CONTENTS IN COMPLIANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS.

WASHING DOWN OF SPILLS WITH WATER IS NOT RECOMMENDED, AS THIS TENDS TO SPREAD THE CONTAMINATION AND INCREASES THE LIKELIHOOD OF PERCOLATING THE ACID DOWN THROUGH THE SOIL AND/OR OF UNCONTROLLED FLOW OF ACID INTO SEWERS, STREAMS, OR OTHER WATERS. HYDROCHLORIC ACID LEAKS, SPILLS, OR DRAININGS MUST NOT COME IN CONTACT WITH ANY ACID SOLUBLE SULFIDE WASTES (SUCH AS SEWERS) BECAUSE OF THE DANGER OF EVOLVING HYDROGEN SULFIDE GAS.

LARGE SPILLS SHOULD BE HANDLED ACCORDING TO A PREDETERMINED PLAN.

V. PROTECTIVE EQUIPMENT REQUIREMENTS

NORMALLY, RESPIRATORY PROTECTION IS NOT NEEDED SINCE THE VOLATILITY AND TOXICITY ARE LOW. HOWEVER, IF MISTS, VAPORS OR AEROSOLS ARE GENERATED, WEAR A NIOSH/MSHA RESPIRATOR APPROVED FOR DUSTS AND MISTS. PROTECTIVE CLOTHING (GLOVES, BOOTS, APRONS, AND PROTECTIVE SUIT) SHOULD BE MADE OF NEOPRENE, VINYL OR RUBBER AND A FACE SHIELD IS NECESSARY.

VENTILATION REQUIREMENTS: USE GENERAL EXHAUST VENTILATION UNLESS VAPORS, MISTS OR AEROSOLS ARE GENERATED. IF VAPORS, MISTS, OR AEROSOLS ARE PRESENT LOCAL EXHAUST VENTILATION IS RECOMMENDED.

RESPIRATORY REQUIREMENTS: IF VAPORS, MISTS, OR AEROSOLS ARE GENERATED, WEAR A NIOSH/MSHA APPROVED RESPIRATOR. RESPIRATOR PROTECTION IS NOT NORMALLY NEEDED SINCE THE VOLATILITY IS LOW.

VI. HANDLING AND STORAGE

CONTAINERS SHOULD BE STORED IN A COOL, DRY, WELL VENTILATED AREA AWAY FROM NON-COMPATIBLE, REACTIVE, AND FLAMMABLE MATERIALS AND SOURCES OF HEAT OR FLAME ABOVE 100 F. DO NOT EXPOSE TO DIRECT SUNLIGHT.

THIS PRODUCT IS STABLE AND HAS A SHELF LIFE OF ONE YEAR. IT IS HIGHLY CORROSIVE TO MOST METALS WITH EVOLUTION OF HIGHLY FLAMMABLE AND POTENTIALLY EXPLOSIVE HYDROGEN GAS. CONSIDERATION SHOULD BE GIVEN TO THE USE OF TANTALUM, ZIRCONIUM, CERTAIN OF THE HASTELLOY1 BRAND AND CHLORIMET2 BRAND ALLOYS AND GLASSED STEEL IN HANDLING THE MATERIAL. NON-METALLICS TO BE CONSIDERED INCLUDE RUBBER, POLYVINYLCHLORIDE, POLYETHYLENE, POLYPROPYLENE AND FIBERGLASS REINFORCED POLYESTERS WITHIN THEIR RESPECTIVE TEMPERATURE LIMITS.

VII. TOXICOLOGY

THIS MATERIAL MAY BE FATAL IF SWALLOWED AND IS HARMFUL IF IT IS CONTACTED BY THE SKIN OR EYES. HARMFUL IF INHALED. THE REPORTED ODOR THRESHOLD IS 1 PART PER MILLION (PPM) IN THE AIR. ITS IRRITATION THRESHOLD IS 1-5 PPM IN THE AIR.

INHALATION: REPEATED OR PROLONGED EXPOSURE TO CONCENTRATIONS GREATER THAN ACCEPTED OCCUPATIONAL LIMITS MAY CAUSE DENTAL DISCOLORATION AND EROSION OF THE TEETH. INHALATION OF THE MIST OR VAPOR OF HYDROGEN CHLORIDE GAS MAY CAUSE IRRITATION OF THE MUCUS MEMBRANES AND RESPIRATORY, TRACT WITH SYMPTOMS OF BURNING, CHOKING, AND COUGHING. AT EXPOSURE CONCENTRATIONS GREATER THAN THE TLV, DAMAGE MAY OCCUR TO THE MUCOUS MEMBRANES (ULCERATION OF THE NOSE AND THROAT) AND RESPIRATORY TRACT. AT THESE HIGH CONCENTRATIONS, SEVERE BREATHING DIFFICULTIES MAY OCCUR WHICH MAY BE DELAYED IN ONSET AND MAY BE DUE TO PULMONARY EDEMA (FLUID IN THE LUNG) OR LARYNGEAL EDEMA OR SPASM.

SKIN CONTACT: DIRECT CONTACT OF THE LIQUID WILL BE CORROSIVE TO THE SKIN, WITH THE POTENTIAL FOR SCARRING AND ULCERATION OF THE CONTACTED TISSUE. HYDROCHLORIC ACID MIST MAY RAPIDLY CAUSE SKIN INFLAMMATION AND BURNS. REPEATED CONTACT WITH THE MIST HAS BEEN REPORTED TO CAUSE A CONTACT DERMATITIS (SKIN RASH).

EYE CONTACT: EYE IRRITATION AND/OR SEVERE BURNS WITH PERMANENT DAMAGE AND POSSIBLE LOSS OF SIGHT MAY RESULT IF EXPOSED TO THE MIST. DIRECT CONTACT WITH THIS LIQUID WILL RESULT IN CORROSION TO THE EYE WITH RESULTING SEVERE BURNS, POTENTIAL VISUAL IMPAIRMENT OR LOSS OF SIGHT.

INGESTION: THERE IS NO DATA AVAILABLE ON THE POTENTIAL EFFECTS FROM REPEATED EXPOSURE BY THIS ROUTE AS THE LIKELIHOOD OF THIS OCCURRING IS LOW BECAUSE OF THE CORROSIVE NATURE OF THE CHEMICAL. INGESTION MAY RESULT IN BURNS OF THE MOUTH, THROAT AND STOMACH, PAIN, NAUSEA, VOMITING, AND POSSIBLY DEATH DUE TO ESOPHAGEAL OR GASTRIC NECROSIS.

EXPOSURE LIMIT INFORMATION: THE FEDERAL OSHA PERMISSIBLE EXPOSURE LIMIT (PEL) IS A CEILING LIMIT OF 5 PPM (7 MG/M3) FOR HYDROGEN CHLORIDE (29 CFR 1910.1000).

THE AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH, 1992) HAS RECOMMENDED A THRESHOLD LIMIT VALUE (TLV) FOR HYDROGEN CHLORIDE OF 7.5 MG/M3.

VIII. FIRST AID

SHOULD AN EXPOSURE OCCUR OR BE SUSPECTED, IMMEDIATELY START THE RECOMMENDED PROCEDURE BELOW. SIMULTANEOUSLY CONTACT A POISON CONTROL CENTER, A PHYSICIAN OR THE NEAREST HOSPITAL. INFORM THE PERSON CONTACTED OF THE TYPE AND EXTENT OF EXPOSURE, DESCRIBE THE VICTIM'S SYMPTOMS AND FOLLOW THE ADVICE GIVEN.

INGESTION:IF SWALLOWED, IMMEDIATELY GIVE SEVERAL GLASSES OF WATER BUT DO NOT INDUCE VOMITING. THIS MATERIAL IS CORROSIVE. IF VOMITING DOES OCCUR, GIVE FLUIDS AGAIN. HAVE A PHYSICIAN DETERMINE IF CONDITION OF PATIENT WILL PERMIT INDUCTION OF VOMITING OR EVACUATION OF STOMACH. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSING PERSON.

SKIN CONTACT: USING A DRY CLOTH, IMMEDIATELY WIPE AWAY EXCESS MATERIAL FROM SKIN AND REMOVE ALL CONTAMINATED CLOTHING AND SHOES. UNDER A SAFETY SHOWER, FLUSH ALL AFFECTED AREAS THOROUGHLY WITH LARGE AMOUNTS OF RUNNING WATER FOR AT LEAST 15 MINUTES. DO NOT ATTEMPT TO NEUTRALIZE WITH CHEMICAL AGENTS. GET MEDICAL ATTENTION IMMEDIATELY. PROPERLY DISCARD CONTAMINATED CLOTHING AND SHOES.

EYE CONTACT: IMMEDIATELY FLUSH THE EYES WITH LARGE QUANTITIES OF RUNNING WATER FOR A MINIMUM OF 15 MINUTES. HOLD THE EYELIDS APART DURING THE FLUSHING TO ENSURE RINSING OF THE ENTIRE SURFACE OF THE EYE AND LIDS WITH WATER. DO NOT ATTEMPT TO NEUTRALIZE WITH CHEMICAL AGENTS. OBTAIN MEDICAL ATTENTION AS SOON AS POSSIBLE. OILS OR OINTMENTS SHOULD NOT BE USED AT THIS TIME. CONTINUE THE FLUSHING FOR AN ADDITIONAL 15 MINUTES IF A PHYSICIAN IS NOT IMMEDIATELY AVAILABLE.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, CLEAR VICTIM'S AIRWAY AND APPLY ARTIFICIAL RESPIRATION. IF VICTIM IS BREATHING, OXYGEN MAY BE GIVEN FROM A DEMAND-TYPE OR CONTINUOUS-FLOW INHALER, PREFERABLY WITH A PHYSICIAN'S ADVICE. GET MEDICAL ATTENTION IMMEDIATELY.

IX. REACTIVITY DATA

THIS PRODUCT IS INCOMPATIBLE WITH ALKALINE MATERIALS, ALUMINUM, AMINES, CARBONATES, IRON, SULFURIC ACID, HYDROXIDES, LEATHER AND OTHER FABRICS, METALLIC OXIDES, MAGNESIUM, OLEUM, PERCHLORIC ACID, AND ZINC. HYDROGEN GAS MAY BECOME FLAMMABLE BY REACTION WITH MANY METALS. CHLORINE GAS IS RELEASED BY REACTION WITH OXIDIZING AGENTS. DO NOT EXPOSE TO HEAT OR DIRECT SUNLIGHT.

X. TRANSPORTATION DATA

UNDER THE HAZARDOUS MATERIALS TABLE 49 CFR 172.101 HYDROCHLORIC ACID IS A CORROSIVE MATERIAL, UN 1789, AND IS REGULATED AS A DOT HAZARDOUS

MATERIAL. 49 CFR 172.101 APPENDIX, STATES THAT THE REPORTABLE QUANTITY (RQ) OF A SPILL OR LEAK OF HYDROCHLORIC ACID IS 5,000 POUNDS AND MUST BE REPORTED IMMEDIATELY AT OR ABOVE THIS LIMIT.

THE ABOVE MATERIAL IS SUBJECT UNDER 49 CFR 173.244 AND 173.263, TO THE U.S. DOT HAZARDOUS MATERIALS REGULATIONS BY THE MODES AND PACKAGING QUANTITIES STATED BELOW:

RAIL - BULK AND NON-BULK
MOTOR - BULK AND NON-BULK
WATER - BULK AND NON-BULK
AIR - BULK AND NON-BULK

XI. DISPOSAL

IF THIS PRODUCT BECOMES A HAZARDOUS WASTE, IT MEETS THE CRITERIA OF A HAZARDOUS WASTE AS DEFINED UNDER 40 CFR 261.

IF THIS PRODUCT BECOMES A HAZARDOUS WASTE, IT WILL BE HAZARDOUS WASTE WHICH IS SUBJECT TO THE LAND DISPOSAL RESTRICTIONS UNDER 40 CFR 268 AND MUST BE MANAGED ACCORDINGLY.

IF THIS MATERIAL BECOMES HAZARDOUS WASTE, IT MUST BE DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS IN A PERMITTED HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITY IN COMPLIANCE WITH 40 CFR 268.

IT IS THE RESPONSIBILITY OF THE USER TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE, AND DISPOSAL FOR HAZARDOUS AND NON-HAZARDOUS WASTES.

XII. ADDITIONAL REGULATORY STATUS INFORMATION

XIII. ADDITIONAL INFORMATION

THIS PRODUCT IS CERTIFIED BY THE NATIONAL SANITATION FOUNDATION (NSF)

ALL INFORMATION IS OFFERED IN GOOD FAITH, WITHOUT GUARANTEE OR OBLIGATION FOR THE ACCURACY OR SUFFICIENCY THEREOF, OR THE RESULTS OBTAINED, AND IS ACCEPTED AT USER'S RISK. THE USES REFERRED TO ARE FOR THE PURPOSE OF ILLUSTRATION ONLY. USER SHOULD INVESTIGATE AND ESTABLISH THE SUITABILITY OF SUCH USE(S) IN EVERY CASE. NOTHING HEREIN SHALL BE CONSTRUED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS.

XIV. SOURCE OF REFERENCES

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FOR FURTHER INFORMATION CONTACT:

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TRACY, CALIFORNIA 95376

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11/93 - 3M - PRINTED IN USA
ALL PURE
ALL PURE CHEMICAL COMPANY

AGA GAS
HYDROGEN, COMPRESSED; (D.O.T); WATER GAS **Revised: 01/01/1995**

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MATERIAL SAFETY DATA SHEET

AGA

AGA GAS, INC. (216) 642-6600
6225 OAKTREE BOULEVARD
P.O. BOX 94737
CLEVELAND, OH 44101-4737

PRODUCT NAME: HYDROGEN

TRADE NAME AND SYNONYMS: HYDROGEN, COMPRESSED; (D.O.T); WATER GAS

CHEMICAL NAME AND SYNONYMS: HYDROGEN; NORMAL HYDROGEN

ISSUE DATE AND REVISIONS: REVISED JANUARY 1995

CAS# 1333-74-0

DOT I.D. NO: UN 1049

DOT HAZARD CLASS: DIVISION 2.1

FORMULA: H2

CHEMICAL FAMILY: INORGANIC FLAMMABLE GAS

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT
HYDROGEN IS DEFINED AS A SIMPLE ASPHYXIANT (ACGIH 1994-1995); OSHA 1993 PEL (8 HR. TWA)=NO LISTING. OXYGEN LEVELS SHOULD BE MAINTAINED AT GREATER THAN 18 MOLAR PERCENT AT NORMAL ATMOSPHERIC PRESSURE (pO2>135 TORR).

SYMPTOMS OF EXPOSURE
INHALATION: HIGH CONCENTRATIONS OF HYDROGEN SO AS TO EXCLUDE AN ADEQUATE SUPPLY OF OXYGEN TO THE LUNGS CAUSES DIZZINESS, DEEPER BREATHING DUE TO AIR HUNGER, POSSIBLE NAUSEA AND EVENTUAL UNCONSCIOUSNESS.

TOXICOLOGICAL PROPERTIES

HYDROGEN IS INACTIVE BIOLOGICALLY AND ESSENTIALLY NONTOXIC; THEREFORE, THE MAJOR PROPERTY IS THE EXCLUSION OF AN ADEQUATE SUPPLY OF OXYGEN TO THE LUNGS.

HYDROGEN IS NOT LISTED IN THE IARC, NTP OR BY OSHA AS A CARCINOGEN OR POTENTIAL CARCINOGEN.

PERSONS IN ILL HEALTH WHERE SUCH ILLNESS WOULD BE AGGRAVATED BY EXPOSURE TO HYDROGEN SHOULD NOT BE ALLOWED TO WORK WITH OR HANDLE THIS PRODUCT.

RECOMMENDED FIRST AID TREATMENT
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO HYDROGEN. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF EXTREME FIRE AND EXPLOSION HAZARD.

INHALATION:
CONSCIOUS PERSONS SHOULD BE ASSISTED TO AN UNCONTAMINATED AREA AND INHALE FRESH AIR. QUICK REMOVAL FROM THE CONTAMINATED AREA IS MOST IMPORTANT. UNCONSCIOUS PERSONS SHOULD BE MOVED TO AN UNCONTAMINATED AREA, GIVEN ASSISTED RESPIRATION AND SUPPLEMENTAL OXYGEN. FURTHER TREATMENT SHOULD BE SYMPTOMATIC AND SUPPORTIVE.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS OR GASES:

HYDROGEN IS FLAMMABLE OVER A VERY WIDE RANGE IN AIR.

PHYSICAL DATA

BOILING POINT: -423 DEG. F (-252.8 DEG. C)

LIQUID DENSITY AT BOILING POINT: 4.43 LB/FT3 (70.96 KG/M3)

VAPOR PRESSURE @ 70 DEG. F: (21.1 DEG. C)= ABOVE THE CRITICAL TEMPERATURE OF -399.8 DEG. F (-239.9 DEG. C)

GAS DENSITY AT 70 DEG. F 1 ATM: .0052

SOLUBILITY IN WATER: VERY SLIGHTLY

FREEZING POINT: -434.6 DEG. F (-259.2 DEG. C)

EVAPORATION RATE: N/A (GAS)

SPECIFIC GRAVITY (AIR=1): @ 70 DEG. F (21.1 DEG. C) = .069

APPEARANCE AND ODOR: COLORLESS, ODORLESS GAS

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): N/A (GAS)

AUTO IGNITION TEMPERATURE: 1058 DEG. F (570 DEG. C)

FLAMMABLE LIMITS % BY VOLUME: LEL 4 UEL 74.5

EXTINGUISHING MEDIA: WATER, CARBON DIOXIDE, DRY CHEMICAL

ELECTRICAL CLASSIFICATION: CLASS 1, GROUP B

SPECIAL FIRE FIGHTING PROCEDURES:
IF POSSIBLE, STOP THE FLOW OF HYDROGEN. COOL SURROUNDING CONTAINERS WITH WATER SPRAY. HYDROGEN BURNS WITH AN ALMOST INVISIBLE FLAME OR RELATIVELY LOW THERMAL RADIATION.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
HYDROGEN IS VERY LIGHT AND RISES VERY RAPIDLY IN AIR. SHOULD A HYDROGEN FIRE BE EXTINGUISHED AND THE FLOW OF GAS CONTINUE, INCREASE VENTILATION TO PREVENT AN EXPLOSION HAZARD, PARTICULARLY IN THE UPPER PORTIONS OF BUILDINGS OR SHEDS WHERE THE GAS MIGHT "COLLECT".

REACTIVITY DATA

STABILITY:
UNSTABLE ( )
STABLE (X)

CONDITIONS TO AVOID: NONE

INCOMPATIBILITY (MATERIALS TO AVOID): OXIDIZERS

HAZARDOUS DECOMPOSITION PRODUCTS: NONE

HAZARDOUS POLYMERIZATION:
MAY OCCUR ( )
WILL NOT OCCUR (X)

CONDITIONS TO AVOID: NONE

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
EVACUATE ALL PERSONNEL FROM AFFECTED AREA. USE APPROPRIATE PROTECTIVE EQUIPMENT. IF LEAK IS IN USER'S EQUIPMENT, BE CERTAIN TO PURGE PIPING WITH AN INERT GAS PRIOR TO ATTEMPTING REPAIRS. IF LEAK IS IN CONTAINER OR CONTAINER VALVE, CONTACT YOUR CLOSEST SUPPLIER LOCATION OR CALL THE EMERGENCY TELEPHONE NUMBER LISTED HEREIN.

WASTE DISPOSAL METHOD:
DO NOT ATTEMPT TO DISPOSE OF WASTE OR UNUSED QUANTITIES. RETURN IN THE SHIPPING CONTAINER PROPERLY LABELED, WITH ANY VALUE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE TO YOUR SUPPLIER. FOR EMERGENCY DISPOSAL ASSISTANCE, CONTACT YOUR CLOSEST SUPPLIER LOCATION OR CALL THE EMERGENCY TELEPHONE NUMBER LISTED HEREIN.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE):
POSITIVE PRESSURE AIR LINE WITH MASK OR SELF-CONTAINED BREATHING APPARATUS SHOULD BE AVAILABLE FOR EMERGENCY USE.

VENTILATION: HOOD WITH FORCED VENTILATION

LOCAL EXHAUST: TO PREVENT ACCUMULATION ABOVE THE LEL

MECHANICAL (GEN.): IN ACCORDANCE WITH ELECTRICAL CODES

SPECIAL: N/A

OTHER: N/A

PROTECTIVE GLOVES: PLASTIC OR RUBBER

EYE PROTECTION: SAFETY GOGGLES OR GLASSES

OTHER PROTECTION EQUIPMENT: SAFETY SHOES, SAFETY SHOWER

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION
DOT SHIPPING NAME: HYDROGEN, COMPRESSED

DOT SHIPPING LABEL: FLAMMABLE GAS

DOT HAZARD CLASS: DIVISION 2.1

I.D. NO.: UN 1049

SPECIAL HANDLING RECOMMENDATIONS:
USE ONLY IN WELL-VENTILATED AREAS. VALVE PROTECTION CAPS MUST REMAIN IN PLACE UNLESS CONTAINER IS SECURED WITH VALVE OUTLET PIPED TO USE POINT. DO NOT DRAG, SLIDE OR ROLL CYLINDERS. USE A SUITABLE HAND TRUCK FOR CYLINDER MOVEMENT. USE A PRESSURE REDUCING REGULATOR WHEN CONNECTING CYLINDER TO LOWER PRESSURE (<3,000 PSIG) PIPING OR SYSTEMS. DO NOT HEAT CYLINDER BY ANY MEANS TO INCREASE THE DISCHARGE RATE OF PRODUCT FROM THE CYLINDER. USE A CHECK VALVE OR TRAP IN THE DISCHARGE LINE TO PREVENT HAZARDOUS BACK FLOW INTO THE CYLINDER.

FOR ADDITIONAL HANDLING RECOMMENDATIONS, CONSULT COMPRESSED GAS ASSOCIATION'S PAMPHLET G-5, P-1, P-14, AND SAFETY BULLETIN SB-2.

SPECIAL STORAGE RECOMMENDATIONS:
PROTECT CYLINDERS FROM PHYSICAL DAMAGE. STORE IN COOL, DRY, WELL-VENTILATED AREA OF NONCOMBUSTIBLE CONSTRUCTION AWAY FROM HEAVILY TRAFFICKED AREAS AND EMERGENCY EXITS. DO NOT ALLOW THE TEMPERATURE WHERE CYLINDERS ARE STORED TO EXCEED 125F (52C). CYLINDERS SHOULD BE STORED UPRIGHT AND FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED OVER. FULL AND EMPTY CYLINDERS SHOULD BE SEGREGATED. USE A "FIRST IN - FIRST OUT" INVENTORY SYSTEM TO PREVENT FULL CYLINDERS BEING STORED FOR EXCESSIVE PERIODS OF TIME. POST "NO SMOKING OR OPEN FLAMES" SIGNS IN THE STORAGE OR USE AREA. THERE SHOULD BE NO SOURCES OF IGNITION IN THE STORAGE OR USE AREA.

FOR ADDITIONAL STORAGE RECOMMENDATIONS, CONSULT COMPRESSED GAS ASSOCIATION'S PAMPHLET G-5, P-1, P-14, AND SAFETY BULLETIN SB-2.

SPECIAL PACKAGING RECOMMENDATIONS:
HYDROGEN IS NONCORROSIVE AND MAY BE USED WITH ANY COMMON STRUCTURAL MATERIAL.

OTHER RECOMMENDATIONS OR PRECAUTIONS:
EARTH-GROUND AND BOND ALL LINES AND EQUIPMENT ASSOCIATED WITH THE HYDROGEN SYSTEM. ELECTRICAL EQUIPMENT SHOULD BE NON-SPARKING OR EXPLOSION PROOF. COMPRESSED GAS CYLINDERS SHOULD NOT BE REFILLED EXCEPT BY QUALIFIED PRODUCERS OF COMPRESSED GASES. SHIPMENT OF A COMPRESSED GAS CYLINDER WHICH HAS NOT BEEN FILLED BY THE OWNER OR WITH HIS (WRITTEN) CONSENT IS A VIOLATION OF FEDERAL LAW (49CFR).

ALWAYS SECURE CYLINDERS IN AN UPRIGHT POSITION BEFORE TRANSPORTING THEM. NEVER TRANSPORT CYLINDERS IN TRUNKS OF VEHICLES, ENCLOSED VANS, TRUCK CABS OR IN PASSENGER COMPARTMENTS. TRANSPORT CYLINDERS SECURED IN OPEN FLATBED OR IN OPEN PICK-UP TYPE VEHICLES.

*VARIOUS GOVERNMENT AGENCIES (I.E. DEPARTMENT OF TRANSPORTATION, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, FOOD AND DRUG ADMINISTRATION AND OTHERS) MAY HAVE SPECIFIC REGULATIONS CONCERNING THE TRANSPORTATION, HANDLING, STORAGE OR USE OF THIS PRODUCT WHICH WILL NOT BE REFLECTED IN THIS DATA SHEET. THE CUSTOMER SHOULD REVIEW THESE REGULATIONS TO ENSURE THAT HE IS IN FULL COMPLIANCE.

INFORMATION CONTAINED IN THIS MATERIAL SAFETY DATA SHEET IS OFFERED WITHOUT CHARGE FOR USE BY TECHNICALLY QUALIFIED PERSONNEL AT THEIR DISCRETION AND RISK. ALL STATEMENTS, TECHNICAL INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BASED ON TESTS AND DATA WHICH WE BELIEVE TO BE RELIABLE, BUT THE ACCURACY OR COMPLETENESS THEREOF IS NOT GUARANTEED AND NO WARRANTY OF ANY KIND IS MADE WITH RESPECT THERETO. THIS INFORMATION IS NOT INTENDED AS A LICENSE TO OPERATE UNDER OR A RECOMMENDATION TO PRACTICE OR INFRINGE ANY PATENT OF THIS COMPANY OR OTHERS COVERING ANY PROCESS, COMPOSITION OF MATTER OR USE.

SINCE THE COMPANY SHALL HAVE NO CONTROL OF THE USE OF THE PRODUCT DESCRIBED HEREIN, THE COMPANY ASSUMES NO LIABILITY FOR LOSS OR DAMAGE INCURRED FROM THE PROPER OR IMPROPER USE OF SUCH PRODUCT.

REPORTING UNDER SARA, TITLE III, SECTION 313 NOT REQUIRED.

NFPA 704 NO. FOR HYDROGEN = 1 4 0 NONE

AIR PRODUCTS AND CHEMICALS
ISOBUTYLENE Revised: 06/01/1985

MSDS Contents

HEALTH HAZARD DATA
PHYSICAL DATA
FIRE AND EXPLOSION HAZARD DATA
REACTIVITY DATA
SPILL OR LEAK PROCEDURES
SPECIAL PROTECTION INFORMATION
SPECIAL PRECAUTIONS*

AIR
PRODUCTS

SPECIALTY GAS
MATERIAL SAFETY
DATA SHEET

EMERGENCY PHONE (800) 523-9374
IN PENNSYLVANIA (800) 322-9092

PRODUCT NAME
ISOBUTYLENE

CAS #115-11-7

AIR PRODUCTS AND CHEMICALS, INC.
ALLENTOWN, PA 18195
(215) 481-8257

TRADE NAME AND SYNONYMS
ISOBUTYLENE
CHEMICAL NAME AND SYNONYMS
ISOBUTYLENE, ISOBUTENE,
2-METHYLPROPENE

ISSUE DATE
AND REVISIONS 04/78, 06/85

FORMULA
(iso) C4H8

CHEMICAL FAMILY
ALKENE

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT
SEE LAST PAGE.

SYMPTOMS OF EXPOSURE
INHALATION: MODERATE CONCENTRATIONS WHICH EXCLUDE AN ADEQUATE SUPPLY OF OXYGEN TO THE LUNGS CAUSE DIZZINESS,DROWSINESS AND EVENTUAL UNCONSCIOUSNESS. IT ALSO HAS A VERY MILD ANESTHETIC EFFECT WHICH MIGHT CAUSE LACK OF COORDINATION OR LESSENED MENTAL ALERTNESS.

SKIN AND EYE CONTACT: IT IS MILDLY IRRITATING TO MUCOUS MEMBRANES. DUE TO ITS RAPID RATE OF EVAPORATION. ISOBUTYLENE CAN CAUSE TISSUE FREEZING OR FROSTBITE ON CONTACT.

TOXICOLOGICAL PROPERTIES
ISOBUTYLENE HAS A VERY MILD ANESTHETIC EFFECT, HOWEVER. THE MAJOR HEALTH HAZARD IS THE EXCLUSION OF AN ADEQUATE SUPPLY OF OXYGEN TO THE LUNGS.

FROSTBITE EFFECTS ARE A CHANGE IN COLOR OF THE SKIN TO GRAY OR

WHITE POSSIBLY FOLLOWED BY BLISTERING.

RECOMMENDED FIRST AID TREATMENT
!PROMPT MEDICAL ATTENTION IS REQUIRED IN ALL CASES OF OVEREXPOSURE TO ISOBUTYLENE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND MUST BE AWARE OF EXTREME FIRE AND EXPLOSION HAZARD.!

INHALATION: MOVE EXPOSED PERSONNEL TO AN UNCONTAMINATED AREA. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT, GIVE OXYGEN. MEDICAL ASSISTANCE SHOULD BE SOUGHT IMMEDIATELY.

SKIN CONTACT OR FROSTBITE: REMOVE CONTAMINATED CLOTHING AND FLUSH AFFECTED AREAS WITH LUKEWARM WATER. !DO NOT USE HOT WATER.! A PHYSICIAN SHOULD SEE THE PATIENT PROMPTLY IF THE CRYOGENIC "BURN" HAS CAUSED BLISTERING OF THE SKIN OR DEEP TISSUE FREEZING.

INFORMATION CONTAINED IN THIS MATERIAL SAFETY DATA SHEET IS OFFERED WITHOUT CHARGE FOR USE BY TECHNICALLY QUALIFIED PERSONNEL AT THEIR DISCRETION AND RISK. ALL STATEMENTS, TECHNICAL INFORMATION AND RECOMMENDATIONS CONTAINED HEREIN ARE BASED ON TESTS AND DATA WHICH WE BELIEVE TO BE RELIABLE, BUT THE ACCURACY OR COMPLETENESS THEREOF IS NOT GUARANTEED AND NO WARRANTY OF ANY KIND IS MADE WITH RESPECT THERETO. THIS INFORMATION IS NOT INTENDED AS A LICENSE TO OPERATE UNDER OR A RECOMMENDATION TO PRACTICE OR INFRINGE ANY PATENT OF THIS COMPANY OR OTHERS COVERING ANY PROCESS, COMPOSITION OF MATTER OR USE.

SINCE THE COMPANY SHALL HAVE NO CONTROL OF THE USE OF THE PRODUCT DESCRIBED HEREIN, THE COMPANY ASSUMES NO LIABILITY FOR LOSS OR DAMAGE INCURRED FROM THE PROPER OR IMPROPER USE OF SUCH PRODUCT.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES
ISOBUTYLENE IS FLAMMABLE OVER A WIDE RANGE IN AIR.

PHYSICAL DATA

BOILING POINT
19.6 F (- 6.9 C)

LIQUID DENSITY AT BOILING POINT
39.1 LB/FT(3) (626 KG/M3)

VAPOR PRESSURE @ 70 F (21.1 C) =
39 PSIA (269 KPA)

GAS DENSITY AT 70-F, 1 ATM
0.148 LB/FT(3)(2.37 KG/M3)

SOLUBILITY IN WATER
INSOLUBLE

FREEZING POINT
- 220.6 F (- 140.3 C)

APPEARANCE AND ODOR
COLORLESS GAS WITH AN UNPLEASANT ODOR SIMILAR TO THAT WHICH IS EMITTED WHEN BURNING ANTHRACITE COAL.

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED)
SEE LAST PAGE

AUTO IGNITION TEMPERATURE
869 F (465 C)

FLAMMABLE LIMITS % BY VOLUME
LEL 1.8 UEL 9.6

EXTINGUISHING MEDIA
WATER, CARBON DIOXIDE, DRY CHEMICAL

ELECTRICAL CLASSIFICATION
CLASS 1. GROUP NOT SPECIFIED

SPECIAL FIRE FIGHTING PROCEDURES
KEEP CYLINDER(S) COOL WITH WATER SPRAY FROM A DISTANCE. IF POSSIBLE WITHOUT RISK, MOVE CYLINDER(S) AWAY FROM FIRE AREA. IF POSSIBLE WITHOUT RISK, STOP THE FLOW OF GAS TO A FIRE. ALLOW GAS FIRE TO BURN ITSELF OUT. (CONTINUED ON LAST PAGE.)

UNUSUAL FIRE AND EXPLOSION HAZARDS
ISOBUTYLENE IS DENSER THAN AIR AND CAN TRAVEL CONSIDERABLE DISTANCES TO AN IGNITION SOURCE AND FLASH BACK. CYLINDER(S) MAY EXPLODE OR VENT WHEN EXPOSED TO FIRE.

REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
UNSTABLE	( )	
STABLE	(X)	

INCOMPATIBILITY (MATERIALS TO AVOID)
OXIDIZERS

HAZARDOUS DECOMPOSITION PRODUCTS
NONE

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
MAY OCCUR	( )	
WILL NOT OCCUR	(X)	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
EVACUATE ALL PERSONNEL FROM AFFECTED AREA. USE APPROPRIATE PROTECTIVE EQUIPMENT. IF LEAK IS IN USER'S EQUIPMENT, BE CERTAIN TO PURGE PIPING WITH AN INERT GAS PRIOR TO ATTEMPTING REPAIRS. IF LEAK IS IN CONTAINER OR CONTAINER VALVE. CALL THE "800" EMERGENCY PHONE NUMBER LISTED HEREIN.

WASTE DISPOSAL METHOD
ALL FEDERAL, STATE AND LOCAL REGULATIONS REGARDING HEALTH AND POLLUTION SHOULD BE FOLLOWED IN WASTE DISPOSAL. CONTACT AIR PRODUCTS FOR SPECIFIC RECOMMENDATIONS. DO NOT DISPOSE OF UNUSED QUANTITIES.
(CONTINUED ON LAST PAGE.)

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE) POSITIVE PRESSURE AIR LINE WITH MASK OR SELF-CONTAINED BREATHING APPARATUS SHOULD BE AVAILABLE FOR EMERGENCY USE.

VENTILATION
HOOD WITH FORCED VENTILATION

LOCAL EXHAUST
TO PREVENT ACCUMULATION ABOVE THE LEL

MECHANICAL (GEN.)
IN ACCORDANCE WITH ELECTRICAL CODES

SPECIAL

OTHER

PROTECTIVE GLOVES
PLASTIC OR RUBBER

EYE PROTECTION
SAFETY GOGGLES OR GLASSES

OTHER PROTECTIVE EQUIPMENT
SAFETY SHOES, SAFETY SHOWER, EYEWASH "FOUNTAIN."

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION
DOT SHIPPING NAME: LIQUIFIED PETROLEUM GAS
DOT HAZARD CLASS: FLAMMABLE GAS
DOT SHIPPING LABEL: FLAMMABLE GAS ID NO.: UN 1075

SPECIAL HANDLING RECOMMENDATIONS
USE ONLY IN WELL-VENTILATED AREAS. VALVE PROTECTION CAPS MUST REMAIN IN PLACE UNLESS CONTAINER IS SECURED WITH VALVE OUTLET PIPED TO USE POINT. DO NOT DRAG, SLIDE OR ROLL CYLINDERS. USE A SUITABLE HAND TRUCK FOR CYLINDER MOVEMENT. USE A PRESSURE REDUCING REGULATOR WHEN CONNECTING CYLINDER TO LOWER PRESSURE (<250 PSIG) PIPING OR SYSTEMS. DO NOT HEAT CYLINDER BY ANY MEANS TO INCREASE THE DISCHARGE RATE OF PRODUCT FROM THE CYLINDER. USE A CHECK VALVE OR TRAP IN THE DISCHARGE LINE TO PREVENT HAZARDOUS BACK FLOW INTO THE CYLINDER.

FOR ADDITIONAL RECOMMENDATIONS CONSULT THE AIR PRODUCTS SPECIALTY GAS CATALOG SAFETY AND TECHNICAL INFORMATION SECTION OR COMPRESSED GAS ASSOCIATION PAMPHLET P-1.

SPECIAL STORAGE RECOMMENDATIONS
PROTECT CYLINDERS FROM PHYSICAL DAMAGE. STORE IN COOL, DRY, WELL-VENTILATED AREA OF NON-COMBUSTIBLE CONSTRUCTION AWAY FROM

HEAVILY TRAFFICKED AREAS AND EMERGENCY EXITS. DO NOT ALLOW THE TEMPERATURE WHERE CYLINDERS ARE STORED TO EXCEED 130 F (54 C). CYLINDERS SHOULD BE STORED UPRIGHT AND FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED OVER. FULL AND EMPTY CYLINDERS SHOULD BE SEGREGATED. USE A "FIRST IN-FIRST OUT" INVENTORY SYSTEM TO PREVENT FULL CYLINDERS BEING STORED FOR EXCESSIVE PERIODS OF TIME. POST "NO SMOKING OR OPEN FLAMES" SIGNS IN THE STORAGE OR USE AREA. THERE SHOULD BE NO SOURCES OF IGNITION IN THE STORAGE OR USE AREA.

FOR ADDITIONAL RECOMMENDATIONS CONSULT THE AIR PRODUCTS SPECIALTY GAS CATALOG SAFETY AND TECHNICAL INFORMATION SECTION OR COMPRESSED GAS ASSOCIATION PAMPHLET P-1.

SPECIAL PACKAGING RECOMMENDATIONS
ISOBUTYLENE IS NONCORROSIVE AND MAY BE USED WITH ANY COMMON STRUCTURAL MATERIAL.

OTHER RECOMMENDATIONS OR PRECAUTIONS
EARTH-GROUND AND BOND ALL LINES AND EQUIPMENT ASSOCIATED WITH THE ISOBUTYLENE SYSTEM. ELECTRICAL EQUIPMENT SHOULD BE NON-SPARKING OR EXPLOSION PROOF. COMPRESSED GAS CYLINDERS SHOULD NOT BE REFILLED EXCEPT BY QUALIFIED PRODUCERS OF COMPRESSED GASES. SHIPMENT OF A COMPRESSED GAS CYLINDER WHICH HAS NOT BEEN FILLED BY THE OWNER OR WITH HIS (WRITTEN) CONSENT IS A VIOLATION OF FEDERAL LAW (49CFR).

*VARIOUS GOVERNMENT AGENCIES (I.E.. DEPARTMENT OF TRANSPORTATION, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION. FOOD AND DRUG ADMINISTRATION AND OTHERS) MAY HAVE SPECIFIC REGULATIONS CONCERNING THE TRANSPORTATION, HANDLING. STORAGE OR USE OF THIS PRODUCT WHICH WILL NOT BE REFLECTED IN THIS DATA SHEET. THE CUSTOMER SHOULD REVIEW THESE REGULATIONS TO ENSURE THAT HE IS IN FULL COMPLIANCE.

SPECIALTY GAS DEPARTMENT
AIR PRODUCTS AND CHEMICALS, INC.
ALLENTOWN, PA 18195
(215) 481-8257

TIME WEIGHTED AVERAGE EXPOSURE LIMIT (CONTINUED) ISOBUTYLENE IS DEFINED AS A SIMPLE ASPHYXIANT. OXYGEN LEVELS SHOULD BE MAINTAINED AT GREATER THAN 18 MOLAR PERCENT AT NORMAL ATMOSPHERIC PRESSURE WHICH IS EQUIVALENT TO A PARTIAL PRESSURE OF 135 MM HG. (ACGIH 1984-85)

FLASH POINT (METHOD USED) (CONTINUED)
- 105 F (- 76 C) CLOSED CUP

SPECIAL FIRE FIGHTING PROCEDURES (CONTINUED)
VENTILATE LOW AREAS WHERE FLAMMABLE OR EXPLOSIVE MIXTURES MAY FORM.

WASTE DISPOSAL METHOD (CONTINUED)
RETURN THE PROPERLY LABELED SHIPPING CONTAINER TO AIR PRODUCTS FOR DISPOSAL WITH VALVE(S) TIGHTLY CLOSED, OUTLET SEAL(S) SECURED AND VALVE PROTECTION CAP IN PLACE. FOR EMERGENCY DISPOSAL ASSISTANCE, CALL THE "800" EMERGENCY PHONE NUMBER

LISTED HEREIN.

PRINTED IN U.S.A 320-548

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ACROS ORGANICS
NITRIC ACID Revised: 12/20/1994

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SECTION 16 - ADDITIONAL INFORMATION

NITRIC ACID
000016550

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS NAME:NITRIC ACID

CATALOG NUMBERS:
12466-0010, 12466-0025, 12466-5000, 13362-0010,
13362-0025, 42400-0025, 42400-5000, 1146307, 1146422, 1200500,
1868819, EK 114 6307, EK 114 6422,
EK 120 0500, EK 186 8819

SYNONYMS:
AZOTIC ACID, ENGRAVERS NITRATE, HYDROGEN NITRATE.

COMPANY IDENTIFICATION: ACROS ORGANICS
JANSSEN PHARMACEUTICALAAN 3
2440 GEEL, BELGIUM

FOR INFORMATION IN NORTH AMERICA, CALL: 800-ACROS-01
FOR INFORMATION IN EUROPE, CALL: 0032(0) 14575211
FOR EMERGENCIES IN THE US, CALL CHEMTREC: 800-424-9300
FOR EMERGENCIES OUTSIDE THE US, CALL: 0032(0) 14575299

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS

CAS#	CHEMICAL NAME	%	EINECS#
7697-37-2	NITRIC ACID	69-71%	UNLISTED

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE: CLEAR, COLORLESS TO YELLOW LIQUID WITH A STRONG, ACRID ODOR.
DANGER! OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. CAUSES EYE, SKIN, AND DIGESTIVE TRACT BURNS. CAUSES SEVERE RESPIRATORY TRACT IRRITATION. MAY CAUSE PERFORATION OF THE DIGESTIVE TRACT AND EROSION

OF TEETH.

TARGET ORGANS: NONE.

POTENTIAL HEALTH EFFECTS

EYE: CAUSES SEVERE EYE BURNS.
MAY CAUSE IRREVERSIBLE EYE INJURY.

SKIN: MAY CAUSE SEVERE SKIN IRRITATION.
CAUSES SKIN BURNS.
MAY CAUSE DEEP, PENETRATING ULCERS OF THE SKIN.

INGESTION:
CAUSES GASTROINTESTINAL TRACT BURNS.
MAY CAUSE PERFORATION OF THE DIGESTIVE TRACT.

INHALATION:
MAY BE FATAL IF INHALED.
EFFECTS MAY BE DELAYED.
MAY CAUSE IRRITATION OF THE RESPIRATORY TRACT WITH BURNING PAIN IN THE NOSE AND THROAT, COUGHING, WHEEZING, SHORTNESS OF BREATH AND PULMONARY EDEMA.

CHRONIC:
REPEATED INHALATION MAY CAUSE CHRONIC BRONCHITIS.
REPEATED EXPOSURE MAY CAUSE EROSION OF TEETH.

SECTION 4 - FIRST AID MEASURES

EYES: FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES, OCCASIONALLY LIFTING THE UPPER AND LOWER LIDS. GET MEDICAL AID IMMEDIATELY. DO NOT ALLOW VICTIM TO RUB OR KEEP EYES CLOSED.

SKIN: FLUSH SKIN WITH PLENTY OF SOAP AND WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
GET MEDICAL AID IF IRRITATION DEVELOPS OR PERSISTS.
WASH CLOTHING BEFORE REUSE.

INGESTION:DO NOT INDUCE VOMITING AND SEEK IMMEDIATE MEDICAL ADVICE.

INHALATION:
REMOVE FROM EXPOSURE 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.
NO SPECIFIC ANTIDOTE EXISTS.

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.
STRONG OXIDIZER. CONTACT WITH COMBUSTIBLE MATERIALS MAY CAUSE A FIRE.
USE WATER SPRAY TO KEEP FIRE-EXPOSED CONTAINERS COOL.
SUBSTANCE IS NONCOMBUSTIBLE.

EXTINGUISHING MEDIA:
SUBSTANCE IS NONCOMBUSTIBLE; USE AGENT MOST APPROPRIATE TO EXTINGUISH SURROUNDING FIRE.

AUTOIGNITION TEMPERATURE: NOT AVAILABLE.

FLASH POINT: NOT AVAILABLE.

EXPLOSION LIMITS, LOWER:NOT AVAILABLE.
UPPER:NOT AVAILABLE.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

GENERAL INFORMATION:
USE PROPER PERSONAL PROTECTIVE EQUIPMENT AS INDICATED IN SECTION 8.

SPILLS/LEAKS:
ABSORB SPILL WITH INERT MATERIAL, (E.G., DRY SAND OR EARTH), THEN PLACE INTO A CHEMICAL WASTE CONTAINER. WEAR A SELF CONTAINED BREATHING APPARATUS AND APPROPRIATE PERSONAL PROTECTION. (SEE EXPOSURE CONTROLS, PERSONAL PROTECTION SECTION).

SECTION 7 - HANDLING AND STORAGE

HANDLING:
WASH THOROUGHLY AFTER HANDLING.
REMOVE CONTAMINATED CLOTHING AND WASH BEFORE REUSE.
USE WITH ADEQUATE VENTILATION.
DO NOT GET ON SKIN OR IN EYES.
DO NOT INGEST OR INHALE.
STORAGE:
STORE IN A COOL, DRY, WELL-VENTILATED AREA AWAY FROM INCOMPATIBLE SUBSTANCES.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

ENGINEERING CONTROLS:
USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP AIRBORNE CONCENTRATIONS BELOW THE PERMISSIBLE EXPOSURE LIMITS.

EXPOSURE LIMITS

CHEMICAL NAME	ACGIH	NIOSH	OSHA - FINAL PELS
NITRIC ACID	2 PPM : 5.2 MG/M3: 4 PPM STEL: 10 MG/M3 STEL	2 PPM TWA; 5 MG/M3 TWA: 4 PPM STEL; 10 MG/M3 STEL	2 PPM TWA; 5 MG/M 3 TWA

OSHA VACATED PELS:
NITRIC ACID:
2 PPM TWA: 5 MG/M3 TWA; 4 PPM STEL; 10 MG/M3 STEL

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.

SKIN: WEAR APPROPRIATE PROTECTIVE GLOVES AND CLOTHING TO PREVENT SKIN EXPOSURE.

CLOTHING: WEAR APPROPRIATE PROTECTIVE CLOTHING TO PREVENT SKIN EXPOSURE.

RESPIRATORS: FOLLOW THE OSHA RESPIRATOR REGULATIONS FOUND IN 29CFR 1010.134. ALWAYS USE A NIOSH-APPROVED RESPIRATOR WHEN NECESSARY.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:	LIQUID
APPEARANCE:	TRANSPARENT, CLEAR OR YELLOWISH LIQUID.
ODOR:	STRONG ACRID.
PH:	1.0
VAPOR PRESSURE:	6.8 MM HG
VAPOR DENSITY:	NOT AVAILABLE.
EVAPORATION RATE:	NOT AVAILABLE.
VISCOSITY:	NOT AVAILABLE.
BOILING POINT:	186.8 F
FREEZING/MELTING POINT:	-43.6 F
DECOMPOSITION TEMPERATURE:	NOT AVAILABLE.

SOLUBILITY:	SOLUBLE IN WATER.
SPECIFIC GRAVITY/DENSITY:	1.50
MOLECULAR FORMULA:	HNO3
MOLECULAR WEIGHT:	63.0119

SECTION 10 - STABILITY AND REACTIVITY

CHEMICAL STABILITY:
DECOMPOSES WHEN IN CONTACT WITH AIR, LIGHT, OR ORGANIC MATTER.

CONDITIONS TO AVOID:
HIGH TEMPERATURES, INCOMPATIBLE MATERIALS, MOISTURE, REDUCING AGENTS

INCOMPATIBILITIES WITH OTHER MATERIALS:
REACTS WITH OVER 150 CHEMICAL COMBINATIONS. REFER TO NFPA FIRE PROTECTION GUIDE FOR SPECIFIES. REACTS EXPLOSIVELY WITH ORGANIC MATERIALS AND COMBUSTIBLES.

HAZARDOUS DECOMPOSITION PRODUCTS:
NITROGEN OXIDES.

HAZARDOUS POLYMERIZATION: HAS NOT BEEN REPORTED.

SECTION 11 - TOXICOLOGICAL INFORMATION

RTECS#:
CAS# 7697-37-2 QU5775000 QU5900000

LD50/LC50:
INHALATION, RAT: LC50 = 67 PPM 4 HR

CARCINOGENICITY:
NITRIC ACID
NOT LISTED BY ACGIH, IARC, NIOSH, NTP, OR OSHA.
NO COMPONENTS ARE LISTED BY ACGIH, IARC, NIOSH, NTP, OR OSHA.

EPIDEMIOLOGY:
NO INFORMATION AVAILABLE.

TERATOGENICITY:
EFFECTS ON NEWBORN; BIOCHEMICAL AND METABOLIC, ORAL-RAT TDLo=2345 MG/KG (FEMALE 18D POST). FETOTOXICITY: STUNTED FETUS, ORAL-RAT TDLo=21150 MG/KG (FEMALE 1-21D POST).

REPRODUCTIVE EFFECTS:
NO INFORMATION AVAILABLE.

NEUROTOXICITY:
NO INFORMATION AVAILABLE.

MUTAGENICITY:

NO INFORMATION AVAILABLE.

OTHER STUDIES:
NONE.

SECTION 12 - ECOLOGICAL INFORMATION

ECOTOXICITY:

MOSQUITO FISH: TLm=72 PPM/96H (FRESH WATER)

COCKLE: LC50=330-1000 PPM/48H (SALT WATER)

ENVIRONMENTAL FATE:
NO INFORMATION AVAILABLE.

PHYSICAL/CHEMICAL:
NO INFORMATION AVAILABLE.

PHYSICAL/CHEMICAL:
NONE.

SECTION 13 - DISPOSAL CONSIDERATIONS

DISPOSE OF IN A MANNER CONSISTENT WITH FEDERAL, STATE, AND LOCAL REGULATIONS.

RCRA D-SERIES MAXIMUM CONCENTRATION OF CONTAMINANTS: NOT LISTED.
RCRA D-SERIES CHRONIC TOXICITY REFERENCE LEVELS: NOT LISTED.
RCRA F-SERIES: NOT LISTED.
RCRA P-SERIES: NOT LISTED.
RCRA U-SERIES: NOT LISTED.

NOT LISTED AS A MATERIAL BANNED FROM LAND DISPOSAL ACCORDING TO RCRA.

SECTION 14 - TRANSPORT INFORMATION

US DOT
SHIPPING NAME: NITRIC ACID
HAZARD CLASS: 8
UN NUMBER: UN 2031
PACKING GROUP:1

IMO
SHIPPING NAME: NITRIC ACID
HAZARD CLASS: 8
UN NUMBER: 2031
PACKING GROUP:2

IATA
SHIPPING NAME: NITRIC ACID

HAZARD CLASS: 8
UN NUMBER: 2031
PACKING GROUP:2

RID/ADR
SHIPPING NAME: NITRIC ACID, OTHER THAN RED FUMING, WITH LESS THAN 70%
70% ACID
DANGEROUS GOODS CODE: 8(2B)
UN NUMBER: 2031

CANADIAN TDG
SHIPPING NAME: NITRIC ACID
HAZARD CLASS: 8(9.2)
UN NUMBER: UN2031

SECTION 15 - REGULATORY INFORMATION

A. FEDERAL
TSCA
CAS# 7697-37-2 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/ SARA
SECTION 302 (RQ)
NONE OF THE CHEMICALS IN THIS MATERIAL HAVE AN RQ.
SECTION 302 (TPQ)
CAS# 7697-37-2: TPQ = 1000 POUNDS
SECTION 313
SECTION 313:
THIS MATERIAL CONTAINS NITRIC ACID (CAS# 7697-37-2, 69-71%), WHICH IS
SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF SARA TITLE III AND
40 CFR PART 373.
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:
CAS# 7697-37-2 IS LISTED AS A HAZARDOUS SUBSTANCE UNDER THE CWA.
NONE OF THE CHEMICALS IN THIS PRODUCT ARE LISTED AS PRIORITY
POLLUTANTS UNDER THE CWA.
NONE OF THE CHEMICALS IN THIS PRODUCT ARE LISTED AS TOXIC POLLUTANTS
UNDER THE CWA.

OSHA:
CAS# 7697-37-2 IS CONSIDERED HIGHLY HAZARDOUS BY OSHA.

B. STATE
NITRIC ACID CAN BE FOUND ON THE FOLLOWING STATE RIGHT TO KNOW LISTS:
CALIFORNIA, NEW JERSEY, FLORIDA, PENNSYLVANIA, MINNESOTA, MASSACHUSETTS.

CALIFORNIA NO SIGNIFICANT RISK LEVEL:
NONE OF THE CHEMICALS IN THIS PRODUCT ARE LISTED.

C. INTERNATIONAL
CANADA
CAS# 7697-37-2 IS LISTED ON CANADA'S DSL/NDSL LIST.
CAS# 7697-37-2 IS LISTED ON CANADA'S INGREDIENT DISCLOSURE LIST.
EUROPEAN LABELING IN ACCORDANCE WITH EC DIRECTIVES
HAZARD SYMBOLS: NOT AVAILABLE.
RISK PHRASES:
SAFETY PHRASES:

SECTION 16 - ADDITIONAL INFORMATION

ADDITIONAL INFORMATION:
NO ADDITIONAL INFORMATION AVAILABLE.
MSDS CREATION DATE:DECEMBER 20, 1994

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.

MATERIAL SAFETY DATA SHEET

APPENDIX B
SPECIFIC HEALTH AND SAFETY PROCEDURES

NOTE: Health and safety procedures that will be utilized during the project are listed below. A copy of all the Health and Safety Procedures (HS001-999) will be available on site or via ShawNet.

Accident Prevention Program: Management Safety Reviews

HS045	Job Safety Analysis
HS051	Tailgate Safety Meeting
HS060	Hazard Communication Program
HS308	Underground/Overhead Utility Contact Prevention
HS400	Working in Hot Environments
HS401	Cold Stress
HS402	Hearing Conservation
HS600	Personal Protection Program
HS601	Respiratory Protection
HS800	Motor Vehicle Operation: General Requirements

PROCEDURE

Subject: **ACCIDENT PREVENTION PROGRAM: MANAGEMENT SAFETY INSPECTIONS**

1.0 PURPOSE AND SUMMARY

This procedure establishes the requirement for management safety inspections of project and office locations. These inspections are an integral part of the overall accident prevention program and help to demonstrate management's commitment to safety. Key requirements of this procedure include:

- Project managers are required to conduct one inspection per month and ensure that at least one other inspection is conducted during the month;
- Office managers are required to conduct an office safety inspection once every six months.
- Completed inspection reports are given to the project/office health and safety representative for review. A copy of the completed report will then be forwarded to the respective business line health and safety manager.

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 TEXT

Inspections of project and office locations by managers, supervisors, and the health and safety staff are critical factors in a comprehensive accident prevention program. Management safety inspections help demonstrate management's commitment to safety and verify that proper work practices are in use. These inspections are also used to verify the existence of safe work conditions and regulatory compliance. All employees are afforded the opportunity to participate in the inspection process via the safety interview process.

4.1 Safety Inspections and Documentation

Safety inspections are required by various tiers of the management structure. The objective is for operation managers to visibly demonstrate their concern for safety in the workplace by direct contact with employees while in the workplace. Each inspection is to be documented on the appropriate Safety Inspection Report (Attachment 2 or 3).

The primary responsibilities of the inspector include:

- Interviewing employees with regard to health and safety issues and how they might be corrected;
- Observing and correcting unsafe conditions and acts; and
- Verifying that corrective actions have been assigned to a responsible employee and implemented.

Positive safety observations and safety issues not specifically addressed in the Safety Inspection Report can be documented on the last page of the report. A list of all corrective action items will be maintained showing the corrective action, responsible person, and the date action is to be completed. Completed reports are to be given to the project/office health and safety representative, then forwarded to the respective business line health and safety manager.

4.1.1 Management Site Visits

Each senior manager is encouraged to make an informal safety inspection and review previously conducted inspection reports, during each site visit, to demonstrate their commitment to safety and reinforce the responsibilities of project management. Findings during this informal inspection are to be brought to the attention of the project manager so that corrective action can be initiated.

4.1.2 Project Managers

All project managers are required to complete at least one safety inspection per month and ensure that at least one other safety inspection per month is conducted. In the event that the project manager is not present at the project site during the month, this responsibility may be delegated to the project supervisor.

4.1.3 Office Managers

Office managers are required to conduct an office safety inspection once every six months. Managers are encouraged to conduct more frequent inspections if the office location is being remodeled or if new space is being occupied that was not previously inspected.

4.1.4 Project Supervisors

Project supervisors are expected to inspect their projects monthly and ensure that corrective actions are implemented. Dependent upon project manager participation, project supervisors may also be required to conduct an additional monthly inspection. The requirement to conduct these inspections cannot be delegated.

4.1.5 Health and Safety Representative

Health and safety representatives must continually observe activities and correct unsafe acts/conditions as soon as reasonably possible. They are also required to review each Safety Inspection Report completed at their location to ensure that corrective actions are implemented. Once this review is complete, they will forward the reports to the appropriate business line health and safety manager.

4.2 Workshops

Health and safety representatives will present workshops and/or conduct joint inspections to help managers and supervisors develop their inspection skills.

5.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

6.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances

7.0 ATTACHMENTS

1. Responsibility Matrix
2. Project Safety Inspection Report
3. Office Safety Inspection Report
4. Laboratory Inspection Report

ATTACHMENT 1

ACCIDENT PREVENTION PROGRAM: MANAGEMENT SAFETY INSPECTIONS RESPONSIBILITY MATRIX

Action	Procedure Section	*Responsible Party*				
		Senior Managers	**Project/ Office Manager**	**Project Supervisors**	**Health and Safety Representative**	**Director of Health and Safety**
Issue, Revise, and Maintain Procedure	3.1					X
Conduct Informal Safety Inspections and Review Previously Completed Reports	4.1.1	X				
Conduct Safety Inspections	4.1.2 4.1.3 4.1.4		X	X		
Give Completed Reports to Health and Safety Representative	4.1.2 4.1.3 4.1.4		X	X		
Review Reports and Forward to Health and Safety Manager	4.1.5				X	
Conduct Inspection Workshops	4.2				X	

ATTACHMENT 2

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

BUSINESS LINE: _____ PROJECT NAME/NUMBER:
PROGRAM MANAGER: _____ PROJECT MANAGER:
GENERAL PROJECT DESCRIPTION:
SITE ACTIVITIES AT TIME OF INSPECTION:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: _____ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: _____ DATE:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: _____ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: _____ DATE:

INSPECTION COMPLETED BY: _____ DATE:

HEALTH AND SAFETY REVIEW BY: _____ DATE:

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

	YES	NO	N/A
FIRST AID			
1. Are first aid kit locations identified and accessible?			
2. Are emergency eye wash/safety showers available and inspected monthly?			
3. Are first aid kits inspected weekly?			
4. Is a qualified first aid/CPR provider on site?			
PERSONAL PROTECTIVE EQUIPMENT			
1. Have levels of personnel protection been established?			
2. Are respirators decontaminated, inspected, and stored according to standard procedures?			
3. Have employees been fit-tested?			
4. Is defective personal protective equipment tagged and taken out of service?			
5. Does compressed breathing air meet CGA Grade "D" minimum?			
6. Are there sufficient sizes and quantities of protective equipment?			
7. At a minimum, are employees utilizing safety glasses, hard hats, and steel toe boots?			
FIRE PREVENTION			
1. Are employees smoking only in designated outdoor areas?			
2. Are fire lanes established and maintained?			
3. Are flammable liquid dispensing systems bonded?			
4. Are approved safety cans available for storage of flammable liquids?			
5. Has the local fire department been contacted?			
6. Are fire extinguishers available and inspected monthly?			
7. Are flammables and combustibles properly stored?			
8. Are flammable storage cabinets available and used when needed?			
AIR MONITORING			
1. Is required air monitoring being conducted?			
2. Are air monitoring instruments calibrated daily?			
3. Are air monitoring logs up to date?			
4. Are instrument user manuals available?			
5. Are instruments being maintained?			
6. Are employees notified of personal sampling results within 5 days of receipt?			
WELDING AND CUTTING			
1. Are fire extinguishers present at welding and cutting operations?			
2. Are confined spaces evaluated prior to and during cutting and welding operations?			
3. Have Hot Work Permits been completed?			
4. Are proper helmets, goggles, aprons, and gloves available for welding and cutting operations?			
5. Are welding machines properly grounded?			
6. Are oxygen and fuel gas cylinders stored a minimum of 20 feet apart?			
7. Are only trained personnel permitted to operate welding and cutting equipment?			
8. Are gas cylinders transported in a secured vertical position with caps in place?			
HAND AND POWER TOOLS			
1. Are defective hand and power tools tagged and taken out of service?			
2. Is eye protection available and used when operating power tools?			

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

	YES	NO	N/A
3. Are guards and safety devices in place on power tools?			
4. Are power tools inspected before each use?			
5. Are nonsparking tools available when necessary?			
6. Is the correct tool being used for the job?			

MOTOR VEHICLES

1. Are vehicles regularly inspected?			
2. Are personnel licensed for the vehicles they operate?			
3. Are unsafe vehicles tagged and reported to supervision?			
4. Is vehicles safety equipment operating properly?			
5. Are loads secure?			
6. Are vehicle occupants using safety belts?			
7. Are current insurance cards and blank accident report forms located in vehicles?			

EMERGENCY PLANS

1. Are emergency telephone numbers posted?			
2. Have emergency escape routes been designated?			
3. Are employees familiar with the emergency signal?			
4. Has the emergency route to the hospital been established and posted?			
5. Is a vehicle on site that can transport injured employees to the hospital?			

MATERIALS HANDLING

1. Are materials stacked and stored to prevent sliding or collapsing?			
2. Are tripping hazards identified?			
3. Are semi-trailers chocked?			
4. Are fixed jacks used under semi-trailers?			
5. Are riders prohibited on materials handling equipment?			
6. Are approved manlifts provided for the lifting of personnel?			
7. Are personnel in manlifts wearing approved fall protection devices?			

FIRE PROTECTION

1. Has a fire alarm system been established?			
2. Do employees know the location and use of all fire extinguishers?			
3. Are fire extinguisher locations posted?			
4. Are combustible materials segregated from open flames?			
5. Have fire extinguishers been professionally inspected during the last year?			
6. Are fire extinguishers visually inspected monthly?			

ELECTRICAL

1. Is electrical equipment and wiring properly guarded and maintained in good condition?			
2. Are extension cords kept out of wet areas?			
3. Is damaged electrical equipment tagged and taken out of service?			
4. Have underground electrical lines been identified by proper authorities?			
5. Has a lockout/tagout system been established?			
6. Are GFCIs being used on all temporary electrical systems and as needed?			
7. Are extension cords being inspected daily (i.e., group pin in place, no unapproved splices)?			
8. Are warning signs exhibited on high voltage equipment (250V or greater)?			

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

	YES	NO	N/A
9. Is adequate distance maintained from overhead electrical lines?			
10. Are switches, circuit breakers, and switchboards installed in wet locations enclosed in weatherproof enclosures?			
CRANES AND RIGGING			
1. Are cranes inspected daily prior to use?			
2. Are crane swing areas barricaded or demarked?			
3. Is all rigging equipment tagged with an identification number and rated capacity?			
4. Is rigging equipment inspection documented?			
5. Are slings, chains, and rigging inspected before each use?			
6. Are damaged slings, chains, and rigging tagged and taken out of service?			
7. Are slings padded or protected from sharp corners?			
8. Do employees keep clear of suspended loads?			
9. Are rated load capacities and special hazard warnings posted on crane?			
10. Are the records of annual crane inspection available?			
11. Has accessible areas within the swing radius of the rear of the crane been barricaded?			
12. Do crane operators have required training/certification?			
COMPRESSED GAS CYLINDERS			
1. Are breathing air cylinders charged only to prescribed pressures?			
2. Are like cylinders segregated and stored in well ventilated areas?			
3. Is smoking prohibited in cylinder storage areas?			
4. Are cylinders stored secure and upright?			
5. Are cylinders protected from snow, rain, etc.?			
6. Are cylinder caps in place before cylinders are moved?			
7. Are fuel gas and oxygen cylinders stored a minimum of 20 feet apart?			
8. Are propane cylinders stored and used only outside of buildings?			
SCAFFOLDING			
1. Is scaffolding placed on a flat, firm surface?			
2. Are scaffold planks free of mud, ice, grease, etc.?			
3. Is scaffolding inspected before each use?			
4. Are defective scaffold parts taken out of service?			
5. Have employees completed scaffold user training?			
6. On scaffolds where platforms are overlapped, is planking overlapped a minimum of 12 inches?			
7. Does scaffold planking extend over end supports between 6 to 18 inches (dependent upon platform length)?			
8. Are employees restricted from working on scaffolds during storms and high winds?			
9. Are all pins in place and wheels locked?			
10. Is required perimeter guarding (top rail, mid rail, and toe board) present?			
11. Has a competent person been designated to oversee scaffold construction?			
12. Are employees prohibited from moving mobile scaffold horizontally while employees are on them?			
13. Are all scaffold components manufactured by the same company?			
WALKING AND WORKING SURFACES			
1. Are ladders regularly inspected?			
2. Are access ways, stairways, ramps, and ladders clean of ice, mud, snow, or debris?			

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

	YES	NO	N/A
3. Are ladders being used in a safe manner?			
4. Are ladders kept out of passageways, doors, or driveways?			
5. Are broken or damaged ladders tagged and taken out of service?			
6. Are metal ladders prohibited in electrical service?			
7. Are stairways and floor openings guarded?			
8. Are safety feet installed on straight and extension ladders?			
9. Is general housekeeping being maintained?			
10. Are ladders tied off?			
11. Are handrails and side rails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches?			
SITE SAFETY PLAN			
1. Is a site safety plan available on site or accessible to all employees?			
2. Does the safety plan accurately reflect site conditions and tasks?			
3. Have potential hazards been described to employees on site?			
4. Is there a designated safety official on site?			
5. Have all employees signed the safety plan acknowledgment form?			
SITE POSTERS			
1. Are the following posters displayed in a prominent and accessible area?			
A. Minimum Wage			
B. OSHA Job Protection			
C. Equal Employment Opportunity			
2. Are all required state-specific posters displayed?			
SITE CONTROL			
1. Are work zones clearly marked?			
2. Are support trailers located to minimize exposure from a potential release?			
3. Are support trailers accessible for approach by emergency vehicles?			
4. Is the site properly secured during and after work hours?			
5. Is an exclusion zone sign-in/sign-out log maintained?			
6. Are only employees with current training and physicals permitted in exclusion zone?			
HEAVY EQUIPMENT			
1. Is heavy equipment inspected as prescribed by the manufacturer?			
2. Is defective heavy equipment tagged and taken out of service?			
3. Are project roads and structures inspected for load capacities and proper clearances?			
4. Is heavy equipment shut down for fueling and maintenance?			
5. Are backup alarms installed and working on mobile equipment?			
6. Have qualified equipment operators been designated?			
7. Are riders prohibited on heavy equipment?			
8. Are guards and safety appliances in place and used?			
9. Are operators using the "three point" system when mounting/dismounting equipment?			
EXCAVATION			

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

	YES	NO	N/A
1. Has a "competent person" been designated to oversee excavation activities?			
2. Prior to opening excavations, are utilities located and marked?			
3. Has a professional engineer evaluated all excavations greater than 20 feet deep?			
4. Is there rescue equipment on site and accessible to the excavation area?			
5. Is excavated material placed a minimum of 24 inches from the excavation?			
6. Are the sides of excavations sloped or shored to prevent cave ins?			
7. Have excavations greater than 4 feet deep been monitored for hazardous atmospheres (i.e., LEL/O_2 deficiency)?			
8. Are ladders or ramps used in excavations over 4 feet deep?			
9. Are means of egress available so as to require no more than 25 feet of lateral travel?			
10. Are barriers, i.e., guardrails or fences, placed around excavations near pedestrian or vehicle thoroughfares?			
11. Is excavation inspected daily by competent persons and documented?			
CONFINED SPACES			
1. Have employees been trained in the hazards of confined spaces?			
2. Are confined space permits posted at entrance to confined space?			
3. Is a copy of the confined space entry procedure available?			
4. Has a rescue plan been established?			
5. Is an entry supervisor present at each permit-required entry?			
6. Are required extraction/fall protection devices being used?			
DECONTAMINATION			
1. Are decontamination stations set up on site?			
2. Is decontamination water properly contained and disposed of?			
3. Are all pieces of equipment inspected for proper decontamination before leaving the site?			
4. Are shin/metatarsal guards being used during power washing activities?			
HAZARD COMMUNICATION			
1. Is there a copy of the HAZCOM procedure on site?			
2. Are there MSDSs for required materials/chemicals present on site?			
3. Are all containers properly labeled, as to content, hazard?			
4. Have employees been trained in accordance with the HAZCOM procedure?			
5. Do employees (including subcontractors) know and understand the effects of exposure from the chemicals on site?			
6. Have all personnel signed the HAZCOM acknowledgment form?			
7. Is there an updated list of chemicals maintained on site?			
TRAINING			
1. Are tailgate safety meetings being conducted daily?			
2. Are current training/medical records maintained on site?			
DOCUMENTATION			
1. Is an OSHA 300 Log maintained on site and posted during February 1, to April 30,?			
2. Are accident report forms available?			
3. Is a copy of health and safety policy and procedures available on site?			

PROJECT SAFETY INSPECTION REPORT

PROJECT _____ **DATE** _____

ALL NEGATIVE RESPONSES	CORRECTIVE ACTION	ASSIGNED TO	DATE ASSIGNED	DATE COMPLETED	VERIFIED BY

DESCRIBE POSITIVE SAFETY OBSERVATIONS

ATTACHMENT 3

OFFICE SAFETY INSPECTION REPORT

OFFICE _____ **DATE** _____

DATE: _____ OFFICE NAME:
OFFICE MANAGER:
AREA(S) OF OFFICE INSPECTED:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: _____ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: _____ DATE:

INTERVIEWED EMPLOYEE:
SAFETY ISSUE:
CORRECTIVE ACTION:

ASSIGNED TO: _____ FOLLOW-UP DATE:
CORRECTION VERIFIED BY: _____ DATE:

INSPECTION COMPLETED BY: _____ DATE:

HEALTH AND SAFETY REVIEW BY: _____ DATE:

OFFICE SAFETY INSPECTION REPORT

OFFICE _____ **DATE** _____

	YES	NO	N/A
FIRST AID			
1. Are first aid kits accessible and identified?			
2. Are emergency eye wash/safety showers available where needed and inspected?			
3. Are first aid kits inspected weekly?			
FIRE PREVENTION			
1. Are employees smoking only in designated outdoor areas?			
2. Are fire lanes/evacuation routes established and maintained?			
3. Are approved safety cans/cabinets available for storage of flammable liquids?			
4. Are fire exits clearly identified and unobstructed?			
FURNITURE AND EQUIPMENT			
1. Are desks, file cabinets, etc. arranged so that drawers do not open into aisles or walkways?			
2. Are desk and file drawers closed after use?			
3. Is weight distributed in file cabinets so that upper drawer contents does not create a top-heavy condition?			
4. Are cabinets, bookcases, and shelves secured to prevent their falling over?			
5. Are faulty desks, chairs, or other office equipment repaired or taken out of service?			
6. Is adequate and sufficient lighting provided in all work areas?			
7. Are paper cutter blades in fully down and locked position when not in use?			
8. Are work stations arranged to be comfortable without unnecessary strains on backs, arms, necks, etc.?			
9. Do machines with exposed moving parts have appropriate guards?			
AISLES AND FLOORS			
1. Is aisle clearance adequate for two-way traffic and for unobstructed access to all parts of the office and building?			
2. Does office arrangement allow easy egress under emergency conditions?			
3. Are wastebaskets, briefcases, or other objects placed where they are not a tripping hazard?			
4. Are floors clear of pencils, bottles, and other loose objects?			
5. Are tripping hazards from electrical cords, phone outlets, or other protrusions on the floor prevented by arrangement of furniture or other means?			
6. Are floors free of loose tiles and projections that can create a tripping hazard?			
7. Is carpeting in good condition and not badly worn or torn?			
HAND AND POWER TOOLS			
1. Are defective hand and power tools tagged and taken out of service?			
2. Is eye protection available and used when operating power tools?			
3. Are guards and safety devices in place on power tools?			
4. Are power tools inspected before each use?			
5. Is the correct tool being used for the job?			
6. Do knife blades have guards when not in use?			
MOTOR VEHICLES			
1. Are vehicles regularly inspected?			
2. Are personnel licensed for the vehicles they operate?			
3. Are unsafe vehicles reported to supervision?			

OFFICE SAFETY INSPECTION REPORT

OFFICE _____ **DATE** _____

	YES	NO	N/A
4. Is safety equipment on vehicles?			
5. Are loads secure on vehicles?			
6. Are vehicle occupants using safety belts?			
7. Are current insurance cards and blank accident report forms located in vehicles?			
EMERGENCY PLANS			
1. Are emergency telephone numbers posted?			
2. Have emergency escape routes been designated?			
3. Are employees familiar with the emergency signal?			
4. Has an emergency route to the hospital been established and posted?			
MATERIALS HANDLING			
1. Are materials stacked and stored to prevent sliding or collapsing?			
2. Are flammables and combustibles stored in approved containers?			
3. Are tripping hazards identified?			
4. Are riders prohibited on material handling equipment?			
FIRE PROTECTION			
1. Has a fire alarm system been established?			
2. Do employees know the location and use of all fire extinguishers?			
3. Are fire extinguisher locations marked?			
4. Have fire extinguishers been professionally inspected during the last year?			
5. Are fire extinguishers visually inspected monthly?			
6. Is there an operating fire detection system?			
ELECTRICAL			
1. Are extension cords kept out of wet areas?			
2. Are certified electricians used for electrical work?			
3. Are GFCIs being used as needed?			
4. Are extension cords not being used in lieu of permanent wiring?			
5. Are warning signs exhibited on high voltage equipment (250V or greater)?			
6. Are switches, circuit breakers, and switchboards installed in wet locations enclosed in weatherproof enclosures?			
7. Are electric fans protected with guards of not over one-half inch mesh, which prevents fingers getting inside guard?			
8. Are cords, panels, receptacles, and plugs in good condition?			
9. Are multi-outlet strips not plugged into other multi-outlet strips?			
10. Are extension cords not plugged into other extension cords?			
11. Are circuit breakers or fuse panels properly labeled, kept closed, and accessible?			
12. Are extension cords arranged so that they are not placed over radiators, steam pipes, through doorways, or under carpets?			
13. Do space heaters have automatic shut-offs that will actuate if the heater tips over?			
14. Are space heaters UL listed and plugged directly into a wall receptacle?			
15. Are space heaters located at least 3 feet from combustible material?			
WALKING AND WORKING SURFACES			
1. Are cords, cables, and other items not placed in walkways?			
2. Are ladders regularly inspected?			
3. Are access ways, stairways, ramps, and ladders clean of ice, mud, snow, or debris?			

OFFICE SAFETY INSPECTION REPORT

OFFICE _____ **DATE** _____

	YES	NO	N/A
4. Are ladders being used in a safe manner?			
5. Are ladders kept out of passageways, doors, or driveways?			
6. Are broken or damaged ladders tagged and taken out of service?			
7. Are metal ladders prohibited in electrical service?			
8. Are stairways and floor openings guarded?			
9. Are safety feet installed on straight and extension ladders?			
10. Are employees walking instead of running?			
11. Are handrails and side rails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches?			
12. Are there torn, loose, or curled carpets?			
HOUSEKEEPING			
1. Is good housekeeping maintained?			
2. Are paper and materials stored properly?			
3. Are cleaning fluids used only in small quantities and stored in closed containers that are kept in well-ventilated areas?			
4. If cleaning fluids are flammable, are they not used near a flame or an open heating element?			
5. Are wastebaskets emptied on a daily basis?			
SITE POSTERS			
1. Are the following posters displayed in a prominent and accessible area?			
A. Minimum Wage			
B. OSHA Job Protection			
C. Equal Employment Opportunity			
2. Are all required state-specific posters displayed?			
HAZARD COMMUNICATION			
1. Is the written HAZCOM program available?			
2. Is there a MSDS FOR EACH HAZARDOUS CHEMICAL present in the office?			
3. Are all containers properly labeled, as to content, hazard?			
4. Have employees been trained on chemical hazards?			
5. Have all employees signed the HAZCOM acknowledgment form?			
6. Is there a list of chemicals maintained on site?			
DOCUMENTATION			
1. Is an OSHA 300 Log maintained and posted during February1, to April 30?			
2. Are accident report forms available?			
3. Is a copy of health and safety policy and procedures available?			

OFFICE SAFETY INSPECTION REPORT

OFFICE _____ **DATE** _____

ALL NEGATIVE RESPONSES	CORRECTIVE ACTION	ASSIGNED TO	DATE ASSIGNED	DATE COMPLETED	VERIFIED BY

DESCRIBE POSITIVE SAFETY OBSERVATIONS

ATTACHMENT 4
LABORATORY SAFETY INSPECTION REPORT

LOCATION _____ **DATE** _____

		YES	NO	N/A
I.	FIRST AID			
1.	Are first aid kit locations identified and accessible?			
2.	Are emergency eye wash/safety showers available and inspected monthly?			
3.	Is access to eye wash units and safety showers unimpeded?			
II.	PERSONAL PROTECTIVE EQUIPMENT			
1.	Are employees wearing safety glasses in the laboratory?			
2.	Are laboratory coats worn by all employees and visitors when working with chemicals and/or samples?			
3.	Are gloves worn when chemicals and samples are handled?			
III.	FIRE PREVENTION/FIRE PROTECTION			
1.	Are employees smoking only in designated outdoor areas?			
2.	Are flammable storage cabinets available and used when needed?			
3.	Has a fire alarm system been established?			
4.	Are fire extinguishers available and inspected monthly?			
5.	Do employees know the location and use of fire extinguishers?			
6.	Are fire extinguisher locations posted?			
7.	Have fire extinguishers been professionally inspected during the last year?			
IV.	EMERGENCY PLANS			
1.	Are emergency telephone numbers posted?			
2.	Have emergency escape routes been designated?			
3.	Are employees familiar with the emergency signal?			
4.	Are appropriate spill kit supplies available?			
5.	Are emergency exits marked?			
6.	Are sprinkler heads unobstructed?			
V.	ELECTRICAL			
1.	Are extension cords kept out of wet areas?			
2.	Are extension cords arranged so that they are not placed over radiators, steam pipes, through doorways, or under carpets?			
3.	Are cords, panels, receptacles, and plugs in good condition?			
4.	Are extension cords not being used in lieu of permanent wiring?			
5.	Are extension cords not plugged into other extension cords?			
6.	Are multi-outlet strips not plugged into other multi-outlet strips?			
7.	Has a lockout/tagout system been established?			
8.	Are GFCIs being used on all temporary electrical systems and as needed?			
9.	Are warning signs exhibited on high voltage equipment (250V or greater)?			
10.	Are circuit breakers or fuse panels properly labeled, kept closed, and accessible?			
VI.	COMPRESSED GAS CYLINDERS			
1.	Are like cylinders segregated and stored in well ventilated areas?			
2.	Is smoking prohibited in cylinder storage areas?			
3.	Are cylinders stored secure and upright?			
4.	Are cylinders protected from snow, rain, etc.?			

ATTACHMENT 4
LABORATORY SAFETY INSPECTION REPORT

LOCATION _____ **DATE** _____

		YES	NO	N/A
5.	Are cylinder caps in place for storage and movement?			

VIII. WALKING AND WORKING SURFACES

1.	Are accessways, stairways, and ramps clean of ice, mud, snow, or debris?			
2.	Are stairways and floor openings guarded?			
3.	Are handrails and siderails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches?			
4.	Are tripping hazards from electrical cords, phone outlets, or other protrusions on the floor prevented by arrangement of furniture or equipment?			
5.	Are floors free of loose tiles and projections that can create a tripping hazard?			

VIII. HAZARD COMMUNICATION

1.	Is there a copy of the Chemical Hygiene Plan (CHP) on site?			
2.	Have employees been trained in accordance with the CHP?			
3.	Are all containers properly labeled as to content, hazard, etc.?			
4.	Is there an updated list of chemicals maintained at the laboratory?			
5.	Are there MSDSs for the chemicals present in the laboratory?			
6.	Do employees know and understand the effects of exposure from the chemicals they work with?			

IX. DOCUMENTATION

1.	Is an OSHA 300A Log maintained on site and posted between February 1and May 1?			
2.	Are accident report forms available?			

X. FURNITURE AND EQUIPMENT

1.	Are desks, file cabinets, etc. arranged so that drawers do not open into aisles or walkways?			
2.	Are desk and file drawers closed after use?			
3.	Are cabinets, bookcases, and shelves secured to prevent their falling over?			
4.	Is adequate and sufficient lighting provided in all work areas?			
5.	Are work stations arranged to be comfortable without unnecessary strains on backs, arms, necks, etc.?			
6.	Do machines with exposed moving parts have guards?			

XI. LABORATORY FUME HOODS

1.	Are face velocities posted on each hood?			
2.	Is the average face velocity at least 100 ft/min.?			
3.	Is the sash position marked or otherwise indicated to show the acceptable position for achieving the desired airflow rate?			
4.	Has the hood face velocity been measured with a calibrated instrument in the last 6 months?			
5.	Are signs posted on hoods that are not working correctly?			
6.	Does the hood contain visual indicators that it is working properly (e.g., manometer, magneheilic guage, etc.)?			

ATTACHMENT 4
LABORATORY SAFETY INSPECTION REPORT

LOCATION _____ **DATE** _____

	YES	NO	N/A
XII. GENERAL LABORATORY RULES			
1. Are open-toed shoes and sandals prohibited in the laboratory?	____	____	____
2. Are eating, drinking, chewing gum or tobacco products prohibited in the laboratory?	____	____	____
3. Are food refrigerators labeled such as to prevent chemical storage or vice versa?	____	____	____
XIII. HOUSEKEEPING			
1. Are lab benches orderly?	____	____	____
2. Are laboratories free of liquid spills?	____	____	____
3. Are sinks free of accumulated glassware?	____	____	____
4. Are waste disposal containers available and labeled?	____	____	____

PROCEDURE

Subject: JOB SAFETY ANALYSIS (JSA)

1.0 PURPOSE AND SUMMARY

This procedure provides the guidelines to perform a Job Safety Analysis.
The (JSA) is an effective management technique for identifying hazardous conditions and unsafe acts in the workplace. A JSA is intended to analyze the individual steps or activities, which together create a job or specific work duty, and to detect any actual or potential hazards that may be present. This process can identify less obvious potential hazards that may go undetected during routine management observations or audits. **A new JSA must be completed every day, before commencement of any work activity and updated in the event of changing conditions. It should be understood that changing conditions that a work crew encounters during a work period (inclement weather, another contractor began work in area, etc.) requires that the JSA be modified to address the new hazards. The JSA should be changed to reflect new conditions in the task being performed or new hazards not identified previously.**

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  5.2 Methods of Conducting JSA's
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  5.5 Identifying the Hazards and Potential Accidents
  5.6 Accident Types
  5.7 Writing Instructions
  5.8 Develop Solutions
6.0 Specific Requirements
  6.1 Sequence of Basic Job Steps
  6.2 Potential Hazards
  6.3 Recommended Action Procedure
7.0 References
8.0 Attachments

3.0 Responsibility Matrix

3.1 Procedure Responsibility

The Manager/Supervisor is responsible for implementing and enforcing this procedure.

The Safety Representative is responsible for monitoring compliance with this procedure.

Each Employee is responsible for complying with the project safety program, along with the rules and regulations as stipulated in this procedure and instructions issued by the employee's supervisor.

It is the responsibility of management and supervision to ensure that this policy is followed. Accordingly, should the project / site requirements stipulate the use of another method of job safety analysis, it is the responsibility of management and supervision to ensure that the proposed method either meets or exceeds this JSA policy and the accompanying JSA form. Any policy or JSA form that does not cover the items contained herein shall not be used.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1

4.0 DEFINITIONS

HAZARD - A potential danger. Oil on the floor is a hazard.
ACCIDENT - An unintended happening that may result in injury, loss or damage.
EXAMPLE - Slipping on the oil is an accident.
INJURY - The result of an accident. A sprained wrist from the fall would be an injury.

5.0 TEXT

5.1 General Requirements

The first page of the JSA form is a checklist that should be used for reference purposes and serves to assist the work crew and supervisor in completing the second page of the JSA. The first page of the JSA form is used to write out the various tasks involved, potential hazards, recommended actions, etc.

Job Safety Analysis is a procedure used to review job methods and uncover hazards:

- That may have been overlooked in a Hazard Analysis, project layout or design of the

equipment, tools processes or work area.

- That may have developed after production started.
- That may have resulted from changes in work procedures or personnel

The three basic steps in performing a job safety analysis are

- (Job Task) Break the job down into successive steps or activities and observe how these actions are performed.
- (Potential Hazards) Identify the hazards and potential accidents. This is the critical step because only an identified problem can be corrected or eliminated.
- (Recommended Actions) Develop safe job procedures to eliminate the hazards and prevent potential accidents.

5.2 Methods of Conducting JSA's

There are two basic methods for conducting the Job Safety Analysis:

— Direct observation

— Group discussion

A fast and efficient method of conducting a JSA is through direct observations of job performance. In many instances, however, this method may not be practical. However, through direct observation, one can gain knowledge concerning an activity and use it on a future JSA.

For instance, new jobs and those that are done infrequently do not lend themselves to direct observation. When this is the case, the JSA can be made through discussions with persons familiar with the job. Individuals often involved in the process include, but are not limited to, first line supervisors, safety specialists, engineers, experienced employees and outside contractors.

5.3 Analyzing The Job

When analyzing the job, most people start with the worst first. You should be guided by the following factors:

- **Frequency of Accidents** (Including "near misses"):
  An element of a job that repeatedly produces accidents is a candidate for starting a JSA. The greater the number of incidents associated with a job element, the greater its priority claim for a JSA.

- **New or Revised Jobs**:
  Jobs created by changes in equipment or in processes obviously have no history of accidents, but their accident potential may not be fully appreciated. Analysis should not be delayed until accidents or near misses occur.
  Any changes from the original task/job shall be noted on the form as a revision. Once this has occurred the new found hazards must be reviewed with the crew.

- **Multiple Employee Exposure**
  Jobs that expose more than one individual to potential hazards should also be analyzed.

5.4 Common Errors

Five common errors that are often made when performing a job analysis are:

- Making the breakdown so detailed that an unnecessarily large number of steps are listed.
- Making the job so general that basic steps are not recorded.
- Failure to identify the education and experience level of the target audience.
- Failure to identify end use(s). (i.e., training, actual procedure, basis for procedure, etc.)
- Always relying on the Supervisor for completing the JSA. Supervisor should describe work scope to the crew. The crew should then assist in identifying hazards and controls at the job site with active involvement from the Supervisor. Ultimately, the supervisor is responsible, however, crew members and the Supervisor should be actively involved in each JSA.

5.5 Identifying the Hazards and Potential Accidents

The purpose is to identify all hazards, both **physical** and **environmental**. To do this, ask yourself these questions about each step:

- Is there a danger of striking against, being struck by, or otherwise making harmful contact with an object?
- Can the employee be caught in, on, by or between objects?
- Is there a potential for a slip, trip or fall? If so, will it be on the same elevation or to a different elevation?
- Can he strain himself by pushing, pulling, lifting, bending or twisting?
- Is the Environment hazardous to one's safety or health? Has the weather been considered as a factor? Has the work product of others, as it pertains to the environment, been considered???

5.7 Accident Types

- Struck by
  - moving or flying object
  - falling material
- Struck against
  - stationary or moving object
  - protruding object
  - sharp or jagged edge
- Contact with
  - acid
  - electricity
  - heat
  - caustic
  - cold
  - radiation
  - toxic and noxious substances
- Overexertion / repetitive
  - Lifting
  - pulling
  - pushing
  - reaching
  - twisting
- Caught
  - in
  - on
  - between
- Fall to
  - same level
  - lower level
- Bodily reaction from
  - voluntary motion
  - involuntary motion
- Rubbed or abraded by
  - friction
  - pressure
  - vibration

5.8 Writing Instructions

- Put any qualifying statements first, not last.
- Start each instruction with an action word.
- Each instruction should be observable.
- Each instruction should be measurable.

When evaluating a given procedure, ask the following question.

"What should the employee do -- or not do -- to eliminate this particular hazard or prevent this potential accident?"
Answer must be specific and concrete to be beneficial. General precautions such as "be careful"; "use caution" or "be alert" are useless. Answers should state what to do and how to do it.

This recommendation, "Make certain the wrench does not slip or cause loss of balance" is incomplete. It does not tell how to prevent the wrench from slipping. Here is a more complete recommendation. "Set the wrench properly and securely. Test its grip by exerting a slight pressure on it. Brace yourself against something immovable, or take a stance with feet wide apart before exerting full pressure. This prevents loss of balance if

the wrench slips."

Job Safety Analyses can be very beneficial if they are performed correctly. They not only result in a safer job, but also increase productivity and eliminate waste. Take the time to do them correctly; **and more importantly, use them.**

5.9 Develop Solutions

The final step in conducting a JSA is to develop a recommended safe job procedure to prevent the occurrence of potential accidents. The principle solutions are:

- Find a new way to do the job.
- Change the physical conditions that create the hazard.
- Try to eliminate remaining hazards by changing work methods or procedures.
- Try to reduce the necessity of doing a job, or at least the frequency that it must be performed.

6.0 Specific Requirements

Instructions for Completing Job Safety Analysis Form

Job Safety Analysis (JSA) is an important accident prevention tool that works by finding hazards and eliminating or minimizing them before the job is performed, and before they have a chance to become accidents.

- Use your JSA for job clarification and hazard awareness
- as a guide in new employee training
- for periodic contacts and for retraining of senior employees
- as a reference tool to be used prior to commencing a job which is performed infrequently
- as an accident investigation tool
- Informing employees of specific job hazards and protective measures.

6.1 Sequence of Basic Job Steps

Break the job down into steps. Each of the steps of a job should accomplish some major task. The task will consist of a set of movements used to perform a task, and then determine the next logical set of movements.
For example, the job might be to move a box from a conveyor in the receiving area to a shelf in the storage area. How does that break down into job steps? Picking up the box from the conveyor and putting it onto a hand truck is one logical set of movements, so it is one job step.

Everything related to that one logical set of movements is part of that job step. The next logical set of movements might be pushing the loaded hand truck to the storeroom. Removing the boxes from the truck and placing them on the shelf is another logical set of movements. Finally, returning the hand truck to the receiving area might be the final step in this type of job.

Be sure to list all the steps in a job. Some steps might not be done each time -- checking the casters on a hand truck, for example. However, that task is part of the job as a whole, and should be listed and analyzed.

6.2 Potential Hazards

Identify the hazards associated with each step. Examine each step to find and identify hazards -- actions, conditions and possibilities that could lead to an accident. It is not enough to look at the obvious hazards. It is also important to look at the entire work environment and discover every conceivable hazard that might exist.

- Be sure to list health hazards as well, even though the harmful effect may not be immediate. A good example is the harmful effect of inhaling a solvent or chemical dust over a long period of time.
- Hazards contribute to accidents, injuries and occupational illnesses. In order to do part three of a JSA effectively, you must identify potential and existing hazards. That's why it's important to distinguish between a hazard, an accident and an injury. Each of these terms has a specific meaning:

Some people find it easier to identify possible accidents, illnesses, and work back from them to the hazards. If you do that, you can list the accident and illness types in parentheses following the hazard. However, be sure you focus on the hazard for developing recommended actions and safe work procedures.

6.3 Recommended Action Procedure

Decide what actions are necessary to eliminate or minimize the hazards that could lead to an accident, injury or occupational illness. Among the actions that can be taken are:

1) engineering the hazard out

2) administrative controls

   - job instruction training

   - good housekeeping

- good ergonomics
  (Positioning the person in relation to the machine or other elements in the Environmental in such a way as to eliminate stresses and strains)

3) providing personal protective equipment

- List recommended safe operating procedures on the form, and list required or recommended personal protective equipment for each step of the job.
- Be specific. Say exactly what needs to be done to correct the hazard, such as "lift, using your leg muscles." Avoid general statements like "be careful."
- Give a recommended action or procedure for every hazard.
- If the hazard is a serious one, it shall be corrected immediately.

The JSA should be changed to reflect new conditions in the task being performed or new hazards not identified previously.

7.0 REFERENCES

"Job Hazard Analysis", U.S. Dept. of Labor -- OSHA Publication No. 3071

"Job Safety Analysis" - Safety Manual No. 5, U.S. Dept. of Interior, Mining Enforcement and Safety Administration

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Job Safety Analysis Form

ATTACHMENT 1
EMPLOYEE AND SUBCONTRACTOR TRAINING REQUIREMENTS

Responsibility Matrix

Action	Procedure Section	*Responsible Party*		
		Manager/ Supervisor	H&S Representative	Employee
Responsible for implementing and enforcing procedure	3.1	X		
Monitoring for compliance with the procedure.	3.1		X	
Complying with the project JSA program, along with the rules and regulations as stipulated in this procedure	3.1			X
Review completed JSA forms for any errors and communicate to the originator of the changes.	5.5		X	

Shaw The Shaw Group Inc.

JOB SAFETY ANALYSIS

DATE:
JOB#:
PERMIT#:
ISSUED BY:

SUPERVISION/FOREMAN _____ _____

Consider the following and check the items which apply to the job, then review with the work crew.

PERMITS
- ____ Required
- ____ Cold Work
- ____ Hot Work
- ____ Entry Permit
- ____ All Conditions Met
- ____ Signed Off When Complete
- ____ Other _____

PERSONAL PROTECTIVE EQUIP. (PPE)
- ____ Type of Gloves
- ____ Composition of Gloves
- ____ Special Purpose Gloves
- ____ Tyvek Suit
- ____ Acid Suit /Slicker Suit
- ____ Rubber Boots
- ____ Mono Goggles (vented/non-vented)
- ____ Face Shield
- ____ Respirator
- ____ Fresh Air
- ____ Ear Protection
- ____ Safety Harness
- ____ Burning Goggles
- ____ Other _____

TOOLS
- ____ Current Inspection
- ____ Proper Tools for the Job
- ____ Good Tool Condition
- ____ Qualifications
- ____ Other _____

EMERGENCY EQUIPMENT
- ____ Fire Extinguishers
- ____ Safety Shower
- ____ Evacuation Route
- ____ Other _____

ACCESS
- ____ Scaffold (properly inspected)
- ____ Ladder (Tied off)
- ____ Manlift
- ____ Personnel Basket (inspected & approved)
- ____ Operator Training
- ____ Special Provisions
- ____ Other

WELDING
- ____ Flashburns
- ____ Combustibles
- ____ Spark Containment
- ____ Shields
- ____ Grounding
- ____ Water Hose
- ____ Fire Extinguisher
- ____ Fire Blanket
- ____ Fire Watch
- ____ Sewer Covers
- ____ Other _____

OVERHEAD WORK
- ____ Barricades
- ____ Signs
- ____ Hole Cover
- ____ Handrail
- ____ Other _____

ELECTRICAL
- ____ Locked & Tagged out
- ____ Try Start/Stop Switch
- ____ GFCI Test
- ____ Assured Grounding
- ____ Extension Cord Inspection
- ____ Other _____

LIFTING
- ____ Forklift
- ____ Cherry Picker
- ____ Load Chart
- ____ Angle
- ____ Crane
- ____ Chainfall
- ____ Proper Rigging Practices
- ____ Manual Lifting
- ____ Condition of Equipment
- ____ Operator Certificate

HAZARDS (ENVIRONMENTAL)
- ____ Electrical Shock
- ____ Heat Stress
- ____ Heavy Objects
- ____ Hot/Cold Surf. Or Mat.
- ____ Inadequate Lighting
- ____ Line Breaking
- ____ Noise
- ____ Poor Access/Egress
- ____ Sharp Objects
- ____ Other _____

HAZARDS/CHEMICALS
- ____ Chemical Burn Shin/Eyes
- ____ Flammable
- ____ Ingestion
- ____ Inhalation
- ____ Skin Contamination

HAZARDS/BODY
- ____ Fall Potential
- ____ Pinch Points
- ____ Slip-Trip Potential
- ____ Other _____

OTHER WORK IN AREA
- ____ Others Working Overhead
- ____ Type Work Others Doing
- ____ PPE Due to Other Work
- ____ Other _____

Confined Space

Know the Following:

- Possible hazards within the confined space
- First signs of exposure
- How to summons help
- How to track personnel
- Entering and exiting the confined space
- Maintain contact with all entrants by voice or visual
- Do not attempt to rescue unless you are a part of a coordinated effort
- Remain at entry point assume no duties with take you from there.

SUPERVISOR/FOREMAN RECOMMENDATION: _____

Shaw The Shaw Group Inc.

JOB SAFETY ANALYSIS

DATE:
JOB#:
PERMIT#:
ISSUED BY:

Location of Job
(Unit/Location on Project):

Required PPE:	**Safety Access/ Location**	Supervisor of Work:
	Safe Haven:	JSA Prepared By:
	Wind Direction:	Are other crews in area?
Pre-Job Preparation 1. Fill out JSA 2. Review JSA (EVERYONE) 3. Sign JSA (EVERYONE)	Evacuation Route: Assembly Point:	New: / Revised:

Job Task (What are You Doing)	**Audit the Job** Audit Time:
Potential Hazards	**Supervisors Comments**
Recommended Action or Procedure	**Supervisor's Initials:**

Crew Name Signatures:		

PROCEDURE

Subject: TAILGATE SAFETY MEETINGS

1.0 PURPOSE AND SUMMARY

This procedure establishes the requirement for the conductance of tailgate safety meetings. These meetings are to be conducted at each company project site, on a daily basis, prior to the start of any work activities.

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8.0 Attachments

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Tailgate Safety Meeting - A short training or informative session that provides safety guidelines for the planned work activities for the day or shift.

5.0 TEXT

The project supervisor or his/her designee conducts a tailgate safety meeting at the beginning of each shift or whenever new employees arrive at the work site. The topics discussed at the tailgate safety meeting should cover the work assignments for the day, the expected hazard(s) presented by the work, and an explanation on how employees will protect themselves from those hazards.

The meetings are to be documented by the completion of a Tailgate Safety Meeting Form. The project supervisor will assure that the form is properly completed and signed by all attendees. Completed forms will be maintained in the project files.

The following sections provide guidance for the completion of the form:

- **Project Name/Number** - Specific project name and number assigned to the project.
- **Date** - Date of meeting.
- **Time** - Time at which meeting is held.
- **Client** - Identification, name, etc. of entity for whom work is to be performed.
- **Work Activities** - Detailed description of the work activities to be performed that day.
- **Hospital Name/Address** - Hospital name and address designated to be used for the project.
- **Phone Number** - Designated hospital non-emergency phone number.
- **Ambulance** - Phone number for medical emergency transportation.
- **Safety Topics Presented:**

    1. **Chemical Hazards** - Specific chemical name and adverse properties of all chemicals to be encountered on the job that day. A Material Safety Data Sheet (MSDS) for each should be available and discussed in accordance with Procedure HS060.

    2. **Physical Hazards** - Address physical hazards associated with the work site, such as slipping/tripping/falling hazards, pinch points, overhead hazards, and nearby operations that could pose a hazard.

    3. **Personal Protective Equipment** - Specify levels of protective clothing and protective devices to be used by employees for each of the days activities.

4. **New Equipment** - Indicate proper work techniques and any hazards associated with new or unfamiliar equipment.

5. **Other Safety Topic(s)** - List any remaining safety topics pertinent to the potential hazards of the job for that day. This is an area where different, unique subjects can be introduced to make the tailgate safety meeting more interesting.

- **Attendees** - Printed name and signature of all persons in attendance. (Also, list affiliation if not employed by the company.)

- **Meeting Conducted By** - Printed name and signature of individual conducting the tailgate safety meeting.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS060 Hazard Communication Program

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Tailgate Safety Meeting Form

ATTACHMENT 1
TAILGATE SAFETY MEETINGS

Responsibility Matrix

Action	Procedure Section	*Responsible Party*	
		Director of Health and Safety	Project Supervisor
Issuance, Revision, and Maintenance of Procedure	3.1	X	
Conduct Meeting	5.0		X

ATTACHMENT 2

TAILGATE SAFETY MEETING FORM

Project Name/Number: _____ Date: _____ Time: _____

Client: _____

Work Activities: _____

Hospital Name/Address: _____

Hospital Phone No.: _____ Ambulance Phone No.: _____

Safety Topics Presented

Chemical Hazards: _____

_____

Physical Hazards: _____

_____

Personal Protective Equipment:

Activity: _____ PPE Level: _____

Activity: _____ PPE Level: _____

Activity: _____ PPE Level: _____

Activity: _____ PPE Level: _____

Activity: _____ PPE Level: _____

New Equipment: _____

Other Safety Topic(s): _____

_____

Attendees

NAME PRINTED	SIGNATURE
	_____
	_____
	_____
	_____
	_____
	_____
	_____
	_____

Meeting conducted by: _____

PROCEDURE

Subject: HAZARD COMMUNICATION PROGRAM

1.0 PURPOSE AND SUMMARY

This procedure has been developed to ensure that all affected company employees are provided with current information on the hazardous chemicals that they may encounter during their work. The basic principle of Hazard Communication (HAZCOM) is that anyone that works with hazardous chemicals has both a need and a right to know the identities and the hazards of any chemical to which they may be occupationally exposed. This principle has been propagated by the Occupational Safety and Health Administration (OSHA) in 29 Code of Federal Regulations (CFR) 1910.1200 *Hazard Communication.*

Some company activities are likely to occur in states or localities that either have or will have requirements that differ from those contained within the federal standard. In such circumstances, the local health and safety representative will be responsible for ensuring that these requirements are included in either a site health and safety plan or a similar document and conveyed to all affected employees. If federal, state, or local regulations vary or conflict, the more protective requirements and practices will be followed.

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  5.4 Material Safety Data Sheets (MSDS)
  5.5 Training
  5.6 Trade Secrets
  5.7 Contractors
6.0 Exception Provisions
7.0 Cross References
8.0 Attachments

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The EH&S Operations Manager is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Article - A manufactured item other than a fluid or particle which is formed to a specific shape or design during manufacture, has end use function dependent in whole or in part upon its shape or design during end use, which under normal conditions of use does not release more than trace amounts of a hazardous substance and does not pose a physical hazard or health risk to employees.

Affected Employee - Any company employee who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies.

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I)

Hazardous Chemical - Any chemical which poses a physical or health hazard.

Health Hazard - A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. Health hazards include chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.

Immediate Use - When hazardous chemicals will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

Label - Any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.

Local Health and Safety Representative - The person who is responsible for the management and/or oversight of health and safety activities at a particular workplace. He/she may be assigned as a site health and safety officer or act as a home office health and safety manager who

is responsible for multiple workplaces. This person does not necessarily need to be physically located at a workplace in which they are responsible for ensuring that the requirements of this procedure are fulfilled. The local health and safety representative may designate another qualified individual to assume some or all of the responsibilities delineated in this procedure.

Physical Hazard - A chemical for which there is scientifically valid evidence that it is a combustible liquid, compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable, or reactive.

Responsible Party - The entity responsible for preparation or distribution of Material Safety Data Sheets (MSDS) that can provide additional information on the hazardous chemical and appropriate emergency procedures.

Trade Secret - Any confidential formula, pattern, process, device, information, or compilation of information that is used in an employer=s business, and that gives the employer an opportunity to obtain an advantage over competitors who do not currently know or use it.

Workplace - An establishment, job site, laboratory, office, or project at one geographic location containing one or more work areas.

5.0 TEXT

In accordance with the requirements established in 29 CFR 1910.1200, employers are required to develop, implement, and maintain at each workplace a HAZCOM program. The program contained herein is intended to ensure that the hazards of all chemicals used by employees are evaluated and that information concerning the hazards of each chemical are conveyed to affected employees. The company program generally consists of five provisions, including hazardous chemical inventories, procurement of hazardous chemicals, container labeling, MSDSs, and the development and implementation of employee training programs. Since the company does not typically produce, distribute, or import hazardous chemicals, the focus of this procedure is on establishing an effective consumer/handler type HAZCOM program and the communication of information to our affected employees.

There are some types of chemicals that are specifically exempt from this procedure. These materials include:

- Any hazardous waste as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1967, as amended (42 U.S.C. 6901 *et seq.*), when subject to regulations issued under that Act by the U.S. Environmental Protection Agency.

- Any hazardous chemical as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) when the hazardous chemical is the focus of

remedial or removal actions being conducted under CERCLA in accordance with U.S. Environmental Protection Agency regulations.

- Tobacco or tobacco products.

- Wood or wood products, including lumber which will not be processed, where the manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility. Wood or wood products which have been treated with a hazardous chemical are covered by this procedure, and wood which may be subsequently sawed or cut, generating dust.

- Articles.

- Food or alcoholic beverages which are sold, used, or prepared in a retail establishment, or foods intended for personal consumption by employees while in the workplace.

- Any drug, as defined by the Federal Food, Drug, and Cosmetic Act, when it is in solid, final form for direct administration to patient; drugs which are packaged by the manufacturer for sale to consumers in a retail establishment; and drugs intended for personal consumption by employees while in the workplace.

- Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace.

- Any consumer product or hazardous chemical, as defined by Consumer Product Safety Act and Federal Hazardous Chemicals Act, where the employer can show that it is used in the workplace for the purpose intended by the manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended.

- Nuisance particulates where the manufacturer, distributor, or importer can establish that they do not pose any physical or health hazard covered under this procedure.

- Ionizing and nonionizing radiation.

- Biological hazards.

5.1 Hazardous Chemical Inventories

A complete list of all hazardous chemicals known to be present in the workplace that may expose an employee to a physical or health hazard will be maintained at each office location and project site. This list will be placed in the front section of the MSDS binder discussed in Section 5.4. The local health and safety representative/site safety officer will be responsible for maintaining the list and revising it as new chemicals are procured

or when chemicals are no longer used and have been removed from the workplace. The identity of the hazardous chemical maintained on the list will be consistent with that which appears on the MSDS. All affected employees will be made aware of the location of the MSDS binder.

5.2 Procurement of Hazardous Chemicals

Since the company does not typically manufacture, distribute, or import hazardous chemicals, procurement is the primary method of obtaining hazardous chemicals. The person initiating the procurement of a hazardous chemical will be responsible for requesting a MSDS from the manufacturer or distributor. This MSDS is to be provided either prior to or at the time of receipt of the chemical. Hazardous chemicals are strictly forbidden to be accepted without an accompanying MSDS. Upon receipt of a hazardous chemical, the person receiving the shipment will notify the local health and safety representative so that a review of the MSDS can be conducted. Also, note that the supplier is only required to submit a MSDS with the initial shipment of a hazardous chemical to a specific location.

In the unlikely event that a hazardous chemical is either manufactured, imported, or distributed by the company, the Vice President, Health and Safety will be notified so that required actions, as dictated by OSHA, can be implemented.

5.3 Container Labeling

Labeling on hazardous chemical containers is meant to provide immediate information to affected employees about the hazards of chemicals they will be expected to handle during the course of their job duties. It is the responsibility of the manufacturer, importer, or distributor of the chemical to ensure that each hazardous chemical leaving their place of business is labeled, tagged, or marked with the following information:

- Identity of the hazardous chemical (must be common to the label, the MSDS, and the chemical inventory list);
- Appropriate warnings of the hazardous effects of a chemical (words, pictures, symbols, or any combination that appears on the label and convey the specific physical or health hazards including target organ effects); and
- Name and address of the chemical manufacturer, importer, or other responsible party.

The person receiving the shipment is responsible to ensure that each container of hazardous chemical(s) has been provided with this labeling information. Hazardous chemicals that do not contain adequate labeling will not be accepted by the receiving person. In the event that hazardous chemicals that do not contain adequate labeling are inadvertently received, they are not to be handled until the identity of the material and appropriate hazard warnings are provided. If the hazardous chemical is regulated by a

chemical-specific health standard, then it must be labeled in accordance with the requirements of that standard.

As long as the hazardous chemicals are maintained in their original, properly labeled container and their composition is not altered, there is no need for additional labeling. In the event that the chemical is transferred from a labeled container to an unlabeled portable container, the user must label this secondary container unless the container is intended for immediate use of the employee who performs the transfer. In this case, the container must be labeled with the identity of the chemical and the appropriate hazard warnings, as described above.

In locations where employees are present who only communicate in languages other than English, all labeling information must be presented in their language as well as in English.

5.4 Material Safety Data Sheets (MSDS)

MSDSs are written documents that convey specific, detailed information about the hazards associated with a specific chemical. It is the responsibility of the manufacturer, importer, or distributor to either provide MSDSs prior to shipment or with the shipped materials. The employee receiving the shipment of materials is responsible to ensure that a MSDS has been supplied. As described in Section 5.2, the employee initiating the procurement is responsible for requesting a MSDS from the manufacturer or distributor. In the event that a MSDS has not been provided, it is the responsibility of the receiving person to obtain one from the manufacturer or distributor as soon as possible. The material will not be handled prior to the receipt of a MSDS.

Each MSDS will be forwarded to the local health and safety representative/site safety officer or a designee who will then place a copy into a MSDS binder. This binder will be maintained in the workplace and updated as new materials arrive. The local health and safety representative/site safety officer will ensure that this binder is reviewed with all affected employees and is readily accessible during each work shift. A designated area for the storage of the binder will be established and all employees are to be informed of its location. Employees can request a personal copy of a MSDS by completing the Employee Request for MSDS form provided in Attachment 2. Where employees travel between workplaces during a work shift, the MSDSs may be kept at the primary workplace. Affected employees must be able to immediately obtain information from the MSDSs in the event of an emergency.

MSDSs will be in English and other languages, as necessary, for the particular employees in which the MSDSs will be used. MSDSs are to include the following information:

- Name, address, and telephone number of the responsible party;
- Identity of the chemical as it appears on the label;
- Hazardous ingredients;

- Physical and chemical characteristics;
- Physical and health hazards;
- Primary route(s) of entry;
- OSHA permissible exposure limit (PEL) or other applicable exposure limits;
- Carcinogen information;
- Safe handling and use information;
- Control measures;
- Emergency and first aid procedures; and
- Date of preparation and latest revision date.

5.5 Training

All affected employees will be provided with information and training on the hazardous chemicals in their work area at the time of their initial assignment, when new information about the hazards of a chemical is discovered, and whenever a new physical or health hazard that the employees have not previously been informed of is introduced into the workplace. The HAZCOM training record has been provided as Attachment 3.

Information provided in this training will include:

1. Requirements of the HAZCOM program.
2. Any operations in the work area where hazardous chemicals are present.
3. Location of written hazard communication program, listing of hazardous chemicals present and MSDS.
4. Methods and observations that may be used to detect the presence or release of hazardous chemicals by use of monitoring devices, visual appearance or odor.
5. The physical and health hazards of chemicals in the work area.
6. Protection measures to be utilized to prevent exposure, appropriate work practices, emergency procedures and proper PPE to be used.
7. Explanation of the labeling system and the MSDS and how employees can obtain and use the appropriate hazard information.

Training on this HAZCOM program may be satisfied by the use of two different types of training sessions. These sessions include:

- **Tailgate Safety Meetings** - These meetings will be used to convey the methods and observations that may be used to detect the presence or release of a hazardous chemical in the workplace, the physical and health hazards of the chemicals in the workplace, and the measures that can be taken to protect affected employees from these hazards. The guidelines for this meeting are described in Procedure HS051, Tailgate Safety Meetings.

- **Workplace-Specific or Annual Refresher Training** - Either of these training sessions can be used to convey the details of this HAZCOM program. These details include an explanation of labeling systems, the use of MSDSs, and how employees

can obtain and use the appropriate hazard information. These training sessions are discussed further in Procedure HS050, Training Requirements.

Workplace-specific and tailgate safety meetings will be facilitated by the local health and safety representative or another individual who is knowledgeable on the requirements of the HAZCOM program and the specific chemicals that are being discussed. Training for non-English speaking employees shall be conducted in a manner such that the employee is able to comprehend. Annual refresher training can only be conducted by personnel previously approved by the company Training Department.

5.6 Trade Secrets

Some hazardous chemical manufacturers, importers, and distributors may withhold proprietary information required to be present on a MSDS. In such instances, the name and telephone number of the manufacturer, importer, or distributor will be forwarded to the Vice President of Health and Safety for further action. It will be the responsibility of the Vice President of Health and Safety to either obtain the necessary information or to decide to reject the chemical for use in company workplaces.

5.7 Contractors

During the execution of our work, there will be situations when the company will be at locations where employees of other entities may be exposed to chemicals being used by the company. It will be the responsibility of the local health and safety representative or designee to provide the other entities= site representative(s) with copies of all MSDSs in which their employees may be exposed, as well as the labeling system in place, the protective measures to be taken, safe handling procedures to be used, and the location and availability of the MSDS binder.

Periodically, company work areas will be located on or adjacent to a facility operated by another entity. In these situations, the local health and safety representative or designee will contact the other entity to obtain applicable MSDS(s) for hazardous chemicals that company employees may be exposed to.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS050 Training Requirements
HS051 Tailgate Safety Meetings
HS500 OSHA Regulated Toxic and Hazardous Chemicals
OSHA 29 CFR 1910.1200

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Employee Request for MSDS
3. HAZCOM and Right-to-Know Standards Employee Training Record

ATTACHMENT 1
HAZARD COMMUNICATION PROGRAM

Responsibility Matrix

Action	Procedure Section	*Responsible Party*				
		Purchaser	**Receiver**	**Affected Employee**	**Local Health and Safety Representative**	**EH&S Operations Manager**
Understand and Comply With State and/or Local Regulations	1.0				X	
Issuance, Revision, and Maintenance of Procedure	3.1					X
Review and Understand This Procedure	5.0	X	X	X	X	
Establish, Update, and Revise MSDS Binder	5.1				X	
Request MSDSs for Procured Chemicals	5.2	X				
Initial Review of MSDSs	5.2				X	
Implement Requirements For Company Manufactured, Imported, or Distributed Chemicals	5.2					X
Review Incoming Shipments for Hazard Labeling/MSDS	5.3		X			
Request Missing MSDSs From Manufacturer or Distributor	5.4		X			
Provide HAZCOM Training	5.5				X	
Receive HAZCOM Training	5.5			X		
Obtain Information on Proprietary Chemicals	5.6					X
Transmit MSDSs to Contractors	5.7				X	
Obtain MSDSs From Other Entities	5.7				X	

ATTACHMENT 2

EMPLOYEE REQUEST FOR MATERIAL SAFETY DATA SHEET (MSDS)

Employee Name: (Please print) _____

Employee Number: _____

Job Title/Location: _____

Department/Work Area: _____

I am requesting a copy of the MSDS(s) for the following chemical(s):

(Chemical name, Common name, Trade name)

1. _____

2. _____

3. _____

_____

Signature Date

I have received a copy of the above MSDS(s) I requested.

_____

Signature Date

cc: Local Health and Safety Representative

ATTACHMENT 3

HAZARD COMMUNICATION AND RIGHT-TO-KNOW STANDARDS EMPLOYEE TRAINING RECORD

	INITIAL:
1. I have been informed about the Hazard Communication Program, Material Safety Data Sheets (MSDS), their use and location, and the procedures to obtain copies.	
2. I have been informed that some of my work may involve exposure to toxic substances, the hazards of which will be reviewed with me in tailgate safety meetings or site-specific training.	
3. I have been informed about the right of employees to have access to relevant exposure and medical records, and the procedures for requesting access.	
4. I understand that the company must act upon a request in a reasonable amount of time so as to avoid interruption of normal work operations.	
5. I have been provided access to the applicable regulations governing hazard communication, and access to employee exposure and medical records.	

PRINT NAME: _____

SIGNATURE: _____

EMPLOYEE NUMBER: _____

DATE: _____

ATTACHMENT 4

CHEMICAL LISTING

Chemical	MSDS Number
A12 - Car Cleaner Wax	1
A-33 Dry	2
ABC Dry Chemical	3
Acetone	4
Acid, Acetic	5
Acid Hydrochloric	6
Acid, Nitric	7
Acid, Nitric (Lightning)	8
Acid, Oxalic Dihydrate	9
Alcohol, Ethyl	10
Alcohol, Isopropyl	11
Alcohol, Methanol	12
Alconox	13
All Weather DTR Primer White Comp A	14
Aluminum Nitrate, 9-Hydrate	15
Amine Mixture	16
Ammonium Hydroxide	17
Anti-Seize Lubricant (133K)	18
Anti-Static Spray #19050	19
Antimicrobial Wipes	20
Armor All Protectant	21
Barium Nitrate	22
Bentonite Extender D20	23
Bradley Opti-Aid and Opti-Aid Plan 1181	24
Brake Cleaner (Aerosol), GUNK	25
Buffer Solution pH4	26
Buffer Solution pH7	27
Buffer Solution pH10	28
Butyl Rubber Sealant	29
Butyl Tape Glazing Compound 250 H	30
Calcium Chloride, (Flake)	31
Calcium Oxide, (Lime)	32
Canvak Coating	33
Carbon Dioxide	34
Casrn 38640-62-9	35
Casrn 92-71-7	36
Castrol Super Clean	37
Cement sp-4633	38
Certicool Instant Cold Pack	39
Chemlok AP-134	40
Closed Cell Neoprene Sponge	41

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CPVC Orange Cement	44
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Dap Kwik Foam	46
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Dextrose	49
Diazinon Ultra Insect Spray	50
Diesel Aid	51
Diesel Fuel	52
Dow All Purpose Cleaner	53
Dow Disinfectant Bathroom Cleaner	54
Dow Glass Plus	55
Dragon Home Pest Killer	56
Dursban Many Purpose Concentrate	57
Dye, (D11006 Chromatint Uranine HS Liquid)	58
Dyed Fuel Oil #2	59
Enforcer Wasp and Hornet Killer XT	60
Enoz Old Fashioned Moth Balls	61
Environcide, Disinfectant Decontaminant/Cleaner	62
Enviroseal 20	63
Envirosorb	64
Eva-Pox Quick Gel #24	65
Ethyl Chloride	66
Ethylene Glycol	67
Eyesaline Concentrate	68
Eyesaline Solution	69
Fantastic All Purpose Cleaner	70
Fast Track Trim Adhesive - 3M Brand	71
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Home Safeguard, Smoke Detector Tester	84
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Hydrogen Peroxide	86
Hydrogen Sulfide	87
Intraplast N	88
Insta-Gel	89

Insta-Gel XF	90
Iron Powder	91
Irritant Smoke	92
Isobutylene in Air	93
Isocyante Mixture	94
Iso-Flex Epoxy SF Primer(Part A)	95
Kerosene	96
Klean-Strip Mineral Spirits	97
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Micro Air I	109
Micro Air	110
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Mountain Grout "Accelerator"	112
Mountain Grout "Flexible"	113
Mountain Grout "Soil Stabilizer"	114
Mr. Jinx	115
Multi-Purpose Anti-Static Cleaner	116
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Non-Flammable Gas Mixture (Multi-Gas)	118
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Polyheed 997	151
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PROCEDURE

Subject: UNDERGROUND/OVERHEAD UTILITY CONTACT PREVENTION

1.0 PURPOSE AND SUMMARY

This procedure prescribes the steps to be followed in order to prevent accidents involving the contact with or damage of underground/overhead utilities. The company provides the operational and training practices required to safely execute work where underground/overhead utility hazards may exist.

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure. Also, see Attachment 1 for matrix of responsibilities.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

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4.0 DEFINITIONS

Company
All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Competent Person – Drilling Oversight (CPDO) Training
When drilling activity is to take place the Shaw's Field Team Leader (FTL) must have successfully completed Shaw's in-house training pertinent to competent person drilling oversight (CPDO Training). The FTL is required not only to have successfully completed CPDO training but to have an appropriate educational background, coupled with field experience and, the authority to make changes to correct deficiencies, or to stop the job if need be.
NOTE: The CPDO training requirement will become effective September 1st 2006. This means that every FTL will have successfully completed CPDO Training prior to August 31, 2006.

Competent Person - Excavation and Trenching
A person who is capable of identifying existing and predictable hazards in the excavation/trenching work area and who has the authority to take prompt corrective measures to eliminate them. NOTE: Excavation/Trenching training is required when trenching/excavation hazards are present/anticipated (i.e. spoil piles, use of three foot (3') or larger diameter augers, or other circumstances) but only recommended when trenching/excavation hazards are not present/anticipated.

Excavation
Any manmade cut, cavity, trench or depression in an earth surface formed by earth removal.

Underground Utility
Any active or inactive subsurface or buried structure that is or was designed to service a public or private facility. These may include, but are not limited, to the following:

- Electric power lines
- Natural gas lines
- Telephone lines
- Telephone cables and fiber optic lines
- Water lines
- Steam and pneumatic lines
- Sewer lines
- Drain lines
- Underground storage tanks
- Septic tanks
- Process or product lines

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Overhead Utility
Any active or inactive overhead structure that is or was designed to service a public or private facility. These may include, but are not limited, to the following:

- Overhead power lines
- Overhead telephone lines
- Overhead fiber optic lines
- Overhead cables
- Overhead supports
- Overhead piping
- Traffic lights
- Utility Bridges

One Call Center
Each state has a One Call, Dig Safe, Miss Dig, etc. dial-in number for requesting mark-out of buried public utilities, such as gas lines, electrical lines, telephone/cable lines, sewer lines, and water lines. This number is typically called a minimum of 72 hours prior to subsurface activities depending on the particular state the work will be conducted. The One Call Center will notify the local public utilities for a line location mark-out for the particular location. The individual public utilities must locate and mark-out the utilities upon request. In most cases, the markouts will not be performed on private property. A confirmation number is established and confirmation report generated and submitted to the requester.

As-Built Drawings
As-built drawings are blueprints that are usually obtained from the facility owner or client. They show original buried utilities and any modifications which have been made.

Private Utility Locating Service
A private utility locating service is a firm established to locate underground utilities using specialized locating equipment, such as ground penetrating radar location devices or radio transmitter type utility locating equipment.

Fiber Optic Service Lines
Fiber optic service lines are communication lines that are buried underground. When damaged, these lines are very expensive to replace. Fiber optic companies routinely provide on-site supervision, if requested. The company encourages this practice.

Field Team Leader (FTL)
The FTL is the person with whom the responsibility of the execution of the field work resides. This person may be the project manager, senior geologist, staff geologist, etc. This individual must have the sufficient experience, training and, field knowledge to ensure all site configuration information is collected and analyzed.

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Site Survey
A site survey is an inspection of the work site to look for signs of other buried utilities that may not be indicated through as-built drawings or through utility locating services. The survey typically involves inspection of overhead electrical services, inspection of basements, utility rooms, garages, etc., for signs of old electrical conduits or fuel/water/septic lines. The FTL must contact the appropriate site representative to provide any additional information that may be marked on the as-builts.

5.0 TEXT

Underground/overhead utilities may be encountered at any job site. The guidelines established in this procedure were developed to help identify and mitigate the potential hazards associated with this type of work.

Any subsurface activity is subject to the underground utility locating regulations for the state where the work will be conducted. This procedure authorizes the use of state, local or other required practices, but requires that the practice which most limits the liability to Shaw for damaged utilities is utilized. No variance is required under these circumstances, but the project-specific Health and Safety Plan (HASP) or work plan shall fully document these more protective procedures.

.

5.1 Preliminary Requirements

The Project Manager or designee must visit the site to mark the boring/excavation locations so they can be clearly identified and then contact the One Call Center for the state in which the work is to be performed in to formally request a utility mark out at the particular work location(s).

Prior to assignment of work the Field Team Leader (FTL) will assure that all affected employees receive an overview of the hazards of encountering underground/overhead utilities. The FTL is responsible to review this procedure, the work practices to control these hazards, and the roles and responsibilities of each worker with the work crew. This procedure and other requirements that may be contained in the site specific HASP shall be reinforced during daily tailgate safety meetings.

5.2 Operating Requirements

5.2.1 Underground Utilities Requirements

Prior to conducting any project site activities, the FTL must ensure that all existing underground/overhead utilities in the work area are located per the state or local mark-out protocols. Documentation of utility mark-out must be completed using the Utility Mark-out Documentation form (Attachment 3). No boring/excavation work is to be performed until all utility mark-outs are verified.

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While on-site, the FTL must conduct a site survey to search for signs of other buried or overhead utilities. This will include areas such as garages, basements, etc. The results of such surveys must be documented on the Utility Markout Documentation form (Attachment 3). The property owner, client, or facility operator must be consulted on the issue of underground utilities. All knowledge of past and present utilities must be evaluated prior to conducting work..

After all mark outs have been completed, and the boring locations have been accepted by the FTL prior to drilling, each borehole location must be hand dug to a minimum of five feet bgs.

If the investigation requires boreholes in an area not covered by a municipal one call system (on private property), then the FTL must utilize appropriate geophysical techniques, hand held utility locating devices, a private utility locating firm, or other approved method to determine the locations of underground utilities. The current accepted geophysical methods for the investigation and location of buried utilities include: Ground Penetrating Radar (GPR), Time Domain and/or Frequency Domain Electromagnetic methods, Magnetometer, and Inductive/Conductive Radio-Magnetic methods. The geophysical methods can be very useful for locating buried utility lines in areas where hand digging is not possible or practical. However, it must be noted that these methods do have limitations that are a function of soil conditions, depth of investigation, imaging resolution, or other factors.

If it is determined that a non-invasive geophysical investigation may be needed, assistance with selecting the appropriate method(s) can be obtained from the Shaw E & I Science and Technology Division, Geophysics & Mapping Group, and a variance request must be submitted and approved prior to the inception of intrusive field activity.

Should the local geology be prone to refusal or should there be any other reason the boring location cannot be cleared to a minimum of 5' bgs then the appropriate aforementioned alternative methods should be utilized to ensure the boring location is clear of utilities 5' bgs, and a variance request must be submitted for review.

5.2.2 Overhead Utilities Requirements

Overhead utility locations must be marked (warning tape, flags, etc.) where heavy equipment, or other equipment, has the potential for contacting overhead utilities. Conduct a site inspection on a daily basis to determine where activities will take place and the location of overhead utilities and overhead obstructions. Once they have been identified, place warning tape on poles and/or guy wires and attempt to plan the work so that no contact will be made with the overhead utilities or obstructions. Share the information with all site personnel during the tailgate safety meeting.

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Maintain at least 10 feet from overhead power lines, up to 50 kV. For voltages over 50 kV, add 0.4 inches per kV to obtain the safe distance between equipment and power lines. If voltage is unknown, remain at least 20 feet from overhead power lines.

As a precaution, a spotter must be used at all times when it is possible to violate the minimum distance requirements for overhead utilities. If contact is deemed unavoidable, consult with the client and the respective health and safety representative to evaluate the area to determine if the particular overhead utility can be removed prior to engaging in the activity.

5.2.3 Other Requirements

Only hand digging is permitted within 3 feet of underground high voltage, product or gas lines. Once the line is exposed heavy equipment can be used but must remain at least 3 feet from the exposed line.

Only experienced, demonstrably proficient equipment operators will be used to operate such heavy equipment as drill rigs, backhoes, front-end loaders, cranes, etc.

Due the sensitivity and costs associated with damage to fiber optic cables the FTL must have documented verbal contact and an agreement with the fiber optic company for all work within 50' of the fiber optic cables. Subsurface investigations near fiber optic cables are more fully discussed in site specific HASP's. Contact your division Health and Safety Professional for specific information on this subject.

5.3 Training Requirements

Competent Person Drilling Oversight (CPDO) Training

The FTL (at least one onsite Shaw person will be performing the drilling oversight) will be required to have successfully completed the approved internal Competent Person Drilling Oversight (CPDO) training.

Prior to assignment of work the Field Team Leader (FTL) will assure that all affected employees receive an overview of the hazards of encountering underground/overhead utilities. The FTL is responsible to review this procedure, the work practices to control these hazards, and the roles and responsibilities of each worker with the work crew. This procedure and other requirements that may be contained in the site specific HASP shall be reinforced during daily tailgate safety meetings.

Trenching/Excavation Training

The Field Team Leader or at least one onsite Shaw employee will be required to have successfully completed Trenching/Excavation training prior to the inception of site work activity when trenching excavation hazards (i.e. spoil piles, use of 3' diameter augers, or anytime similar hazards are present) are present/anticipated. NOTE: This training is now recommended rather than required when trenching/excavation hazards are NOT anticipated/required

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5.4 Incident Reporting Requirements

Employees are required to immediately report to their direct supervisor any overhead or underground utility contact incident, or near miss incidents. Any supervisor (but preferably the supervisor directly responsible for the involved employees) with first-hand knowledge of an incident is required to investigate the incident. The Project Manager and respective Health and Safety Manager or Representative shall be informed of the incident immediately.

At a minimum, the incident investigation will require completion of the incident investigation report and General Liability Property Damage and Loss Report form found in H&S Procedure HS020.

In addition, Attachment 5 provides a "Tip Sheet" to help properly assess and investigate the incident causes and recommendations or requirements.

5.5 Local Jurisdiction Requirements

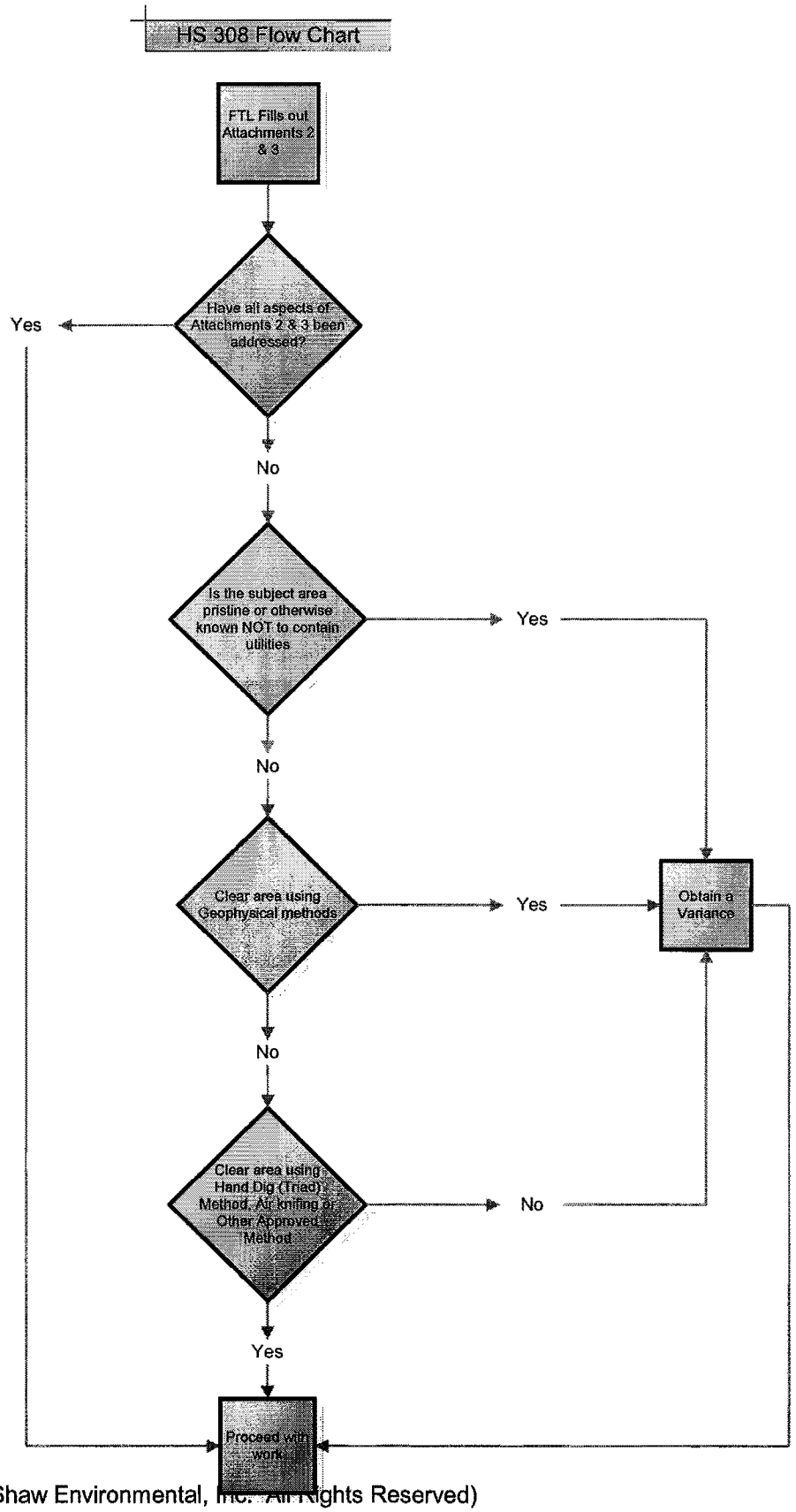
Where local jurisdictions or clients have established requirements different from those in this procedure, the practice which most limits the liability to Shaw for damaged utilities shall be utilized. No variance is required under these circumstances but the project-specific Health and Safety Plan or work plan shall fully document the alternate procedures.

6.0 EXCEPTION PROVISIONS

Anytime a minimum of a 5' clearance cannot be obtained by either hand digging or by using geophysical means, the FTL must obtain a variance from the Regional VP (or equivalent level such as Operations Director for Federal Business Line) or designee to proceed with drilling operations in that area. This would include an initial verbal variance documented in the field log followed up by a written (email) approval from either the Regional VP (or equivalent level or title) or designee. The record of communication will be noted in the field log for the project and, a record of the approval or denial will be placed in the project file.

A variance form can be obtained in HS 013. A flowchart to assist one in determining how and when a variance should be obtained can be found immediately following this section.

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7.0 CROSS REFERENCES

HS013	Health and Safety Procedure Variances
HS020	Accident Prevention Program: Reporting, Investigation, and Review
HS050	Training Requirements
HS307	Excavation and Trenching

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Pre Drilling Checklist
3. Utility Markout Documentation
4. Underground Utility Hits – Tip Sheet for Incident Investigations
5. Frequently Asked Questions

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ATTACHMENT 1 - UNDERGROUND/OVERHEAD UTILITY CONTACT PREVENTION
Responsibility Matrix

Action	Procedure Section	Vice President	Project Manager	Field Team Leader	HS Representative
Project-specific HASP or Work Plan shall document the practices to be used at a particular site.	1.0		X	X	X
Contact the One Call Center for mark out of utilities at the site	5.1		X		
Complete Utility Markout Documentation Form	5.2		X	X	
As-built drawings shall be reviewed	5.2			X	
Only experienced demonstrably proficient equipment operators will be used to operate such heavy equipment as backhoes, front-end loaders, cranes, etc.	5.3			X	
Provide training*	5.3				
Incident Investigation and Reporting	5.4		X	X	X
Exceptions to Procedure	6.0	X	X	X	X

*Provided by Shaw's Training Department

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ATTACHMENT 2 - PRE - DRILLING/BORING/GEOPROBE Checklist

Purpose: This form is designed to help the FTL make decisions drilling/boreholing/geoprobing around underground/overhead utilities.

DATE_____ PROJECT NAME/NUMBER_____
Field Team Leader Name: _____
DURATION/SUMMARY OF WORK TO BE PERFORMED: _____
_____

Consideration	Check	Check	Explanation	Initial
Has the state one-call been contacted?	□ Yes	□ No		
Are any as-built drawings available? If so, do they show any utilities?	□ Yes	□ No		
Has a visual inspection of the work area(s) been completed?	□ Yes	□ No		
If one-call not available has a private locating service or Shaw S&T group been contacted?	□ Yes	□ No		
Were any utilities identified through private locating service? If so, indicate on site drawings.	□ Yes	□ No		
Are there any fiber optic cables within 50 feet of hole locations?	□ Yes	□ No		
If fiber optic cables are within 50 feet has an agreement with the fiber optic company been established?	□ Yes	□ No		
Can a test borehole be advanced by hand digging, probing, post hole digging, and/or air knifed to 5 feet bgs?	□ Yes	□ No		
If hand digging, probing, post hole digging, and or air knifing to 5 feet bgs is not possible, can a non-invasive geophysical investigation be conducted? If not, why?	□ Yes	□ No		
Are you comfortable with approving this authorization?	□ Yes	□ No		
Other considerations:				

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ATTACHMENT 3 - UTILITY MARK-OUT DOCUMENTATION

Project Name:_____ Location:_____
FTL Name: _____ Date:_____
Utility Called:_____ Confirmation #:_____
Subcontractor:_____ Task/Activity:_____
County of work:_____ Municipality of work:_____

Before work is done on any site, contact the appropriate local utility locating service (One Call, Miss Dig, Uloco, etc.) or a local utility contractor to have sub grade utilities marked. NOTE: Boring locations to be placed not in the public right of way are typically not marked out by the public utility mark out, and a private utility locate service must be engaged. Indicate to the utility locator the nearest intersecting street for the site: _____ Confirmation No:_____.

List utility firms (public and private) and the utility they will mark.

Utility Marker Emergency Telephone Numbers Major Utilities Marked by Color Code			
Name of Utility Company	**Utility**	**Color Code**	**Emergency Telephone Number**
	Water	Blue	
	Gas	Yellow	
	Electric	Red	
	Telephone/ Cable/ Communication	Orange	
	Sewer	Green	
"ALL UNDERGROUND UTILITIES MAY NOT BE LOCATED BY THE LOCAL UTILITY SERVICE". Accordingly, you must list other known utilities in the area that the "One Call" service will not contact:			

Attach photos of the area prior to placing boreholes.
Take photos of the area indicating minimum 5' hand dig, post hole dig, probe, GPR or other:
NOTE: For any borehole, should 5' minimum clearance not be obtained, you must contact Business Line VP or equivalent (Operations Director or other on the Federal Business Line) and obtain a variance.

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Completed by:_____ _____ _____
Name Signature Date

ATTACHMENT 3 – UNDERGROUND UTILITY HITS TIP SHEET FOR INCIDENT INVESTIGATIONS

1. Location of the incident.
2. The time of day the incident occurred.
3. What type of utility was hit?
4. How deep was the line hit (in feet)?
5. Who called Designated Locator Service?
6. Note the "One Call" number on the Incident Investigation Follow-up report.
7. Attach the "One Call" record keeping documentation.
8. Were mark-outs completed by the utilities? If so, please identify.
9. Were mark-outs legible at the site?
10. Was the mark-out of the line that was hit accurate?
11. Was the mark-out misinterpreted?
12. Is there a utility damage sheet attached to the Incident Investigation Follow-up Report?
13. Have there been any faults or oversights by any 3rd party? If so, is it documented on the Incident Investigation Follow-up Report?
14. Did the FTL interview the property owner/manager prior to the incident?
15. Was pre-screened by hand digging 5 feet?
16. Were any supplemental utility locator devices used? If so, did we obtain them? If so, were they used on site?
17. Were there blueprints/as built plans available? If so, did we obtain them? If so, were they used on site?
18. Who is paying for the repairs?
19. Please define the total hours and cost estimate/impact to address the utility damage incident:

_____ Site time in hours (not billed to the job)
_____ PM time hours (not billed to the job)
_____ H&S time in hours (not billed to the job)
_____ BLM Time in hours (not billed to the job)
_____ Rework/non-billable time (estimate)
_____ Subcontractor rework/non-billable costs (estimate)
_____ Repair costs to company (estimate)
_____ Repair cost to customer (estimate)

20. Has the FTL completed Shaw's in-house CPDO training?
21. Has the FTL completed trenching/excavation training?
22. Is he/she current with the OSHA 40 hour and 8 hour refresher? If so, what are the dates of the training?
23. Who was the Site Safety Officer on the job site?
24. Does he/she have OSHA 8 hour supervisor training? If so, what are the dates of the training?
25. What was the name of the drilling subcontractor that was on site?
26. Have we researched the training background for this vendor?
27. Was a JSA performed at least once during the day that covered utility contacts and associated hazards?
28. Does this vendor have approved status?
29. Was there a tailgate safety meeting that took place?
30. Were utility mark-outs addressed at the tailgate safety meeting?
31. Were there any markings nearby the "hit" area?

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ATTACHMENT 5 – Frequently Asked Questions (FAQs)

During the roll-out of this revision of HS 308 a variety of questions/comments/concerns arose. These concerns have been put in the form of most frequently asked questions (FAQs) and their respective responses. These FAQs will clear up misunderstanding pertaining to this procedure, and provide valuable information that will help our workforce have a better understanding of how this procedure should be implemented. Please review the FAQs below:

1. *No other competitor of Shaw has felt the need to do anything as extreme as this procedure to ensure minimization of utility hits. Instituting this procedure will put us out of business.*

Response: After thorough review of claims and incidents involving drilling activities and underground utilities, the committee believes that our business/client needs are best served by adopting this policy. And that the likelihood of being put out of business is much greater from continuing to do business the way we currently do it than by adopting this improved policy. The committee realized that 100% adherence to this procedure at all work sites is likely not possible. For those cases where legitimate reasons exist for non-compliance, the committee realized that an effective responsive (variance) system must be in place. The committee believes that the variance procedure, as stated in the policy, should address the exceptions as they occur.

The Committee is not aware of any specific ASTM or true "industry standard". However, the committee is aware that best practices can vary tremendously and many times are client dependent. For example one extremely large Shaw client requires that we continuously probe. On the other end of the spectrum some clients look completely to Shaw for guidance in these matters.

2. *Our clients want us to do the work but do not wish to pay the additional fees involved with this new procedure. Could we offer them a two tiered pricing, one to do it the old way, and one to do it the new way?*

Response: The committee believes that contacting an underground utility of any type, no matter who is at fault or who ultimately pays for fixing, the outcome is a "black eye" for all involved. When these events occur, even if Shaw is not at fault, the committee believes that continued good client relations, and the potential for obtaining future business lessens as utility hits/incidents occur. This procedure is designed to minimize health and safety risks to our workers AND to mitigate liability to Shaw. Receiving the necessary compensation for the precautionary measures outlined in the procedure would be expected, and should be itemized in the initial proposal including a statement as to what will specifically be done in the field to mitigate risks relative to underground utilities and WHY Shaw believes these steps are necessary. However, if the client is willing to assume the entire

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liability resulting from "hitting" an underground utility, the contract should be written to reflect this and a variance would be in order. Keep in mind that Shaw cannot allow a client's desires to take on liability to affect the health and safety of workers. No matter what the client desires might be, Shaw would still expect the basic procedures to be followed for health and safety purposes. The training though yet to be finalized will provide project manager's examples of wording to be used in proposals and contracts.

3. Hand digging to 5' is impossible during frost conditions in Minnesota, Wisconsin and many northern areas. How should this be addressed?

Response: When conditions present themselves that do not allow for hand digging each borehole, other methods must be used for clearance and a variance must be obtained. The alternative methods include a range of non-invasive geophysical survey techniques designed specifically for locating buried utilities, pipelines, tank (UST), and other buried objects that can interfere with drilling. These non-invasive geophysical methods are suggested and mentioned in the procedure.

4. What if the field crew runs into refusal during hand dig clearance?

Response: If refusal occurs and moving to an alternate spot presents the same problem, hand digging may not be possible as mentioned in #2 above. When conditions present themselves that do not allow for hand digging each borehole, other methods must be used for clearance and/or a variance must be obtained. Of course, we expect that the dig safe folks to be contacted, and that a private locating service be utilized if available. Should a private locating service not be available, we can use trained internal sources.
The alternative methods include a range of non-invasive geophysical survey techniques designed specifically for locating buried utilities, pipelines, tank (UST), and other buried objects that can interfere with drilling. The current accepted geophysical methods for the investigation and location of buried utilities include: Ground Penetrating Radar (GPR), Time Domain and/or Frequency Domain Electromagnetic methods, Magnetometer, and Inductive/Conductive Radio-Magnetic methods. These non-invasive geophysical methods are suggested and discussed in the procedures. The geophysical methods can be very useful for locating buried utility lines in areas where drilling and digging are not possible or practical, but these methods do have some limitations that are a function of soil conditions, depth of investigation, and imaging resolution.
If it is determined that a non-invasive geophysical investigation may be needed, assistance with selecting the appropriate method(s) can be obtained from the Shaw E & I Science and Technology Division, Geophysics & Mapping Group. Of course, it is expected that the "dig safe" folks will be contacted, and that a private utility locating service be utilized when appropriate (utility location method is known to be feasible), and if available. Should a private locating service not be available, we can use trained internal Shaw E & I personnel resources to perform utility line location work. Finally, if the Project Manager has determined that a variance to the procedure is justified, a variance request should be submitted for review.

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5. Why is trenching/excavation training required for putting in Geoprobe® boreholes? This seems like tremendous overkill.

Response: The committee believes that, in general, trenching/excavation training is a good educational tool that promotes overall health and safety awareness and provides important information/techniques for our field staff. Trenching/excavation training provides insights into fall hazards, spoil pile placement, and many other related safety issues. Many of our drilling jobs have involved oversized auger bits (3' in diameter) where a large deep borehole is created. The committee agrees that when the diameter of the borehole lessens (i.e. use of a Geoprobe®), the impact of trenching/excavation training decreases. Trenching excavation training is now a requirement only when large boreholes are created or other hazards as mentioned above are present, but only recommended training when Geoprobe ® or similar equipment is being used and the result is trenching excavation type hazards do NOT exist. NOTE: Specific training pertinent to drilling/ Geoprobing ®/boring (CPDO training) will be provided and will be mandatory. Additionally, CPDO and trenching / excavation training are both required on projects where 3' or larger diameter boreholes are to be drilled.

6. Are there any training requirements besides trenching/excavation training?

Response: The committee evaluated a need for training specific to the HS 308 policy (drilling) and solicited the assistance of the training department and certain operations employees to develop CPDO training. This CPDO training includes basic steps needed to be taken from call the dig-safe number, private utility searches, geo-physical capabilities, probing, hand augering, air knifing, water pumping/knifing, hand digging and others.

7. Hand diggings creates heat stress, tripping hazards, back injuries, and other hazards and is unnecessary.

Response: The committee did not envision using a spade and a strong back to dig various 5' holes at the field site. The committee does envision using an air knife, water knife, probe, or other method rather than a hand shovel. The committee understands that not all methods may be acceptable in all states, municipalities or to all clients. The committee was also aware that when all else fails one could consider using a 1" diameter stainless steel auger placing 5' bgs hand borings in a triangular pattern where the auger bit could be placed in between these small hand borings. The committee envisions this theme and methodology to be expanded within the upcoming training. Additional information on augering techniques will be provided in the specific training (CPDO) mentioned above.

8. I need to put borings in pristine farmland next door to a contamination zone. There are no and have never been any utilities in this area. What should I do?

Response: Once you go through the proper utility locate procedure and are confident that no utilities

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exist in the subject area, you need to obtain a variance. This would also hold true for pristine forest preserves, wildlife refuges, or other areas not affected by utilities.

9. Who needs to sign off on a variance?

Response: Variances are signed by the Area Vice President (or designee, which may be delegated to the BLM for each office) along with the Project/Program Manager/Director. When we know in advance that HS308 cannot be adhered to, one should make plans to get a formal variance approval and appropriate paperwork developed two weeks prior to field activity. Variances can also be obtained when field conditions arise that make adherence to HS308 impossible. The variance can be obtained via cell phone in the field with the PM and appropriate management with the outcome noted in the field logbook followed up by an appropriate e-mail. This e-mail should be kept in the project file as proof of variance approval. It is recommended that variances be obtained as soon as it is known that they will be required.

10. What constitutes a "probe"? I assume a Geoprobe® is not valid?

Response: A Geoprobe® is NOT a valid probe in that Geoprobes® have caused damage to sewer lines and other utilities. Probes are typically made of a fiberglass-like material that have a pointed end but will not damage subsurface utilities and allows for the field staff to sense if underground items are encountered.

11. Under 5.1, is a subcontractor a designee?

Response: Although a subcontractor can make arrangements to contact dig safe and more, Shaw must ensure that the sub has, in fact, done what they had agreed to do. It should be remembered that typically on drilling projects, from many of our customer's perspective, the liability remains with Shaw, and they will look to Shaw, not our subs, for resolution of any events that occur. Hence, it is incumbent on Shaw to insure that our procedures are followed by Shaw and Shaw subs.

12. Does ground surface include concrete, asphalt or other man-made coverings?

Response: A simple NO. Some of our projects include drilling through airport runways or tarmacs which can be up to 15" in depth. Manmade surfaces do NOT count in the 5' hand dig clearance specification. If we are attempting to advance boreholes below existing concrete surfaces, the geology below the concrete will be exposed by cutting the concrete and removal of the concrete. After the concrete is removed and the geology is exposed, a hand auger can then be used. Hopefully, the twelve concerns above and the responses to these comments will have helped users understand the implementation of this HS 308 policy. More importantly the committee realizes that information on this subject will be provided during the training mentioned above. It is the committee's belief that once this program has been completely rolled out the need for variances will be minimal and the interactions of the safety department with operations management with this entire process will make ensure success.

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PROCEDURE

Subject: HEAT STRESS

1.0 PURPOSE AND SUMMARY

This procedure establishes the guidelines to protect employees from the effects of heat related illness. It describes the four major types of heat-induced illnesses, methods of prevention, types of treatment, and includes discussions on the monitoring of heat stress situations.

Some clients may have monitoring requirements that differ from those contained in this procedure. In such circumstances, the more protective monitoring requirements will be followed.

2.0 TABLE OF CONTENTS

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Acclimatization - Series of physiological and psychological adjustments that occur in an employee during initial exposures to hot environmental conditions that increase the employee's tolerance to elevated work environment temperature.

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Maximum Heart Rate - Amount of work (beats) per minute a healthy person's heart can be expected to safely deliver. Maximum heart rate (MHR) is calculated by subtracting an employee's age from 200.

5.0 TEXT

Adverse climatic conditions are important considerations in planning and conducting site operations. High ambient temperature can result in deleterious health effects ranging from transient heat fatigue, physical discomfort, reduced efficiency, personal illness, increased accident probability, etc., to serious illness or death. Heat stress is of particular concern when chemical protective garments are worn, since these garments prevent evaporative body cooling. Wearing personal protective equipment places employees at considerably higher risk of developing heat stress.

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses, regular monitoring and other preventive precautions are vital.

5.1 Signs, Symptoms, and Treatment

5.1.1 Heat Rash

Heat rash can be caused by continuous exposure to hot and humid air and skin abrasion from sweat soaked clothing.

Signs and Symptoms: The condition is characterized by a localized red skin rash and reduced sweating. Aside from being a nuisance, the ability to tolerate heat is reduced.

Treatment: Keep skin hygienically clean and allow it to dry thoroughly after using chemical protective clothing.

5.1.2 Heat Cramps

Heat cramps are caused by profuse perspiration with inadequate electrolytic fluid replacement. This often robs the larger muscle groups (stomach and quadriceps) of blood which can cause painful muscle spasms and pain.

Signs and Symptoms: Muscle spasms and pain in the extremities and abdomen.

Treatment: Remove employee to a cool place and give sips of water or an electrolytic drink. Watch for signs of heat exhaustion or stroke.

5.1.3 Heat Exhaustion

Heat exhaustion is a mild form of shock caused by increased stress on various organs to meet increased demand to cool the body. Onset is gradual and symptoms should subside within one hour.

Signs and Symptoms: Weak pulse; shallow breathing; pale, cool, moist skin; profuse sweating; dizziness; fatigue.

Treatment: Remove employee to a cool place and remove as much clothing as possible. Give sips of water or electrolytic solution and fan the person continually to remove heat by convection. CAUTION: Do not allow the affected person to become chilled; treat for shock if necessary.

5.1.4 Heat Stroke

Heat stroke is the most severe form of heat stress; the body must be cooled immediately to prevent severe injury and/or death. **THIS IS A MEDICAL EMERGENCY!**

Signs and Symptoms: Red, hot, dry skin (skin may be wet from previous perspiration particularly when evaporation-preventing clothing is worn); body temperature of 105° degrees Fahrenheit (F) or higher; no perspiration; nausea; dizziness and confusion; strong, rapid pulse.

Treatment: Heat stroke is a true medical emergency. Transportation of the victim to a medical facility must not be delayed. Prior to transport, remove as much clothing as possible and wrap the victim in a sheet soaked with water. Fan vigorously while transporting to help reduce body temperature. Apply cold packs, if available; place under the arms, around the neck, or any other place where they can cool large surface blood vessels. If transportation to a medical facility is delayed, reduce body temperature by immersing victim in a cool water bath (however, be careful not to over-chill the victim once body temperature is reduced below 102° F). If this is not possible, keep victim wrapped in a sheet and continuously douse with water and fan.

5.2 Prevention

The implementation of preventative measures is the most effective way to limit the effects of heat-related illnesses. During periods of high heat, adequate liquids must be provided to replace lost body fluids. Replacement fluids can be a 0.1% (percent) salt water solution, a commercial mix such as Gatorade, or a combination of these with fresh water. The replacement fluid temperature should be kept cool, 50°F to 60°F, and should be placed close to the work area. Employees must be encouraged to drink more than the amount required to satisfy thirst. Employees should also be encouraged to salt their foods more heavily during hot times of the year.

Cooling devices such as vortex tubes or cooling vests can be worn beneath impermeable clothing. If cooling devices are worn, only physiological monitoring will be used to determine work activity.

All workers are to rest when any symptoms of heat stress are noticed. Rest breaks are to be taken in a cool, shaded rest area. Employees shall remove chemical protective garments during rest periods and will not be assigned other tasks.

All employees shall be informed of the importance of adequate rest and proper diet in the prevention of heat stress and the harmful effects of excessive alcohol and caffeine consumption.

5.3 Monitoring

The initiation of heat stress monitoring will be required when employees are working in environments exceeding 90°F ambient air temperature. If employees are wearing impermeable clothing, this monitoring will begin at 78°F. There are two general types of monitoring that the health and safety representative can designate to be used: wet bulb globe temperature (WBGT) and physiological. Attachment 2 will be used to record the results of heat stress monitoring.

5.3.1 Wet Bulb Globe Temperature

The WBGT index is the simplest and most suitable technique to measure the environmental factors which most nearly correlate with core body temperature and other physiological responses to heat. When WBGT exceeds 25.9°C (78°F), the work regiment in Table 2 of the section, Heat Stress, in the latest edition of the American Conference of Governmental Industrial Hygiene (ACGIH) Threshold Limit Value (TLV) Booklet should be followed.

5.3.2 Physiological

Physiological monitoring can be used in lieu of or in addition to WBGT. It is anticipated that this monitoring can be self-performed once the health and safety representative demonstrates appropriate techniques to affected employees. Since individuals vary in their susceptibility to heat, this type of monitoring has its advantages. The two parameters that are to be monitored at the beginning of each rest period are:

- Heart Rate - Each individual will count his/her radial (wrist) pulse as early as possible during each rest period. If the heart rate of any individual exceeds 75% (percent) of their calculated maximum heart rate (MHR = 200 - age) at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work until his/her sustained heart rate is below 75% (percent) of their calculated maximum heart rate.

- Temperature - Each individual will measure his/her oral temperature with a disposable thermometer for one minute as early as possible in the first rest period. If the temperature exceeds 99.6°F at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same.

- An individual is not permitted to return to work if his/her temperature exceeds 100.4°F

5.4 Training

Employees potentially exposed to heat stress conditions will be instructed on the contents of this procedure. This training can be conducted during daily tailgate safety meetings.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS051 Tailgate Safety Meetings

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Heat Stress Monitoring Record

ATTACHMENT 1
HEAT STRESS

Responsibility Matrix

Action	Procedure Section	*Responsible Party*		
		Director of Health and Safety	**Project Supervisor**	**Health and Safety Representative**
Issuance, Revision, and Maintenance of Procedure	3.1	X		
Conduct Monitoring	5.3			X
Inform Employees About Procedure	5.4		X	X

ATTACHMENT 2
HEAT STRESS MONITORING RECORD

Project/Location _____ Date __

Employee Name	Initial Reading Time	First Work Period Time		Second Work Period Time		Third Work Period Time		Fourth Work Period Time		Fifth Work Period Time		Sixth Work Period Time	
	WBGT (°F)	WBGT (°F)		WBGT (°F)		WBGT (°F)		WBGT (°F)		WBGT (°F)		WBGT (°F)	
	Air Temp. (°F)	Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)	
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.

PROCEDURE

Subject: COLD STRESS

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish the guidelines necessary to protect employees from the adverse health effects caused by exposure to low temperature environments.

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The responsibility matrix is Attachment 1.

4.0 TEXT

Most cold related worker fatalities have resulted from failure to escape low air temperatures, or from immersion in low temperature water. Employees should be protected from exposure to cold so that their deep core temperature does not fall below 96.8° degrees Fahrenheit. Core body temperatures below this level will likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

4.1 Signs and Symptoms of Cold Stress

Several factors increase the harmful effects of cold including, being very young or old, wet clothing, having wounds or fractures, smoking, drinking alcoholic beverages, fatigue, emotional stress and certain diseases and medications. The two most prominent adverse effects from exposure to cold temperatures are frostbite and hypothermia. Treatment for cold related injuries should be administered by a person qualified in first aid or a professional medical provider.

4.1.1 Frostbite. Frostbite is the most common injury caused by exposure to cold temperatures. It occurs when cells of the body freeze restricting blood flow and causing tissue damage. The first sign of frostbite is slightly flushed skin which then changes to white or grayish yellow and finally grayish blue. Pain is sometimes initially felt but is often followed by a cold numb feeling.

4.1.2 Hypothermia. Hypothermia is the most severe form of cold stress and results from a drop in the body's core temperature. The initial signs include; shivering, numbness, confusion, weakness, impaired judgement, impaired vision, and drowsiness. Hypothermia victims typically progress through five stages of the condition including; (1) shivering, (2) apathy, (3) loss of consciousness, (4) decreasing pulse and breathing rate, and (5)death.

4.2 Precautionary Measures

It is recommended that employees wear insulated clothing to maintain core temperatures above 96.8°F when working in air temperatures below 40°F. This protective clothing may include but is not limited to:

- Insulated suits, such as whole-body thermal underwear
- Wool or polypropylene socks
- Insulated gloves and boots
- Insulated head cover, such as knit caps, hard hat liners, etc.

When conducting work in air temperatures below 35°F, the following practices shall be followed:

- If the clothing of an employee is expected to become wet, the outer layers of clothing must be impermeable to water.

- If an employees underclothing becomes wet it must be changed immediately. If the clothing becomes wet from sweating, the employee may finish the task which caused the sweating before changing into dry clothing.

- Employees will be provided a warm area (65°F or above) to change from work clothing into street clothing and for breaks.

- Hot liquids, such as soups, warm drinks, etc. shall be provided in the break area. The intake of caffeine containing products shall be discouraged due to their diuretic and circulatory effects.

- If appropriate, approved space heaters may be provided in the work area to warm the hands, feet, etc.

- The buddy system shall be practiced. Any employee observed with signs of cold stress shall immediately proceed to the break area.

- Employees will be reminded to layer their clothing, i.e., wear thinner, lighter clothing next to the body with heavier clothing layered outside the inner clothing.

- Avoid overdressing when going into warm areas or when performing activities which are strenuous. This could potentially lead to heat stress situations.

- Auxiliary heated versions of handwear, footwear, etc., can be used in lieu of mittens, insulated socks, etc. if extremely cold conditions exist.

- Employees handling liquids with high evaporation rates (gasoline, hexane, alcohol, etc.) shall take special precautions to avoid soaking of clothing with the liquids because of the added danger of cold injury caused by evaporative cooling.

- Work shall be arranged in such a way that sitting still or standing for long periods is minimized.

- If the air temperature is 20°F or below the hands shall be protected by mittens or gloves prior to contact with cold surfaces such as metal, etc.

Air temperature is not the only factor to be considered while evaluating cold stress situations. Wind chill cooling rate and the cooling power of air are critical factors. The higher the wind speed the greater the risk of experiencing cold related injuries. For exposed skin, continuous exposure should not be permitted when the air speed and temperature result in an equivalent chill temperature of -25°F of less. The wind chill table provided in attachment two can be used to help assess hazardous conditions attributable to wind chill effects.

4.3 Training

Training on the contents of this procedure will be conducted during tailgate safety meetings held at project or office locations where employees are exposed to cold temperatures. Topics to be discussed during this training will include:

- Proper rewarming procedures and first aid treatment of cold related cases
- Proper clothing practices

- Eating and drinking habits
- Recognition of signs and symptoms of cold stress
- Safe cold weather work practices.

5.0 EXCEPTION PROVISIONS

Variances may be requested as described in procedure HS013; Health and Safety Procedure Variances.

6.0 CROSS REFERENCES

Shaw Environmental & Infrastructure, Inc. (Shaw E & I) Procedure HS051-Tailgate Safety Meetings

Shaw E & I Procedure HS600-Personal Protective Equipment

Threshold Limit Values and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists.

Standard First Aid Workbook, American Red Cross

7.0 ATTACHMENTS

1. Responsibility Matrix
2. Windchill Table

ATTACHMENT 1
COLD STRESS

Responsibility Matrix

Action	*Responsible Party*			
	Procedure Section	**Employee**	**Local HS Representative**	**Director of Health and Safety**
Issuance, revision and maintenance of this procedure	3.1			X
Provide training	4.2		X	
Receive training	4.2	X		

ATTACHMENT 2

Windchill Table

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER In under an hour with dry skin. Maximum danger is false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute.			GREAT DANGER Flesh may freeze within 30 seconds.				
	Trenchfoot and immersion foot may occur at any point on this chart.											

PROCEDURE

Subject: HEARING CONSERVATION PROGRAM

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish guidelines for the company hearing conservation program. Regulatory requirements mandate that the company administer a hearing conservation program whenever employee sound exposures equal or exceed an 8-hour time-weighted average (TWA) sound level of 85 decibels (dB).

Evidence is well established that worker exposure to sound of sufficient intensity and duration can result in hearing damage. This procedure prescribes the control measures required to prevent employee exposure to excessive sound levels and includes provisions for:

- Monitoring of the workplace to determine employee exposures.
- An audiometric testing program which includes baseline and annual audiograms.
- An employee training and information program.
- Description of various control measures that can be used to decrease exposures.
- Providing hearing protection to all affected employees when administrative or engineering controls fail to reduce sound levels to below the action level.
- Recordkeeping requirements.

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  5.4 Employee Training and Information

5.5 Control Measures
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5.5.2 Sound Control in the Transmission Path
5.5.3 Protection for the Receiver
5.6 Recordkeeping
6.0 Exception Provisions
7.0 Cross References
8.0 Attachments

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Action Level - An 8-hour TWA of 85 dB or a dose of 50 percent.

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Standard Threshold Shift (STS) - Change in hearing threshold relative to the baseline audiogram of 10 dB or more at 2,000, 3,000, and 4,000 hertz (Hz) in either ear.

5.0 TEXT

5.1 General

The company hearing conservation program will be implemented and protection against the effects of sound exposure will be provided whenever sound levels exceed the action level.

5.2 Monitoring

Monitoring of employee exposures to sound will be conducted whenever it is anticipated that exposure may exceed the action level. This monitoring will be conducted by a qualified individual who, through professional credentials, training, or experience, has the necessary qualifications to specify and use the type of monitoring equipment (area or personal) that will best represent employee exposures. This monitoring will be repeated whenever changes in the work environment lead to the possibility of additional exposures or inadequacy of selected hearing protection. Employees will be provided the

opportunity to observe monitoring and will be notified when the results exceed the action level.

Sound level monitoring instrumentation will be operated on the A-weighted scale in slow response mode. Employee sound exposures will be computed in accordance with Attachment 2 and without regard to any attenuation provided by the use of hearing protection.

5.3 Audiometric Testing

Audiometric testing will be provided to all employees exposed at or above the action level. Testing will be in accordance with Procedure HS100, Medical Policies and Procedures.

5.3.1 Baseline Audiogram. Audiometric test results obtained from the pre-hire medical examination will be used as the baseline audiogram. Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace sound. Employees will also be notified of the need to avoid high levels of non-occupational sound exposure during this 14-hour period.

5.3.2 Annual Audiograms. Annual audiograms will be conducted for all employees exposed at or above the action level during the preceding year. Each annual audiogram will be compared to that employee=s baseline audiogram to determine if the audiogram is valid and if a STS has occurred.

5.4 Employee Training and Information

All employees who are exposed to sound levels above the action level are required to participate in a formal training program. This program will be presented by a health and safety representative and include, as a minimum, the following information:

- The effects of sound on hearing.
- The purpose of hearing protection; the advantages, disadvantages, and attenuation of various types; and instructions on selection, fitting, use, and care.
- The specific nature of operations which could result in exposure to excessive sound levels.
- The purpose of audiometric testing and an explanation of the test procedures.
- The engineering controls and administrative practices associated with the employee=s job assignment.

This training program will be repeated annually. Participating employees are required to complete the Hearing Protection Training Completion Record (Attachment 3). This

record will be maintained by the company Training Department in Knoxville. In addition, tailgate safety meetings will be periodically used to instruct employees on the need for hearing protection in designated areas.

The project/location manager will make available to affected employees or their authorized representatives a copy of 29 Code of Federal Regulations (CFR) 1910.95 and will also post a copy in the workplace.

5.5 Control Measures

A straightforward method of controlling sound exposure is to examine the problem in terms of its three basic elements including:

- Sound arises from a source;
- Travels over a path; and
- Affects a receiver or listener.

The solution to a given sound problem might require alteration or modification of any or all of these three basic elements including:

- Modifying the source to reduce its sound output;
- Altering or controlling the transmission path to reduce the sound level reaching the listener; or
- Providing the receiver with hearing protection (but only if the sound source or path cannot be controlled).

5.5.1 Sound Control at the Source. Perhaps the best method for controlling sound at its source is the initial equipment selection process. The following summarizes those features that the buyer should look for and steps to be taken in selecting equipment:

- Low-sound certification.
- Advertisement of a quiet operation, evidence of sound control design.
- Evidence of lower and slower operating characteristics.
- Conductance of side-by-side sound tests of equipment.
- Request an on-site or in operation inspection of mechanical equipment before purchase.

Most mechanical devices are complex sound generators. Though it is impractical to discuss all possible solutions to all sound problems, some general control measures and methods have been provided below:

- Reduce impact or impulse sound by reducing the weight, size, or height of fall of impacting mass.

- Reduce speed in machines and flow velocities and pressure in fluid conveyance systems.

- Balance rotating parts to control machinery sound and vibration of fans, fly wheels, pulleys, cams, shafts, etc.

- Reduce frictional resistance between rotating, sliding, or moving parts by frequent lubrication and proper alignment; static and dynamic balancing of rotating parts; and/or correction of eccentricity or Aout-of-roundness≅ of wheels, gears, rollers, pulleys, etc.

- Reduce resistance in air or fluid systems by use of low flow velocities, smooth surfaces of duct or pipe systems, and long-radius turns and flared sections in pipes, etc., to reduce turbulence.

- Isolate vibration elements in machinery; install motors, pumps, etc., on most massive part of machine; use belt or roller drives in place of gear trains; use flexible hoses and wiring instead of rigid piping and stiff wiring; etc.

- Apply vibration damping materials such as liquid mastics; pads of rubber, felt, foam, or fibrous blankets; or sheet metal viscoelastic laminates or composites to vibrating machine surface.

- Reduce sound leakage from the interior of machines such as compressors by sealing or covering all openings or applying acoustical materials to machine interiors.

5.5.2 Sound Control in the Transmission Path. Another effective way to limit employee exposure to sound is through the use of transmission path controls. These controls may include, but are not necessarily limited to:

- Separation of the sound source and receiver.

- Use of sound absorbing materials on ceiling, floor, or wall surfaces.

- Use of sound barriers and deflectors in the sound path.

- Use of acoustical lining on inside surfaces of passageways, ducts, pipe chases, or electrical channels.

- Use of mufflers or silencers on all gasoline or diesel engines, regardless of size, and particularly on equipment when large quantities of high-pressure, high-velocity gases, liquids, steam, or air are discharged.

- Use vibration isolators and flexible couplers where the sound transmission path is structural in character.

5.5.3 Protection for the Receiver. When engineering controls fail to reduce sound levels to below the action level, hearing protection will be provided. Hearing protection will be provided at no cost to employees and will be replaced as necessary.

Supervisors will ensure that hearing protection is worn by all employees who are exposed at or above the action level. Employees will be given the opportunity to select their hearing protection from a variety of suitable protection devices that attenuate their exposure to the action level or below. Attenuations are determined by subtracting 7 dB from the noise reduction rating (NRR) of the protector and subtracting the remainder from the TWA sound level.

5.6 Recordkeeping

The company will maintain records of all audiometric test records required by this procedure and retain them for at least the following periods:

- Sound exposure measurement records will be retained for two (2) years.

- Audiometric test records will be retained for the duration of the affected employee=s employment.

All records required by this procedure will be provided upon request to employees, former employees, representatives designated by the individual employee, and any authorized government representative.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS100 Medical Policies and Procedures

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Sound Exposure Computation
3. Hearing Protection Training Completion Record

ATTACHMENT 1
HEARING CONSERVATION PROGRAM

Responsibility Matrix

Action	Procedure Section	*Responsible Party*		
		Health and Safety Representative	**Project/Location Manager**	**Director of Health and Safety**
Issue, Revise, and Maintain Procedure	3.1			X
Monitor Employee Exposures	5.2	X		
Provide Training	5.4	X		
Make Available/Post 29 CFR 1910.95	5.4		X	

ATTACHMENT 2

SOUND EXPOSURE COMPUTATION

Computation of Employee Sound Exposure

A. Sound dose is computed using Table 1 as follows:

When the sound level is constant over the entire work shift, the sound dose (D), in percent, is given by:

$$D = 100\ C/T$$

Where C is the total length of the work day, in hours, and T is given in Table 1.

B. When the work shift sound exposure is composed of two or more periods of sound at different levels, the total sound dose over the work day is given by:

$$D = 100\ (C_1/T_1 + C_2/T_2 \ldots + C_n/T_n)$$

Where C_n indicates the total time of exposure at a specific sound level and T_n indicates the reference duration for that level as given by Table 1.

C. The eight-hour TWA sound level, in decibels, may be computed from the dose, in percent, by means of the formula:

$$TWA = 16.61\ \log_{10}\ (D/100) + 90$$

For an eight-hour work shift with the sound level constant over the entire shift, the TWA is equal to the measured sound level.

Conversion Between A Dose and an 8-Hour TWA Sound Level

Sound exposure is usually measured with an audio dosimeter which gives a readout in terms of Adose.≅ Dosimeter readings can be converted to an 8-hour TWA sound level.

In order to convert the reading of a dosimeter into TWA, use Table 2. This table applies to dosimeters that are set to calculate dose or percent exposure according to the relationships in Table 1. So, for example, a dose of 91 percent over an 8-hour day results in a TWA of 89.3 decibels and a dose of 50 percent corresponds to a TWA of 85 decibels.

If the dose as read on the dosimeter is less than or greater than the values found in Table 2, the TWA may be calculated by using the formula:

$$TWA = 16.61\ \log_{10}\ (D/100) + 90$$

Where TWA equals 8-hour TWA sound level and D equals accumulated dose in percent exposure.

Table 1
Permissible Sound Exposure

A-Weighted Sound Level (decibels)	Permitted Duration Per Workday (T) (hours)	A-Weighted Sound Level (decibels)	Permitted Duration Per Workday (T) (hours)
80	32.0	106	0.87
81	27.9	107	0.76
82	24.3	108	0.66
83	21.1	109	0.57
84	18.4	110	0.50
85	16.0	111	0.44
86	13.9	112	0.38
87	12.1	113	0.33
88	10.6	114	0.29
89	9.2	115	0.25
90	8.0	116	0.22
91	7.0	117	0.19
92	6.1	118	0.16
93	5.3	119	0.14
94	4.6	120	0.125
95	4.0	121	0.11
96	3.5	122	0.095
97	3.0	123	0.082
98	2.6	124	0.072
99	2.3	125	0.063
100	2.0	126	0.054
101	1.7	127	0.047
102	1.5	128	0.041
103	1.3	129	0.036
104	1.1	130	0.031
105	1.0		

Table 2
Conversion From APercent Sound Exposure≅ or ADose≅ To A8-Hour TWA Sound Level≅

Dose or Percent Sound Exposure (D)	TWA	Dose or Percent Sound Exposure (D)	TWA	Dose or Percent Sound Exposure (D)	TWA	Dose or Percent Sound Exposure (D)	TWA
10	73.4	104	90.3	260	96.9	640	103.4
15	76.3	105	90.4	270	97.2	650	103.5
20	78.4	106	90.4	280	97.4	660	103.6
25	80.0	107	90.5	290	97.7	670	103.7
30	81.3	108	90.6	300	97.9	680	103.8
35	82.4	109	90.6	310	98.2	690	103.9
40	83.4	110	90.7	320	98.4	700	104.0
45	84.2	111	90.8	330	98.6	710	104.1
50	85.0	112	90.8	340	98.8	720	104.2
55	85.7	113	90.9	350	99.0	730	104.3
60	86.3	114	90.9	360	99.2	740	104.4
65	86.9	115	91.1	370	99.4	750	104.5
70	87.4	116	91.1	380	99.6	760	104.6
75	87.9	117	91.1	390	99.8	770	104.7
80	88.4	118	91.2	400	100.0	780	104.8
81	88.5	119	91.3	410	100.2	790	104.9
82	88.6	120	91.3	420	100.4	800	105.0
83	88.7	125	91.6	430	100.5	810	105.1
84	88.7	130	91.9	440	100.7	820	105.2
85	88.8	135	92.2	450	100.8	830	105.3
86	88.9	140	92.4	460	101.0	840	105.4
87	89.0	145	92.7	470	101.2	850	105.4
88	89.1	150	92.9	480	101.3	860	105.5
89	89.2	155	93.2	490	101.5	870	105.6
90	89.2	160	93.2	500	101.6	880	105.7
91	89.3	165	93.6	510	101.8	890	105.8
92	89.4	170	93.8	520	101.9	900	105.8
93	89.5	175	94.0	530	102.0	910	105.9
94	89.6	180	94.2	540	102.2	920	106.0
95	89.6	185	94.4	550	102.3	930	106.1
96	89.7	190	94.6	560	102.4	940	106.2
97	89.8	195	94.8	570	102.6	950	106.2
98	89.9	200	95.0	580	102.7	960	106.3
99	89.9	210	95.4	590	102.8	970	106.4
100	90.0	220	95.7	600	102.9	980	106.5
101	90.1	230	96.0	610	103.0	990	106.5
102	90.1	240	96.3	620	103.2	999	106.6
103	90.2	250	96.6	630	103.3		

ATTACHMENT 3

HEARING PROTECTION TRAINING COMPLETION RECORD

	INITIAL
1. I have been informed about the health hazards associated with exposure to excessive sound levels and its potential effect on hearing.	
2. I have been informed about the types of work that may result in exposure to excessive sound levels, and the necessary protective steps to prevent excessive exposure, including engineering controls and administrative practices.	
3. I understand the purpose for, proper use, and limitations of hearing protection devices, and I have received instructions on selection, fitting, use, and care of such devices.	
4. I have been informed about the purpose of audiometric testing and an explanation of the test procedures.	
5. Copies of the applicable regulations governing occupational exposure to excessive sound have been made available to me.	

PRINT NAME: _____

SIGNATURE: _____

EMPLOYEE NUMBER: _____

DATE: _____

Please File Completed Forms and Forward a Copy to the Knoxville Training Department

PROCEDURE

Subject: PERSONAL PROTECTIVE EQUIPMENT

1.0 PURPOSE AND SUMMARY

This procedure stipulates that the company will provide the personal protective equipment necessary for employees to perform their work safely, as established by the Health & Safety Department. Special purchasing programs for prescription safety glasses and safety shoes are also described. Head, eye, body, and foot protection are discussed in this procedure. Respiratory and hearing protection are cross referenced to the appropriate company procedures.

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- 5.5 Hearing Protection
- 5.6 Body Protection
- 5.7 Providing Personal Protective Equipment to Non-Company Personnel
- 5.8 Management Duties

6.0 Exception Provisions
7.0 Cross References
8.0 Attachments

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The EH&S Operations Manager, is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Company – All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc (Shaw E & I).

5.0 TEXT

The company will provide suitable personal protective equipment as required for the nature of the job being performed, such as, but not limited to, boots, protective clothing, respirators, face shields, safety eyewear, respirator ophthalmic hanger devices, hard hats, and gloves. This personal protective equipment will be specified by the Health & Safety Department prior to use, subject to an assessment of the hazards to which employees will be potentially exposed. Documentation shall be in the project-specific Health and Safety Plan (HASP) or equivalent document.

Employees shall use HS-approved protective equipment on any task where there is potential exposure to: physical hazards such as equipment operation, objects dropping from above, or flying particles; or exposure to toxic or irritating gases, fumes, vapors, liquids, or other materials which might cause respiratory distress or skin irritation.

Employees shall be trained in the proper use, maintenance, and limitations of protective equipment. Safety equipment shall be replaced when it is damaged, contaminated, or has worn out. Training requirements are summarized in company Procedure HS050.

Employees shall wear hard hats, eye protection, and steel-toed foot protection (chemical resistant when required) at all job sites (excluding field offices) and industrial facilities, unless HASP/site rules provide exemption. It is the responsibility of all employees to report to any work site prepared to work in Level D PPE. All other protective equipment is the responsibility of the project.

5.1 Eye Protection

All employees engaged in or working in areas adjacent to eye-hazardous activities or operations shall wear appropriate eye protection.

- Safety glasses are required for impact protection, and shall meet ANSI Standard Z87.1 requirements.
- Chemical goggles are required for protection against chemical splash.
- Face shields are required for face protection from chemical splash and are not a substitute for eye protection.
- Full-face respirators can provide eye and face protection in lieu of safety glasses, goggles, or face shields.

5.1.1 Prescription Eye Protection. The company will provide prescription safety glasses (meeting ANSI Standard Z87.1) for field/shop/lab personnel, and computer glasses for computer users, as required by their individual vision status and job. Glasses will be provided every two years unless damaged on-the-job, or the employee exhibits a significant change of prescription.

Lenses shall be clear polycarbonate or plastic. Special tints or dark lenses can be obtained for special applications (e.g., extended outdoor work) with prior written approval from the Health & Safety Department.

Employees requiring corrective lenses inside of respirator face-pieces will be provided with safety lenses and frames sized for respirators and the respirator insert, in addition to conventional prescription safety glasses.

Employees will arrange and pay for the eye examination through the company-provided vision care program. The company will pay for fitting services and the safety glasses.

The company has established a national contract with a protective eyewear provider. Employees should contact the local HS representative (with current lens prescription), who will coordinate with the local purchasing representative to order eyewear. Employees choosing to use another provider will be reimbursed up to $65 for safety or computer glasses, after the Health & Safety Department has verified that the glasses meet the ANSI Standard requirements.

5.2 Foot Protection

Basic foot protection is required for all job sites and industrial locations. Specialized footwear shall be provided as required by the nature of the work. Special foot protection may include, but is not limited to, chemically resistant, thermally shielded, metatarsal guards, etc.

5.2.1 Leather Safety Shoes. Safety shoes may be used in place of chemical resistant footwear when an employee will be working in a clean or uncontaminated work areas. Generally, when the employee desires to use safety footwear other than standard chemical resistant footwear provided, the company considers it the responsibility of the employee to provide such footwear and ensure that it meets ANSI Standard Z41. Company supervision will enforce the use of appropriate protective footwear per the requirements of the site-specific Health and Safety Plan. Where state or local regulations require (i.e., California and Connecticut), the company will provide all necessary safety equipment.

Employees can purchase safety shoes through national purchasing agreements established by the company. Under the limited circumstances where the company will provide safety shoes, such purchases must be approved by the project or appropriate department/local manager. After the Health & Safety Department has verified that the safety shoes meet ANSI requirements, the employee will be reimbursed for the actual purchase price of the shoes up to a maximum of $90.00.

Athletic-style safety shoes ("safety sneakers") are <u>prohibited</u> for all field operations due to the difficulties created by these styles in supervising proper use of protective footwear. Employees in fixed laboratory operations may wear athletic-style safety shoes with the prior approval of the Lab Director or HS Coordinator.

5.3 Head Protection

Hard hats meeting ANSI Z89.1 shall be provided to protect employees from impact, penetration, falling objects, and/or limited electrical shock and burn, as appropriate for work site hazards.

5.4 Respiratory Protection

Respirators shall be provided, in accordance with Procedure HS601, Respiratory Protection Program.

5.5 Hearing Protection

Hearing protection shall be provided, in accordance with Procedure HS402, Hearing Conservation Program.

5.6 Body Protection

Protective clothing, gloves, boots, and other protective equipment shall be provided as appropriate for the hazards associated with the tasks being performed.

5.7 Providing Personal Protective Equipment to Non-Company Personnel

The following personal protective equipment may be provided to non-company personnel:

- Hard hats
- Chemical goggles
- Safety glasses (non-prescription)
- Face shields
- Chemical resistant boots
- Chemical resistant gloves
- Hearing protectors
- Disposable chemical resistant personal protective clothing

5.8 Management Duties

It is the responsibility of the Health & Safety Department to specify safety equipment requirements for each job.

It is the responsibility of project managers or location managers to provide adequate quantities of safety equipment required for their job(s) or project(s).

It is the responsibility of supervisors to verify that required safety equipment is properly used and to ensure that any employee provided protective equipment is adequate, properly maintained and in a sanitary condition.

6.0 EXCEPTION PROVISIONS

Variances and exceptions shall be permitted pursuant to the provisions of Procedure HS013, "Health & Safety Procedure Variances".

7.0 CROSS REFERENCES

HS050 Training Requirements
HS402 Hearing Conservation Program
HS601 Respiratory Protection Program
ANSI Standard Z41, *Personal Protection - Protective Footwear*
ANSI Standard Z87.0, *Practice for Occupational and Educational Eye and Face Protection*
ANSI Standard Z89.1, *Protective Headwear for Industrial Workers*

8.0 ATTACHMENTS

1. Responsibility Matrix

ATTACHMENT 1
PERSONAL PROTECTIVE EQUIPMENT

Responsibility Matrix

Action	Procedure Section	*Responsible Party*			
		EH&S Operations Manager	Local HS Department	Project/ Location Managers	Supervisors
Issue, revise, and maintain this procedure.	3.1	X			
Approve all personal protective equipment prior to use.	5.0		X		
Coordinate reimbursement to employee for PPE purchases.	5.1.1, 5.2.1		X		
Provide adequate quantities of safety equipment as required.	5.8			X	
Verify that required safety equipment is properly used.	5.8				X

PROCEDURE

Subject: RESPIRATORY PROTECTION PROGRAM

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to prescribe the requirements of the company Respiratory Protection Program (RPP). This procedure provides information and guidance on the proper selection, medical evaluation, training, use, and care of respiratory protective equipment and complies with the requirements of 29 CFR 1910.134 (1998).

All operations which require the use of respiratory protection are subject to the provisions of this procedure.

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

Program responsibilities are detailed throughout this procedure. The Responsibility Matrix summarizes these items and can be found as Attachment 1.

4.0 DEFINITIONS

Action Level (AL) - Airborne contaminant concentration which is one-half of the Permissible Exposure Guideline (PEG).

Air Purifying Respirator (APR) - Negative pressure respirator (also referred to as a cartridge respirator) which filters contaminated air through chemical or mechanical filter elements. APRs include: cartridge, canister, gas masks, and single-use respirators (single-use respirators are not approved for use by the company).

Approved Respirator - Any respirator, identified by manufacturer and model, that has been approved by NIOSH 42 CFR Part 84 and has been incorporated into the List of Approved Respiratory Protective Equipment (Attachment 2).

Assigned Protection Factor (APF) - A term that is reserved in the OSHA Standard 1910.134 (January, 1998). Attachment 3 provided PFs for the respiratory protective equipment based upon type of device and method of fit testing. The company will continue to use the PFs established by NIOSH until OSHA issues their definition of APF.

Company - All wholly-owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Contractor Personnel - A group of persons hired to perform a specific activity based on their expertise and ability to operate independent of direct supervision. Contractor personnel are supervised by their management group which reports to an employee of the company for project direction.

End-of-Service-Life Indicator (ESLI) - A system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Emergency - Emergency means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

Exposure Limit - Several published airborne contaminant concentration values exist which is used in establishing acceptable personnel exposures to contaminants. OSHA publishes the Permissible Exposure Limit (PEL), NIOSH publishes the Recommended Exposure Limit (REL), and the ACGIH publishes the Threshold Limit Value (TLV). All of these exposure limits are based on an 8-hour work shift, 40-hour work week, and 40-year work life. The values may vary from contaminant to contaminant as well as between publishing bodies.

Field Office - Any office or satellite office performing field activities which may require the use of respiratory protection.

Filtering Facepiece (Dust Mask) - A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Fit Factor (FF) - This term means a quantitative estimate of the fit of a particular respirator to a specific individual and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn. The FF incorporates a safety factor of 10 because protection factors in the workplace tend to be much lower than the fit factors achieved during fit testing. Acceptable fit factors are 100 for a tight-fitting half facepiece and 500 for tight-fitting full facepiece respirators.

HASP - Health and Safety Plan.

Health and Safety Representative - A member of the company Health and Safety Functional Resource Group who, through credentials, training, or experience, has the necessary qualifications and authority to specify respiratory protection and evaluate respiratory protection program elements.

Immediately Dangerous to Life or Health (IDLH) - An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Labor Pool Personnel - Temporary personnel hired for a given expertise or ability. Labor pool personnel report directly to an employee of the company.
Nuisance Level - Level of airborne contaminants which is below one-half the action level for that contaminant and presents no other health or safety hazard.

Permissible Exposure Guideline (PEG) - This term designates a specific exposure limit and is based on the best available information. The PEG will be the lower (more protective) of the values for the PEL and TLV. However, the REL shall take precedence for Hazardous Waste Operations (subject to 29 CFR 1910.120 or 1926.65) if no PEL exists, or for contaminants where no PEL or TLV exists. If there is no PEL, TLV, or REL, a Health and Safety Representative shall determine an appropriate permissible exposure guideline.

Permissible Exposure Limit (PEL) - An occupational exposure index promulgated by OSHA which carries the force of law. This value represents the allowable concentration to which it is believed an employee may be exposed to 8 hours a day, 40 days a week, for a 40-year working life without experiencing adverse health effects.

Positive Pressure Respirator - A respirator in which the pressure inside the respirator exceeds the ambient air pressure outside the respirator.

Powered Air Purifying Respirator (PAPR) - A positive pressure APR which incorporates a fan an battery pack unit. The system pulls contaminated air through the filter elements before delivery to the facepiece under positive pressure. Air pressure in the mask must remain above ambient pressure.

Qualitative Fit Test - A procedure for assuring that the respirator provides adequate protection based on a pass/fail fit test that relies on the individual's response to the test agent. Standard fit test protocol will utilize the irritant smoke methods as described in Attachment 4.

Quantitative Fit Test - A fit test that provides an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respiratory Protection Program Coordinator (RPP Coordinator) - A person designated by the Health and Safety Representative to administer and supervise the respiratory program at a local facility or project location. This person will have the necessary training or credentials to execute this task.

Recommended Exposure Limit (REL) - An occupational exposure index published by NIOSH which is a recommended guideline for employee protection. This value represents the allowable concentration to which it is believed an employee may be exposed to 10 hours a day, 40 hours a week, for a 40-year working life without experiencing health effects.

Supplied Air Respirator (SAR) - Positive pressure respirator which supplies an independent source of breathing air to the user. Two types of SARs are available: self-contained breathing apparatus (SCBA) and airline.

Threshold Limit Value (TLV) - An occupational exposure index published by ACGIH which is recognized as an industry guideline and represents the concentration to which it is believed that nearly all employees may be exposed to 8 hours a day, 40 hours a week without experiencing adverse health effects.

5.0 TEXT

The company will employ engineering controls (e.g., enclosure, ventilation, material substitution, etc.) as the primary method to limit employee exposure. However, for those situations where engineering and administrative controls are ineffective at controlling employee exposure, the use of respiratory protective equipment may be required.

This RPP provides specific requirements for selection, assignment, training, and medical evaluation for persons expected to wear respiratory protection.

5.1 Assignment of Equipment to Contractor/Labor Pool Personnel

Contractor personnel shall provide their own respiratory protective equipment and shall also confirm meeting all other requirements of their own RPP and that of the companys RPP (i.e., medical clearance, training, etc.).

The company may provide the following respiratory protective equipment to Contractor Personnel:

- Disposable equipment such as filter elements.
- Hardware for airline systems (up to, but not including, the airline and facepiece) which employees are sharing.

The company will not provide the following respiratory protective equipment to Contractor Personnel:

- APR or PAPR facepieces.
- SCBAs, SAR respirators, or airline.

The company may provide respiratory protective equipment to Labor Pool Personnel if the following have been established:

- The labor pool personnel have successfully completed training as required by 29 CFR 1910.134 and other applicable regulations.
- The labor pool personnel have been fit tested in relation to projected exposure levels and contaminants to be encountered.
- The labor pool personnel have been medically approved to wear respirators.
- All other RPP requirements have been met.

5.2 Approval, Selection, and Purchase of Respiratory Protective Equipment

The following requirements are designed to guide correct selection of respiratory protective equipment.

5.2.1 Approval. The Vice President, Health and Safety has approved respirators manufactured by Survivair as the primary respirators for use by employees. For employees who cannot achieve a satisfactory fit or comfort factor in Survivair respirator, Mine Safety Appliance (MSA) respirators will be selected. The list of approved model respirators is included in Attachment 2. Contractor personnel may select any respiratory protective equipment that has received approval from NIOSH.

5.2.2 Selection. The Health and Safety Representative shall base the selection of respiratory protective equipment upon an assessment of potential respiratory hazards that may be encountered. This assessment may utilize a variety of written information such as the NIOSH Pocket Guide to Chemical Hazards, Material Safety Data Sheets, analytical data, air monitoring results, or other applicable information. The selection process shall incorporate the following guidelines:

- Respiratory protection is to be selected by Health and Safety Representatives only. Full facepiece respirators are the usual preference because of superior protection factor and the face/eye protection afforded. Half facepiece respirators can only be used in situations where less than one-half the PEG is expected. The type of respirator selected will be documented in the Project HASP.

- Selection of the appropriate respiratory protective equipment shall include factors such as the chemical state and physical form of the chemical contaminant, atmospheric concentration during routine and emergency events, potential physical hazards, expected job task requirements, and the performance of the respirator in providing the appropriate level of protection against these hazards.

- Consideration shall be given to the nature of the hazardous operation, location of the hazardous area relative to nonhazardous breathing air supply, duration of wear, activities to be performed, and characteristics and function of the respiratory protective equipment to be worn.

- Selected respirators (i.e., Survivair or MSA) shall be NIOSH certified and used in compliance with the conditions of its certification when employees are exposed to toxic materials or other hazardous atmospheres.

- Respirators must provide adequate face and eye protection for the expected task.

- If an APR or PAPR is used, the respirator shall be equipped with an end-of-service life-indicator (ESLI) certified by NIOSH for the contaminant. If an ESLI is not available for the contaminant, a cartridge element change schedule shall be implemented which is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. This information will be described in the HASP.

- The PF for the respirator selected (Attachment 3) shall be used according to the following relationship with the PEG to establish justification for selection:

  PF x PEG > Maximum anticipated contaminant concentration

  If this equation is false, a respirator with a greater PF must be selected. Also review Attachment 3 to determine the required fit testing for the expected

maximum anticipated contaminant concentration. The Health and Safety Representative may determine that a more conservative approach (e.g., 50 percent PF) may be needed. Decision to do so should be documented in the Project HASP.

- Manufacturer-established limitations of the APR filter elements relative to the contaminants of concern shall be used to establish further justification for the selected respirator should the APRs FF not disqualify its use (e.g., maximum anticipated contaminant concentration).

5.2.3 Purchase. The purchase request of respiratory protective equipment (including cartridges, airlines, compressed air) should be reviewed by a Health and Safety Representative to indicate that the ordered material meets established requirements. **Under no circumstances may anyone (purchasing, warehouse, project manager, etc.) purchase or provide other than the specific respiratory protection equipment selected by the Health and Safety Representative.**

5.3 Medical Evaluation

No employee shall be assigned to a task that requires the use of a respirator unless it has been determined that he/she is physically able to perform the work while using the required respirator. The medical evaluation must be conducted prior to fit testing and work requiring the use of respiratory equipment.

The medical evaluation shall be performed by a physician typically in conjunction with a physical examination meeting the requirements of 29 CFR 1910.120 (f) *Medical Surveillance*. The physician will be informed of the type of work expected of the employee, the types of respiratory protection and personal protective equipment required, and other information indicating the expected stresses of the task. The company medical director shall be given a copy of the company RPP and a copy of 1910.134 (e) *Medical Evaluation.*

The company medical director shall provide a written recommendation regarding the employees ability to use respiratory protection. The company shall ensure that the company medical director supplies the employee with a copy of this recommendation.

Additional medical evaluations will be provided to the employee if:

- Any medical signs or symptoms due to respirator use are reported by the employee, supervisory, or health and safety personnel.

- A change in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

5.4 General Program Requirements

5.4.1 Responsibilities. The following information describes the responsibilities for the selection, use, and maintenance of respiratory protective equipment based upon job function:

Management

- Management shall take necessary and cost-effective measures to reduce, where possible, the need for respiratory protective equipment (e.g., enclosed cabs on heavy equipment to reduce airborne dust, operations performed upwind, etc.)

- Respiratory protective equipment shall be provided by management whenever it is determined that such equipment is necessary to protect the health of the employee or when requested by an employee and approved by the Health and Safety Representative.

- Management shall assign work tasks requiring the use of respiratory protective equipment to only those employees who are medically qualified to wear respiratory protective equipment.

- Management shall ensure that employees are trained in the use of respiratory protection prior to being assigned to an activity that requires its use.

- Management shall provide the means for the maintenance of respiratory protection as required.

Health and Safety Representative

- Health and Safety Representatives shall determine appropriate respiratory protection for each job. The decision logic for this selection shall be documented in the Project HASP.

- Health and Safety Representatives shall monitor compliance with the various aspects of this program, provide technical assistance regarding respirator selection and use, evaluate the effectiveness of the RPP, and support respirator training and fit testing at locations under their control.

- Health and Safety Representatives shall conduct regular audits to determine compliance with this procedure. This audit can include a review of maintenance, training, medical and air monitoring records, and review the status of this procedure with regard to current regulatory requirements.

- Health and Safety Representatives shall maintain or oversee maintenance of all other records required by this RPP and shall provide for the training and fit testing of personnel assigned respiratory protective equipment.

- Health and Safety Representatives shall appoint a RPP Coordinator for each location which uses or may have a need to use respiratory protection. The Health and Safety Representative must assure the RPP Coordinator has the necessary training to fulfill his/her responsibilities.

RPP Coordinator

- The RPP Coordinator shall be responsible for cleaning, maintenance, and storage of all respirators not routinely used or not individually assigned.

- The RPP Coordinator shall maintain respirator supplies, including spare parts; submit purchase requests for new equipment; and assure that sufficient quantities of cartridges are available for each field office/project.

- The RPP Coordinator shall assure that air supply and emergency respiratory protection is properly inspected and maintained.

- Respirators shall be repaired by either qualified personnel under the direction of the RPP Coordinator, or by contracted supplier.

- The RPP Coordinator shall maintain models and sizes of respirators available for selection and fitting.

- The RPP Coordinator shall conduct fit testing.

Training Department

- Records pertaining to training and fit testing will be maintained by the Training Department.

Employee

- The employee shall use the provided respiratory protective equipment when instructed to do so in accordance with training received.

- The employee shall clean, disinfect, and properly store the assigned respirator, unless other arrangements are made on a project level.

- The employee shall guard against damage to the assigned respirator.

- The employee shall inspect the respirator before each use and after cleaning.

- The employee shall report any malfunction of the respirator immediately to their supervisor and/or the RPP Coordinator.

- The employee shall report to their supervisor any change in their medical status that may impact their ability to wear a respirator safely.

5.4.2 Use of Corrective Lens Eyewear. In general, contact lenses are permitted to be worn when respiratory protection is used. Although in certain instances, client- or project-specific rules may not allow for their use.

If an employee chooses not to wear contact lenses, management shall assure that the appropriate frames or ophthalmic device attachments are obtained and provided at no cost to the employee.

5.4.3 Obstruction of Face Seal. Employees who wear respirators are required to be clean shaven to the extent that there is no obstruction between the wearer's skin and the facepiece. Trimmed mustaches and facial hair which does not interfere with the seal are allowable.

In addition, respirators shall not be worn when conditions prevent a good face-to-facepiece seal such as corrective lenses or goggles, or other personal protective equipment.

5.5 Instruction, Training, and Fit Test

5.5.1 Instruction and Training. The Training Department shall provide a standard respiratory protective equipment training program for use by qualified personnel such as the Health and Safety Representative or RPP Coordinator. The Training Department will support training at the project location if the project does not have the qualified personnel and/or the equipment to support its own program. As an alternative, the project location may use a respiratory manufacturer's training program if the program meets company requirements, a competent person conducts the training, adequate equipment is available for demonstration, and fit testing is conducted along guidelines established in this procedure. The Training Department must approve all alternative training methods.

The basic respirator training program shall include, as a minimum, the following:

- Training and annual retraining of employees in the selection, use, maintenance, and limitation of each respirator type used.
- Instruction on the nature of the respiratory hazards and potential health effects resulting from exposure.
- Opportunity for "hands on" experience with the respiratory protective equipment.
- Proper fitting, including demonstrations and practice in wearing, adjusting, and determining the fit of the respirator. A selection of respirators shall be available to determine the most comfortable respirator and the best fit.
- Instruction on how to test the face-to-facepiece seal.

- A familiarization period of wear in ambient air.
- For APRs, wearing the respirator in a test atmosphere (typically irritant smoke) for qualitative fit testing. The qualitative fit test shall follow the guidelines outlined in Section 5.5.2.
- Training to recognize and cope with emergency situations (including respirator failure)
- Training and fit testing shall be repeated annually, unless specific OSHA regulations require a more frequent time period (e.g., asbestos, lead operations). Each person receiving training shall complete the Respirator Fit Test Form (Attachment 5).
- Training records will be maintained by the Training Department and the location Health and Safety Representative. On-site records of training and fit testing will be maintained as required by specific regulation (e.g., asbestos work) (refer to Section 5.8).
- It is the responsibility of the RPP Coordinator to verify that all project personnel meet the requirements of this RPP.

5.5.2 Fit Testing. Prior to the use of any negative or positive pressure tight-fitting facepiece, the employee must be fit tested.

- All employees assigned to operations requiring the use of respiratory protective equipment shall have been fit tested within 12 months, or as required by specific regulations (e.g., asbestos, lead operations). Fit test and qualification cards (or a copy of the completed Attachment 5) must be available during operations.
- The employee shall be fit tested with the same size and model as they are expected to wear.
- Qualitative fit test (QLFT) shall be used when a protection factor of 10 or less is required for a negative pressure respirator.
- Quantitative fit test (QNFT) shall be used when a protection factor of greater than 10 is required for a negative pressure respirator. When executing the QNFT, the acceptable test result is 100 for tight fitting half-facepiece respirators and 500 for full-facepiece respirators.
- Fit testing for tight-fitting atmosphere supplying respirators and tight-fitting APRs shall be in a negative pressure mode regardless of the mode of operation that is used for respiratory protection.

- Assessment of comfort shall be made after allowing adequate time for this evaluation. This evaluation shall include reviewing the following points with the employee: positioning of the mask on nose, room for eye protection if required, room to talk, and positioning of the mask on the face and cheeks.

- The following criteria shall be used to help determine the adequacy of the respirator fit: chin properly placed, strap tension, fit across the nose bridge, and tendency to slip.

- If physical obstruction (e.g., facial hair, eyeglasses) interferes with the face-to-facepiece seal, then it shall be altered or removed so as to eliminate any interference and allow for a satisfactory fit. If the employee refuses to alter the physical obstruction, then they shall be denied a satisfactory fit report and referred to his/her supervisor for consideration.

- The fit test protocol (Attachment 4) shall be followed. The Health and Safety Representative and Training Department shall determine which fit test protocol shall be followed depending upon the situation.

5.6 Maintenance Program

Each RPP Coordinator is responsible for verifying the respirator maintenance program is implemented in an effective manner for the facility or project site, the working conditions, and the potential hazards involved. As a minimum, the following aspects must be implemented:

- Inspection
- Cleaning and sanitizing
- Repair
- Respirator storage
- Inspection and repair documentation, as required
- Compliance with manufacturer recommendations.

Detailed information regarding cleaning, inspection, maintenance, and storage is found in Attachment 7. The RPP Coordinator shall verify compliance with the maintenance program by periodic inspections and field audits.

5.6.1 Inspection

- All respiratory protective equipment systems shall be inspected by the wearer for defects and/or deterioration immediately prior to and after each use.

- Any defects shall be reported to their supervisor immediately and the respirator removed from use until it can be repaired or replaced.

- Respiratory protective equipment systems not used routinely (including all SCBAs and equipment designated only for emergency use) shall be inspected before and after each use and at least every 30 days. Cylinders shall be recharged whenever the pressure falls below 90 percent of the manufacturers recommended pressure level. This inspection shall be documented by some method on the unit (i.e., tag). Records of inspections shall be kept through appropriate documentation. Attachment 6 provides an example of inspection documentation for SCBAs. At a minimum, these records will include: date, inspector, and any unusual finding or condition. Any repairs or modifications shall be documented in detail.

- General field inspection shall include a check of the following: tightness of all connections, facepiece, valves, and any connecting tubes or filtering elements.

- Employees who are manufacturer-qualified repair technicians shall be used for all maintenance beyond field inspections, tests, and user-performed cleaning.

- Air supplied respiratory systems shall be inspected by a manufacturer's authorized representative at the manufacturer's recommended schedule. Manufacturers typically require an annual flow test and a complete overhaul every 5 to 7 years.

- **Specific inspection procedures are outlined in Attachment 7.**

5.6.2 Cleaning and Sanitizing. Employees maintaining their own respirators shall be thoroughly briefed on how to clean and disinfect them. On projects where employees clean their own respirator, the generally accepted procedure involves washing with detergent and warm water using a soft brush, submersion in sanitizing agent, thoroughly rinsing in clean water, drying in a clean place, and storage in sealed plastic bags or equivalent. Precautions to be taken to prevent damage from rough handling during this procedure are detailed in Attachment 7.

At locations where employees share respirators, a centralized cleaning and maintenance facility with specialized equipment and/or materials and personnel trained in respirator maintenance must be established. Cleaning and inspection is primarily the responsibility of the user.

5.6.3 Repair. The company will only use respiratory protective equipment that is physically sound.

- If defects are found during any inspection, two remedies are possible. If parts and trained personnel are available, repair and/or adjustment may be made immediately. If parts or trained repair people are unavailable, the device shall be removed from service until it can be repaired. Under no circumstances shall a device that is known to be defective remain in service.

- Replacement or repair shall be done by adequately trained personnel. For negative pressure respirators, the Health and Safety Representative or RPP Coordinator may train or supervise personnel in the replacement of items such as inhalation/exhalation valves, head harness, cartridge adapters, and lenses. For air-supplied respirators, field repairs are limited to replacement of head harness and lenses. All other work must be completed by a factory-certified repair person.

Repair shall only be made with parts designed for the respirator. Substitution of parts from a different brand or type invalidates the respirator's approval and is prohibited.

5.6.4 Storage. Respirators must be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and mechanical damage.

- Respirators shall be stored in such a manner that the facepiece, exhalation valve, and straps are not distorted.

- Respirators shall be stored in sealable containers (e.g., ziplock bags) after cleaning and disinfecting.

- The storage location of emergency respiratory protection shall be readily accessible and prominently identified.

- Respirators shall be stored in an area free of contamination.

5.7 Field Use

The following guidelines for the use of respirators (or equivalent) shall be incorporated into the Project HASP as appropriate. Additional guidelines may be required based on working conditions and hazards involved. Each location where respiratory protective equipment is required or worn shall include in the Project HASP justification for the selected respiratory protective equipment systems worn as outlined in Section 5.2 of this procedure.

5.7.1 General Requirements. The following general requirements shall be followed whenever respiratory protection is used:

- Employees shall be allowed to leave the regulated area to readjust the facepiece or to wash their faces and to wipe clean the facepieces of their respirators in order to minimize potential skin irritation associated with respirator use.

- Respiratory protective equipment shall not be passed on from one person to another until it has been cleaned and sanitized, per program requirements.

- Respirators will be inspected, and a positive/negative pressure test performed prior to each use.

- Entry into oxygen-deficient (< 19.5 percent O_2) atmospheres, Immediately Dangerous to Life and Health (IDLH) atmospheres, or areas requiring EPA Level A protection is prohibited without the prior approval of the Vice President, Health and Safety or the CIH assigned to the business line.

- Head coverings such as Tyvek hoods shall not be allowed to pass between the face-to-facepiece seal.

- The harness straps of tight-fitting respirators shall not be positioned or worn over hard hats.

5.7.2 Specific Requirements. The following information details specific requirements by respirator class:

Air Purifying Systems

- When APRs are worn, new filter elements shall be installed at the beginning of operations. The filter elements shall be changed whenever the ESLI (color indicators) indicates that cartridge life has expired (e.g., mercury cartridges). When no ESLIs are available, filter replacement will be based on the calculations performed by the Health and Safety Representative. Additionally, the cartridges will be replaced if "breakthrough" is perceived or whenever an increase in breathing resistance is detected. In most cases, the cartridges will be replaced a minimum of once daily, usually at the end of the work shift.

Powered Air Purifying Systems

- When PAPRs are worn, employees shall change filter elements after each day's activities. The filter elements shall be changed whenever the ESLI (color indicators) indicates that cartridge life has expired (e.g., mercury cartridges). When no ESLIs are available, filter replacement will be based on the calculations performed by the Health and Safety Representative. Additionally, the cartridges will be replaced if "breakthrough" is perceived or when airflow through filter elements decreases to an unacceptable level as indicated by the manufacturers test device.

Compressed Air

- Compressed air used for breathing shall meet at least the requirements of the specification for Grade D breathing air or better (D, E, or G; not A, K, or L) as described in the American National Standard Commodity Specification for Air, ANSI/CGA G-7.1-1989. Further information is provided in Attachment 7, Guide to Respiratory Protective Equipment Cleaning, Inspection, Maintenance, and Storage.

- Breathing air suppliers must provide certification of analysis stating conformance, as a minimum, to Grade D breathing air standards as previously referenced for each cylinder and/or air lot.

- Air delivered in bulk, e.g., tube trailers, shall have each tube or unit, or a representative number of tubes or units verified as to oxygen content prior to using that tube.

- Pure oxygen shall NOT be used at any time in open-circuit SCBAs or airline respirators.

- Breathing air cylinders shall be legibly identified with the word "AIR" by means of stenciling, stamping, or labeling as near to the valve end as practical.

- Breathing air cylinders may be stored on their sides provided the valve caps are in place.

Supplied Air Breathing Systems

- Airline couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of airline respirators with nonrespirable gases or oxygen.

- Standard airline couplings for breathing air systems are Foster quick connect fittings with locking dots. Hansen quick connect fitting may also be used, but must not be used where they can be inadvertently actuated and disconnected. For example, Hansen fittings could be used at the regulator connection, but not on the airline unless protected from disconnection by some other means.

- The hose line length shall not exceed 300 feet from the air bank regulator to the user.

- No more than three connections, excluding the connection to the regulator and final connection to the respirator, shall be between the breathing air cylinders and the user.

- Breathing air hose shall be protected from direct contact with chemical materials which may permeate the hose. Acceptable methods of protection include suspension of the hose from the surface or covering with a commercially available sleeve or visqueen. Breathing air hose which has become contaminated will be removed from service and disposed of properly.

- The breathing air regulator shall be adjusted to provide air pressure as per the manufacturer's recommendations. For Survivair units, this pressure shall be between 80 to 125 psi pressure.

- Cascade systems shall be equipped with low pressure warning alarms or similar warning devices to indicate air pressure in the manifold below 500 psi.

- When a cascade system is used to supply breathing air, a worker outside the Exclusion Zone shall be assigned as safety standby within audible range of the low pressure alarm.

- When a cascade system is used to recharge SCBA air cylinders, it shall be equipped with a high-pressure supply hose and coupling rated at a capacity of at least 3,000 psi. The supply hose and coupling shall be relatively short ($\leq$ 3 feet) and secured to prevent whipping when pressurized.

- Large supplied air cylinders shall be stored and handled to prevent damage to the cylinder or valve. Cylinders shall be stored upright with the protective valve cover in place and in such a way (e.g., supported with substantial rope or chain in the upper one-third of the cylinder, or in racks designed for the purpose) as to prevent the cylinder from falling. Cylinders shall not be dropped, dragged, rolled, or allowed to strike each other or to be struck violently. Cylinders shall never be exposed to temperatures exceeding 125EF. Cylinders with visible external damage, evidence of corrosion, or exposure to fire shall not be accepted or used.

- Only cylinders within current hydrostatic test periods shall be used. For fiber wrapped bottles designated by the DOT-E label, hydrostatic testing shall be completed every 3 years. Maximum service life for these cylinders is 15 years. Steel or aluminum cylinders shall be hydrostatically tested every 5 years. No maximum service life is established for steel or aluminum cylinders.

- SCBAs shall only be used in the positive pressure mode when in the Exclusion Zone.

- Standby SCBA equipment must be present when air supply systems are used in IDLH or potentially IDLH atmospheres.

Escape/Egress Units

- These respirators are intended for use in areas where escape with a short-term (5 minute) air supply is necessary. They may be used as adjuncts to airline respirators as a backup air supply, or as independent emergency devices in areas where respiratory protective equipment is not normally required.

- Appropriate training shall be accomplished and documented prior to assigning employees to tasks or locations subject to the use of these respirators.

- Escape/egress units (5-minute air supply) shall never be used as primary standby respirators for confined space entry.

- Escape/egress units shall never be used to enter, or continue working in, a hazardous atmosphere.

5.7.3 IDLH Atmospheres. For all IDLH atmospheres, the company shall ensure that:

- One employee or, when needed, more than one employee is located outside the IDLH atmosphere.

- Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.

- The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue.

- The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue.

- The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation.

- Employee(s) located outside the IDLH atmosphere are equipped with:

- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied air respirator with escape/egress unit.

- Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry. Equivalent means of rescue can be considered.

5.8 Recordkeeping

The following documents must be part of the site recordkeeping program:

- Employees medical clearances for respirator use
- Respirator training and fit testing forms.

5.9 Program Evaluation

This RPP shall be reviewed annually at the direction of the Director Health and Safety.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

Title 29, Code of Federal Regulations, Section 1910.134.

AIHA, ***Respiratory Protection, A Manual and Guideline***, 1980.

American National Standards Institute Practices for Respiratory Protection Z88.2-1992 (or most recent publication)

NIOSH, ***Certified Equipment List*** (most recent version)

Company Health and Safety Procedures:

HS013 Health and Safety Procedure Variances
HS040 Stop Work Authority
HS050 Training Requirement
HS052 Health and Safety Plans
HS102 Management of Employee Exposure and Medical Records
HS104 Employee Notification of Industrial Hygiene Monitoring Records
HS300 Confined Spaces
HS304 Compressed Gas Cylinders
HS600 Personal Protective Equipment

8.0 ATTACHMENTS

1. Responsibility Matrix
2. List of Approved Respiratory Protective Equipment
3. Respirator Type, Protection Factor, and Fit Testing Method
4. Mandatory Respirator Fit Test Protocol
5. Respirator Fit Test Form
6. Emergency Respiratory Protective Equipment Monthly Inspection Checklist
7. Guide to Respiratory Protective Equipment Cleaning, Inspection, Maintenance, and Storage

ATTACHMENT 1
RESPIRATORY PROTECTION PROGRAM

Responsibility Matrix

Action	Procedure Section	*Responsible Party*					
		Employee	**Health and Safety Representative**	**Project/ Location Management**	**Director of Heath & Safety**	**Training**	**RPP Coordinator**
Issue, Revise, and Maintain Procedure	3.1				X		
Assure Proper Selection of Respirators	5.2.2		X				
Review Purchase Requests for Respiratory Equipment	5.2.3		X				
Conduct Fit Testing	5.4		X				X
Assure Compliance with RPP	5.4		X	X			X
Assure Training	5.4		X	X			X
Audit Program Compliance	5.4		X		X		X
Assist/Approve Local Training Program	5.4					X	
Maintenance Program	5.6	X	X	X			X
Field Use	5.7	X	X	X			X
Recordkeeping	5.8	X	X			X	X
Program Evaluation	5.9				X		

ATTACHMENT 2

LIST OF APPROVED RESPIRATORY PROTECTIVE EQUIPMENT

AIR PURIFYING RESPIRATORS (APR)

Respirator Class	Respirator Type	Respiratory Performance	Manufacturer	Model Name	Model Number
Standard APR	Half-Face	Negative Pressure	Survivair	Blue 1	2100-10 S 2200-10 M 2300-10 L
			MSA	Comfo II	479529 S 479428 M 479530 L
	Full-Face	Negative Pressure	Survivair	20/20	202062 S 202072 M 202082 L
			MSA	Ultra Twin	480263 S 480259 M 480267 L
Powered APR	Hood	Continuous Positive Pressure	Survivair	PAPR	5200-15
			MSA	Optimair 6	480251 S 480247 M 480255 L

SUPPLIED AIR RESPIRATORS (SAR)

Respirator Class	Respirator Type	Respiratory Performance	Manufacturer	Model Name	Model Number
Airline SAR	Full-Face	Positive Pressure Demand	Survivair	Panther	P968455
			MSA	Premaire	497291
SCBA SAR	Full-Face	Positive Pressure Demand	Survivair	Cougar	P 9643310
			MSA	MMR WorkMask 2216	Varies on Components
Emergency	Escape/Egress Unit	Continuous Flow	Survivair	5 min. EEGA	9750870
			MSA	Custom Air V	484353

ATTACHMENT 3

RESPIRATOR TYPE, PROTECTION FACTOR, AND FIT TESTING METHOD

Respirator Type	Protection Factor	QLFT	QNFT
Half-Face, Negative Pressure (<100 Fit Factor)[1]	10	Yes	Yes
Full-Face, Negative Pressure (<100 Fit Factor) Used in Atmosphere up to 10 Times the PEG	10	Yes	Yes
Full-Face, Negative Pressure (>100 Fit Factor) Used in Atmospheres Over 10 Times the PEG[2]	50	No	Yes
PAPR (>100 Fit Factor) Used in Atmospheres Over 10 Times the PEG[2]	100	Yes	Yes
SCBA/SAR Used in Positive Pressure (Pressure Demand Mode) (>100 Fit Factor) Used in Atmospheres Over 10 Times the PEG[2]	10,000	Yes [3]	Yes [4]

Footnotes:

1. If quantitatively fit tested, the device must demonstrate a fit factor of at least 100.
2. If quantitatively fit tested, the device must demonstrate a fit factor of at least 500.
3. If qualitatively fit tested, the assigned protection factor is 100.
4. If quantitatively fit tested, the assigned protection factor is 10,000

ATTACHMENT 4

MANDATORY RESPIRATOR FIT TEST PROTOCOL

OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures - General Requirements

The company shall conduct fit testing using the following procedures. The requirements in this attachment apply to all OSHA-accepted fit test methods, both QLFT and QNFT. There are several OSHA-accepted fit test protocols for QLFT. This procedure includes only the irritant smoke protocol since it requires less equipment and is more practical for field use.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subjects formal training on respirator use, because it is only a review.

3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following Item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
   a. Position of the mask on the nose;
   b. Room for eye protection;
   c. Room to talk; and
   d. Position of mask on face and cheeks.

7. The following criteria shall be used to help determine the adequacy of the respirator fit:
   a. Chin properly placed;
   b. Adequate strap tension, not overly tightened;
   c. Fit across nose bridge;
   d. Respirator of proper size to span distance from nose to chin;
   e. Tendency of respirator to slip; and
   f. Self-observation in mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache, or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, he/she shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing his/her duties.

11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

12. *Exercise Regimen*: Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subjects responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

14. *Test Exercises*: The following test exercises are to be performed for all fit testing methods prescribed in this attachment, except for the controlled negative pressure (CNP) method. A separate fit testing exercise regimen is contained in the CNP protocol.

    Each test exercise shall be performed for one minute, except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

    The test subject shall perform exercises, in the test environment, in the following manner:

    a. *Normal Breathing*: In a normal standing position, without talking, the subject shall breathe normally.

    b. *Deep Breathing*: In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

    c. *Turning Head Side to Side*: Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

d. *Moving Head Up and Down*: Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

e. *Talking*: The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can count backward from 100, recite a memorized poem or song or read from a prepared text such as the Rainbow Passage.

> Rainbow Passage:
>
> When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

f. *Grimace*: The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT.)

g. *Bending Over*: The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

h. *Normal Breathing*: Same as Item A.14.a.

B. Qualitative Fit Test (QLFT) Protocols

1. General:

   a. The employer shall ensure that persons administering QLFT are able to perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

   b. The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Irritant Smoke (Stannic Chloride) Protocol: This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

   a. General Requirements and Precautions:

      1. The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

      2. Only stannic chloride smoke tubes shall be used for this protocol.

      3. No form of test enclosure or hood for the test subject shall be used.

4. The smoke take precautions to minimize the test subjects exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

5. The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the buildup of irritant smoke in the general atmosphere.

b. Sensitivity Screening Check: The person to be tested must demonstrate his/her ability to detect a weak concentration of the irritant smoke.

1. The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

2. The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

3. The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subjects direction to determine that he/she can detect it.

c. Irritant Smoke Fit Test Procedure:

1. The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

2. The test subject shall be instructed to keep his/her eyes closed.

3. The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within 6 inches of the respirator.

4. If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

5. The exercises identified in Item A.14 of this attachment shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

6. If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

7. Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

8. If a response is produced during this second sensitivity check, then the fit test is passed.

C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: quantitative fit testing using a nonhazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. General:

   a. The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly, and ensure that test equipment is in proper working order.

   b. The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol: The ambient aerosol CNC quantitative fit testing (Portacount®) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employees own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.

   a. Portacount Fit Test Requirements:

      1. Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 Series 100, Series 99, or Series 95 particulate filter) per manufacturers instruction.

      2. Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the

wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

3. Check the following conditions for the adequacy of the respirator fit: chin properly placed; adequate strap tension, not overly tightened; fit across nose bridge; respirator of proper size to span distance from nose to chin; tendency of the respirator to slip; and self-observation in a mirror to evaluate fit and respirator position.

4. Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

5. Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

6. The test subject shall be instructed to perform the exercises in Item A.14 of this attachment.

7. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

b. Portacount Test Instrument:

1. The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

2. Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this attachment.

3. A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subjects name; overall fit factor; make, model, style, and size of respirator used; and date tested.

3. Controlled Negative Pressure (CNP) Quantitative Fit Testing Protocol - The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer, Dynatech Nevada, also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employees own respirator. To perform the test, the test subject closes his/her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of

the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.

a. CNP Fit Test Requirements:

1. The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.

2. The CNP system defaults selected for test pressure shall be set at 15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

   (Note: CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)

3. The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.

4. The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.

5. The test subject shall be trained to hold his/her breath for at least 20 seconds.

6. The test subject shall don the test respirator without any assistance from the individual who conducts the CNP fit test.

7. The QNFT protocol shall be followed according to Item C.1 of this attachment with an exception for the CNP test exercises.

b. CNP Test Exercises:

1. Normal Breathing: In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his/her breath for 10 seconds during the test measurement.

2. Deep Breathing: In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during test measurement.

3. Turning Head Side to Side: Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the

turning head side to side exercise, the subject needs to hold head full left and hold his/her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his/her breath for 10 seconds during test measurement.

4. Moving Head Up and Down: Standing in place, the subject shall slowly move his/her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his/her head full up and hold his/her breath for 10 seconds during test measurement. Next, the subject shall hold his/her head full down and hold his/her breath for 10 seconds during test measurement.

5. Talking: The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during the test measurement.

6. Grimace: The test subject shall grimace by smiling or frowning for 15 seconds.

7. Bending Over: The test subject shall bend at the waist as if he/she were to touch his/her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during the test measurement.

8. Normal Breathing: The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.

c. CNP Test Instrument:

1. The test instrument shall have an effective audio warning device when the test subject fails to hold his/her breath during the test. The test shall be terminated whenever the test subject failed to hold his/her breath. The test subject may be refitted and retested.

2. A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subjects name; overall fit factor; make, model, style, and size of respirator used; and date tested.

ATTACHMENT 5
RESPIRATOR FIT TEST FORM

NAME (Please Print): _____ SIGNATURE: _____

SSN: _____-_____-_____ HOME DEPT: _____ DATE: _____

CONDUCTED BY: _____ LOCATION: _____

FIT TEST PROTOCOL

QUANTITATIVE:
Fit Factor _____

QUALITATIVE:
Irritant Smoke:
Other (specify):

TYPE OF RESPIRATOR
(Circle Appropriate One)

APR/HF APR/FF SCBA
SAR/EGS PAPR OTHER

Respirator Manufacturer: _____
Model: _____
Size: _____

		INITIAL:
1.	I understand why respiratory protection is needed and where and when it should be used.	
2.	I know how to use this respirator properly.	
3.	I know how to clean and inspect this respirator.	
4.	I understand the limitations and restrictions of this respirator.	
5.	I wore this respirator in normal air and performed the user seal.	
6.	I wore this respirator equipment in a test atmosphere.	
7.	I understand that a good gas-tight face seal cannot be achieved with obstructions such as facial hair or glasses.	
8.	I understand that corrective lenses compatible with the full facepiece are available by my manager.	

ATTACHMENT 6

EMERGENCY RESPIRATORY PROTECTIVE EQUIPMENT MONTHLY INSPECTION CHECKLIST

INSPECTED BY (Print):_____ DATE: _____

BACKPACK#: _____ AIR CYLINDER#: _____

			PASS	FAIL
A. Backpack and Harness Assembly	1. Straps	Inspect for complete set	❑	❑
		Inspect for damaged straps	❑	❑
	2. Buckles	Inspect for mating ends	❑	❑
		Check locking function	❑	❑
	3. Backplage and Cylinder Lock	Inspect backplage for cracks, missing screws/rivets	❑	❑
		Inspect cylinder hold down strap	❑	❑
		Inspect strap tightener	❑	❑
B. Cylinder and Cylinder Valve Assembly	1. Cylinder	Cylinder tight to backplate	❑	❑
		Current Hydrostatic Test	❑	❑
		Inspect cylinder for dents, gouges	❑	❑
		Is cylinder at least 90% filled?	❑	❑
	2. Head and Valve Assembly	Inspect cylinder valve lock for presence	❑	❑
		Inspect cylinder gauge for condition	❑	❑
		Proper function of cylinder valve lock	❑	❑
		Test for cylinder leakage	❑	❑
C. Regulator and High Pressure Hose	1. High Pressure Hose and Connector	Leakage in hose	❑	❑
		Leakage in hose to cylinder connector	❑	❑
	2. Regulator and Low Pressure Alarm	Read regulator gauge (at least 1,000 psi)	❑	❑
		Low pressure alarm sounds at 500 psi	❑	❑
		Test integrity of diaphragm	❑	❑
		Test for positive pressure	❑	❑
		Test bypass system	❑	❑
D. Facepiece and Corrugated Breathing Tube	1. Facepiece	Inspect harness for deterioration	❑	❑
		Inspect facepiece body for deterioration	❑	❑
		Inspect lens	❑	❑
		Inspect exhalation valve	❑	❑
	2. Breathing Tube and Connector	Inspect breathing tube for deterioration	❑	❑
		Inspect connector for threads and gasket	❑	❑
	3. Leak Test and Cleaning	Perform negative pressure test on facepiece/ breathing tube	❑	❑
		Clean and sanitize facepiece	❑	❑

Note: Any item marked Fail will place the equipment out of service until repaired or replaced.

ATTACHMENT 7

GUIDE TO RESPIRATORY PROTECTIVE EQUIPMENT: CLEANING, INSPECTION, MAINTENANCE, AND STORAGE

A program for the maintenance of respirators shall include the following:

- Cleaning and sanitizing
- Inspection for defects
- Maintenance and repair
- Storage
- Assurance of breathing air quality.

The following maintenance, inspection, and storage program is recommended.

1. Cleaning and Sanitizing

Respirators issued to an individual shall be cleaned and sanitized regularly. Each respirator shall be cleaned and sanitized before being worn by different individuals. Respirators intended for emergency use shall be cleaned and sanitized after being used. The following shall be completed in addition to the manufacturers instruction for cleaning:

a. Remove, when necessary, the following components of respiratory inlet covering assemblies before cleaning and sanitizing:

   1. Filters, cartridges, canisters
   2. Speaking diaphragms
   3. Valve assemblies
   4. Any components recommended by the respirator manufacturer.

b. Wash respiratory inlet covering assemblies in warm (43EC or 110EF maximum temperature) cleaner sanitizer solution. A stiff bristle (not wire) brush may be used to facilitate removal of dirt or other foreign material.

c. Rinse the respirator inlet covering assemblies in clean, warm (43EC or 110EF maximum temperature) water.

d. Drain all water, and air, dry the respiratory inlet covering assemblies.

e. Clean and sanitize all parts removed from the respiratory inlet covering assemblies as recommended by the manufacturers

f. If necessary to remove foreign material, hand wipe respiratory inlet covering assemblies, all parts, and all gasket- and valve-sealing surfaces with damp, lint-free cloth.

g. Inspect parts and replace any that are defective.

h. Reassemble parts on respirator inlet covering assemblies.

i. Visually inspect and, where possible, test parts and respirator assemblies for proper function.

j. Place assembled respirators in appropriate containers for storage.

Machines may be used to expedite the cleaning, sanitizing, rinsing, and drying of large numbers of respirators. Extreme care shall be taken to ensure against tumbling, agitation, or exposure to temperatures above those recommended by the manufacturer (normally 43EC or 100EF maximum), as these conditions are likely to result in damage to the respirators.

Ultrasonic cleaners, clothes washing machines, dishwashers, and clothes dryers have been specially adapted and successfully used for cleaning and drying respirators.

Cleaner sanitizers that effectively clean the respirator and contain a bactericidal agent are commercially available. The bactericidal agent frequently used is a quaternary ammonium compound. Strong cleaning and sanitizing agents and many solvents can damage rubber or elastomeric respirator parts. These materials must be used with caution.

Alternatively, respirators may be washed in a detergent solution and then sanitized by immersion in a sanitizing solution. Some sanitizing solutions that have proven effective are: (a) a hypochlorite (bleach) solution (50 parts per million chlorine), 2-minute immersion; (b) an aqueous iodine solution (50 parts per million of iodine), 2-minute immersion; or (c) a quaternary ammonium solution (200 parts per million of quaternary ammonium compounds in water with less than 500 parts per million total hardness), 2-minute immersion.

Inflammation of the skin of the respirator user (dermatitis) may occur if the quaternary ammonium compounds are not completely rinsed from the respirator. The hypochlorite and iodine solutions are unstable and break down with time; they may cause deterioration of rubber or other elastomeric parts and may be corrosive to metallic parts. Immersion times should not be extended beyond the mentioned time periods, and the sanitizers shall be thoroughly rinsed from the respirator parts.

Respirators may become contaminated with toxic materials. If the contamination is light, normal cleaning procedures should provide satisfactory decontamination; otherwise, separate decontamination steps may be required before cleaning.

2. Inspection

The user shall inspect the respirator immediately prior to each use to ensure that it is in proper working condition. After cleaning and sanitizing, each respirator shall be inspected to determine if it is in proper working condition, if it needs replacement parts or repairs, or if it should be discarded. Each respirator stored for emergency or rescue use shall be inspected at least monthly.

Respirator inspection shall include a check for tightness of connections; for the condition of the respiratory inlet covering, head harness, valves, connecting tubes, harness assemblies,

hoses, filters, cartridges, canisters, end-of-service indicators, electrical components, and shelf-life date(s); and for the proper function of regulators, alarms, and other warning systems. Each rubber or other elastomeric part shall be inspected for pliability and signs of deterioration. Each air and oxygen cylinder shall be inspected to ensure that it is fully charged according to the manufacturers instructions.

A record of inspection dates shall be kept for each respirator maintained for emergency or rescue use. Respirators that do not meet applicable inspection criteria shall be immediately removed from service (a temporary replacement assigned) and repaired or permanently replaced.

Inspection of hoop-wrapped air cylinders will follow the recommendations set forth in the Compressed Gas Association, Inc. publication CGA C-6.2-1988, "Guidelines for Visual Inspection & Requalification of Fiber Reinforced High Pressure Cylinders," and will be examined for the following five types of damage:

- Abrasion is damage caused by wearing, grinding, or rubbing away by friction. Abrasions less than 0.005 inch (0.127 mm) deep are acceptable and should have no adverse effects on the safety of the cylinder. Abrasions with isolated groups of fibers exposed or flat spots with a depth greater than 0.005 inch (0.127 mm) but less than 0.0075 inch (0.191 mm) are acceptable if the damage is repaired. Cylinders abraded in excess of 0.0075 inch (0.191 mm) should be taken out of service until professionally inspected.

- Cuts are damage inflicted by a sharp object. Cuts or scratches less than 0.005 inch (0.127 mm) deep are acceptable regardless of length, number, or direction. For cuts greater than 0.005 inch (0.127 mm) deep and up to a depth of 0.015 inch (0.038 mm) with a maximum 1- or 2-inch (25.4 mm or 50.8 mm) length transverse to the fiber direction, the cylinder should be removed from service until repaired. Cylinders with cuts greater than 0.015 inch (0.038 mm) with a maximum greater than 2 inches (50.8 mm) length transverse to the fiber direction or with bare metal showing through must be condemned.

- Impact damage is caused by a cylinder striking or being struck by another object. Impact damage is considered slight if a frosted area is noted in the impact area. These cylinders may be returned to service. Impact damage is severe if evidence of fiber cutting, delamination, and possible structural damage is apparent. Cylinders sustaining severe impact damage should be evaluated using the guidelines for cuts and structural damage.

- Structural damage is damage which causes a visual change in original cylinder configuration. This change can include any evidence of bulges, a cocked end fitting, concave areas on the domes or on the cylinder section, or, if by visual inspection of the cylinder interior, there is evidence of damage involving deformation of the liner. Structurally damaged cylinders must be immediately removed from service and condemned.

- Heat or fire damage to a cylinder is evident by discoloration, charring, or burning of the composite, labels, paint, or plastic components of the valve. Such damage would cause a

cylinder to be removed from service and condemned. Note: If the cylinder is only soiled from smoke or other debris and is found to be intact underneath, it may be returned to service.

3. Maintenance and Repair

Replacement of parts or repairs shall be done only be persons trained in proper respirator maintenance and assembly. Replacement parts shall be only those designated for the specific respirator repaired. Reducing or admission valves, regulators, and alarms shall be adjusted or repaired by the respirator manufacturer or a technician trained by the manufacturer. Instrumentation for valve, regulator, and alarm adjustments and tests should be calibrated to a standard traceable to the National Institute of Standards and Technology (NIST), at a minimum of every 3 years.

4. Storage

Respirators shall be stored in a manner that will protect them against physical and chemical agents such as vibration, shocks, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators shall be stored to prevent distortion of rubber or other elastomeric parts. Respirators shall not be stored in such places as lockers and tool boxes, unless they are protected from contamination, distortion, and damage. Emergency and rescue respirators that are placed in the work areas shall be quickly accessible at all times, and the storage cabinet or container in which they are stored shall be clearly marked.

5. Assurance of Breathing Air Quality

Compressed gaseous air, compressed gaseous oxygen, liquid air, and liquid oxygen used for respiration shall be of high purity. Compressed gaseous air shall meet at least the requirements of the specification for Type I-Grade D breathing air, and liquid air shall meet at least the requirements for Type II-Grade B breathing air as described in ANSI/CGA G-7.1-1989.

The CGA designation for Grade D and Grade E breathing air is as follows:

- Grade D breathing air, as per ANSI/CGA G-7.1-1989, shall contain between 19.5 and 23.5 percent oxygen with the balance predominantly nitrogen, a maximum of 5 mg/m^3 oil (condensed), a maximum of 10 ppm carbon monoxide, no pronounced odor, and a maximum of 1,000 ppm carbon dioxide.

- Grade E breathing air, as per ANSI/CGA G-7.1-1989, shall contain between 20 and 22 percent oxygen with the balance predominantly nitrogen, a maximum of 5 mg/m^3 oil (condensed), a maximum of 10 ppm carbon monoxide, no pronounced odor, a maximum of 500 ppm carbon dioxide, and 25 ppm total hydrocarbon content (as methane).

- Note: The quality verification for oil is not required for synthesized air whose oxygen and nitrogen components are produced by air liquefaction. Carbon monoxide quality verification is not required for Grade D breathing air if synthesized air when nitrogen component was previously analyzed and meets National Foundry (NF) specification and when the oxygen component was produced by air liquefaction and meets United States Pharmacopeia (USP) specification.

Compressed gaseous air may contain low concentrations of oil introduced from equipment during processing or normal operation. If high-pressure oxygen passes through an oil- or grease-coated orifice, an explosion or fire may occur. Therefore, compressed gaseous oxygen shall not be used in supplied air respirators or in open-circuit type self-contained breathing apparatus that have previously used compressed air. Oxygen concentrations greater than 23.5 percent shall be used only in equipment designed for oxygen service or distribution.

The dew point of air used to recharge self-contained breathing apparatus shall be -65EF or lower (less than 25 ppm water vapor). The driest air obtainable (dew point of -100EF or lower) should be used for recharging SCBA cylinders to be used in environments with ambient temperatures below -25EF. The dew point of breathing air used with supplied air respirators should be lower than the lowest ambient temperature to which any regulator or control valve on the respirator or air-supplied system will be exposed.

Breathing air couplings shall be incompatible with outlets for nonrespirable plant air or other gas systems to prevent inadvertent servicing of supplied air respirators with nonrespirable gases. **It is recommended that Foster or Hansen fittings be reserved for breathing air systems.** Breathing air outlets shall be labeled.

Breathing air may be supplied to supplied air respirators from cylinders or air compressors. Cylinders shall be tested and maintained in accordance with applicable DOT specifications for shipping containers (49 CFR 173 and 178). Breathing gas containers shall be marked in accordance with ANSI/CGA C-4-1990. Specific test recommendations for purchased breathing air are given in the following table.

Method of Preparation	Analysis Recommended
Compression: Supplier does not fill cylinders with any other gases.	Check 10% of cylinders from each lot for ppm CO and odor.
Compression: Supplier fills cylinders with gases other than air.	Analyze all cylinders for percent oxygen. Check 10% of cylinders from each lot for ppm CO and odor.
Reconstitution.	Analyze all cylinders for percent oxygen. Check 10% of cylinders from each lot for ppm CO and odor.

A compressor shall be constructed so as to avoid entry of contaminated air. For all air compressors, including portable types, the air intake location shall be carefully selected, and monitored closely to ensure continued quality of air supply to the compressor. The system shall be equipped as necessary with a suitable in-line air-purifying sorbet bed and filter to further assure breathing air quality. Maintenance and replacement/refurbishment of compressor and associated air-purifying/filter media shall be performed periodically, by trained personnel following manufacturer's recommendations and instructions.

As part of acceptance testing, and prior to initial use, representative sampling of the compressor air output shall be performed to ensure that it complies with the requirements in Paragraph 1 of this section. To ensure a continued high-quality air supply, and to account for any distribution system contaminant input, a representative sample should be taken at distribution supply points. Samples should be collected on a periodic basis, as directed by the Program Coordinator. Specific test recommendations are given in the following table.

Type/Sample	Oil Lubricated	Non-Oil Lubricated	Combustion Engine Powered
Water Vapor	X	X	X
Carbon Monoxide	X		X
Condensed Hydrocarbon	X		X
Carbon Dioxide			X
Odor	X	X	X

NOTES:

1. When using air compressors, intake location shall be carefully selected and monitored closely to ensure air supplied to the compressor is of adequate quality.
2. No frequency for periodic checks of air quality is specified, due to wide variation in equipment types, use, working environments, and operating experience.
3. Continuous monitoring of temperature and carbon monoxide are not required.
4. For non-oil lubricated compressors that operate at less than 35 psi, no sampling for water is required.
5. These requirements apply to systems designed for breathing air, other air-supply systems need to be evaluated on a case-by-case basis for the type and frequency of testing.

Further details on sources of compressed air and its safe use can be found in CGA G-7-1988.

PROCEDURE

Subject: MOTOR VEHICLE OPERATION: GENERAL REQUIREMENTS

1.0 PURPOSE AND SUMMARY

This procedure prescribes the general requirements for the operation of motor vehicles on company business. All operators of company owned, leased, and rented vehicles, as well as personal vehicles used on company business, are covered by this procedure. U.S. Department of Transportation (DOT) regulated personnel must also comply with the guidelines contained in Procedure HS810. Key elements of this procedure include:

- All employees who drive or may drive on company business must be familiar with the requirements of this procedure and certify their acceptance of the Company Rules for Motor Vehicle Operation (Attachment 2). This certification will be evaluated via the established point system to determine driving privilege status.

- All new hire candidates shall complete and be familiar with the company Rules for Motor Vehicle Operation (Attachment 2). This certification will be evaluated via the established point system to determine driving privilege status.

- Employees must report all vehicular citations incurred while on company business to their supervisor as soon as possible, but not longer than 24 hours after the occurrence. Once reported, the established evaluation criteria in Section 5.4 will be used to determine corrective actions.

- Employees have the responsibility to keep track of their non-work related vehicular citations and utilize the established evaluation criteria found in Section 5.3 to determine if their overall MVR citations exceed the Overall Driving Record limits (See Section 5.3.2).

- Employees utilizing vehicles while on company business are required to review this procedure and attend a company-designated driver training class at least once every two years.

- Requests for the re-instatement of denied or revoked driving privileges can be made to the appropriate business line Vice-President and the Director of Health & Safety.

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Director of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Chargeable Vehicle Accident - Any at fault vehicle accident meeting any one of the following criteria:

- An individual other than an employee of the company is a party in the accident.
- Property owned by a person or entity other than the company is damaged.
- When only company employees, company owned or leased (not rented) vehicles and property is involved and damage exceeds $2,500.00.

Company - Shaw Environmental & Infrastructure, Inc. (Shaw E & I) and its subsidiaries and affiliates.

Motor Vehicle - Any passenger vehicle, including trucks, used upon the highway or in private facilities for transporting passengers and/or property. This includes personal vehicles operated on company business. For the purpose of this procedure, off-road vehicles, such as ATV's (Four Wheelers) earthmoving equipment, forklifts, non-highway use trucks, etc., are not considered vehicles. The use of motorcycles on company business is prohibited

Project Assigned Employees – Any employee that is assigned to a field operations project position. This designation includes Project Managers, Site Managers/Supervisors, Foremen, Technicians, Scientists, Geologists, Project Business Accountants, etc. This does not include employees that are typically assigned to an office but are visiting a site for brief periods of time, such as to provide technical assistance, perform audits, perform program reviews, etc.

5.0 TEXT

5.1 Company Rules for Motor Vehicle Operation

All employees who will or may be required to operate a company owned, leased, or rented motor vehicle or a personal vehicle used on company business shall acknowledge acceptance of the Company Rules for Motor Vehicle Operation & Employee Driving Record Certification (Attachment 2) prior to such operation. The signed form shall be retained by the Baton Rouge, LA Health & Safety Records Department. Each year, the company shall reserve the right to require covered employees to sign a copy of the most current Company Rules for Motor Vehicle Operation.

FAILURE OF EMPLOYEES TO COMPY WITH COMPANY RULES FOR MOTOR VEHICLE OPERATION OR THIS POLICY SHALL BE SUBJECT TO DISCIPLINARY ACTION UP TO AND INCLUDING (BUT NOT LIMITED TO) REVOCATION OF DRIVING PRIVILEGES FOR COMPANY BUSINESS AND TERMINATION OF EMPLOYMENT.

Those employees who are assigned to use an Employer vehicle which they take home with them must meet the following conditions:

a) The Employee's supervisor signs an Authorization for Assignment Form (See Attachment 7)
b) The Employee signs and agrees to be bound to a Vehicle Usage Agreement (See Attachment 8)
c) The Employee provides proof of insurance on the Employee's personal vehicle which lists the Employee as an insured driver on the insurance and such insurance contains minimum coverage required by law and acknowledges that the Employee's personal insurance will provide primary coverage of the Employee's use of a Company

owned vehicle when such use is not in the course and scope of employment. The authorizing supervisor shall attach a copy of the proof or personal insurance to Attachment 8 for future reference.

The Vehicle Usage Agreement is an agreement by the Employee that his own personal vehicle insurance will be primary as to any claims arising from the Employee's **NON COMPANY** use of Company Vehicles.

Employees operating Company Vehicles without compliance with these requirements, as well as any supervisor who allowed or granted such use, will be deemed to be in violation of Company policy and will be subject to discipline up to and including termination from employment.

5.1.1 Project Assigned Employee Vehicle Use Requirements

The following requirements are set forth as it pertains to Project Assigned Employees.

- Project-assigned employees are not permitted to operate company vehicle (owned, leased or rented) on non-company business after 10:00 p.m. without written authorization from the project manager or the appointed Site Manager/Supervisor with jurisdiction over the vehicle. In those cases where there is shift work, a non-traditional workday (i.e. 3PM to 11PM workday, etc.) or other non-typical circumstances, it is understood that the after 10:00 PM restriction would not be appropriate. However, even in these non-typical circumstances, the Project Manager or the appointed site manager/supervisor shall be required to execute the required written authorization for use of a company vehicle, including the time frame in which employees shall be permitted to use the vehicle after their non-traditional workday.

- Project assigned personnel that are residing in temporary housing / hotels are granted permission to drive to and from the temporary residence and work. Additionally, the Project Manager, or the appointed Site Manager/Supervisor his/her designee (Site Manager, Supervisor, etc.) is required to evaluate and optimize the potential of carpooling of project assigned personnel in an effort to reduce the number of company vehicles being driven to and from the project site.

- Project assigned employees shall not use company vehicles for sight seeing or any other personal/recreational activities.

- Vehicles may be used in support of "daily life activities" such as going to restaurants for dinner, laundromats, local retail stores, grocery stores, etc.

- A maximum distance for "daily life activity" driving shall be no further

than 20-miles from the temporary housing in which an employee resides. In those cases where the maximum allowed distance does not permit daily life activities to be conducted, a written authorization, from the Project Manager or the appointed Site Manager/Supervisor, is required to travel further distances.

- For normal routine travel to and from work, employees shall utilize their own personal transportation.

- If an employee is assigned to a project site that is located within driving distance from the employee's permanent residence, but is too far away to allow for a daily commute, that employee shall utilize their own personal transportation to drive to and from their permanent residence and the project site. (i.e. for initial assignment arrival to the project, trips home on rotation, etc.) Upon arrival to the site, employees shall be allowed to use a company vehicle as required to perform project activities. In these cases, the employee will also be required to drive their personal vehicle to and from the project site from their temporary housing / hotel residence, for personal "daily life activities", etc.

- Employees may drive a Shaw-owned, leased or rented vehicle home during off hours only when authorized in writing by a business line manager, who must hold a position at least one level above the site / project manager to whom the authorized employee reports. In other words, the approval must be signed by the employee's, supervisor's, supervisor or a higher level manager.

- In making vehicle use decisions the authorizing manager shall consider the risk of vehicle accidents, Shaw's liability risks, client and project specific needs, distances to be traveled, employee driving history, and any other relevant factors. Attachments 7 and 8, (Authorization for Assignment and Vehicle Use Agreement forms), shall be used to facilitate this process.

5.2 Pre-employment Evaluation

Human Resources shall distribute a copy of this procedure to all new hire candidates for the completion of Attachment 2. Information provided should be evaluated via the point system in Section 5.3. Human Resources and the hiring manager will be advised regarding any hiring or driving privilege restrictions that may apply. Hiring of persons with regular driving duties (e.g., field technicians and leadmen, sales persons, or others with assigned company motor vehicles) may only proceed after the information contained in Attachment 2 is evaluated.

Once Attachment 2 is completed, it is to be faxed to the Baton Rouge, LA Corporate Health and Safety Records Department at (225) 987-3714. The driving status of the prospective employee will be reported to the appropriate Human Resources Department. Health & Safety will notify the appropriate Human Resources manager when the attachments are not returned.

Discrepancies between the certified driving record report and Attachment 3 shall be reviewed with the prospective employee. Deliberate falsification of driving record information will disqualify prospective employees from being hired.

5.3 Driving Record Point System

The following point system will be used to evaluate the driving record of all existing employees and new hire candidates that can reasonably be expected to operate a motor vehicle during their employment. This data is to be collected through Motor Vehicle Records (MVR) search and by the employee completing Attachment 2 of this policy. Attachment 2 is to be completed by the new hire candidate and reviewed by the regional H&S Assistant to ensure compliance.

Driving Record Point System	
Description	**Assigned Point Value**
Overweight, loss of load, vehicular equipment infraction, etc.	1
Moving violation: speeding, failure to stop, failure to signal, etc.	2
At-fault accident, seatbelt violation	3
Major citation: reckless driving, tailgating, suspended license, speed contest, improper lane usage, Open Container (Non-Work Related), etc.	6
Driving under the influence, Hit and Run (leaving the scene)	8
Open Alcohol Container (Work Related)	8

5.3.1 Pre-Employment Driving Record Point System Evaluation

If a new hire candidate has accumulated three (3) points or less in the last twelve (12) months or five (5) points or less in the last twenty-four (24) months, they will be given the privilege to drive motor vehicles on company business without restrictions.

If a new hire has accumulated four (4) to six (6) points in the last twelve (12) months or six (6) to eight (8) points in the last twenty-four (24) months, they will be placed on probation for a period of twelve (12) months. They will be afforded the privilege to drive motor vehicles on company business during this probationary period. Any driving infractions (i.e., speeding tickets, at-fault accidents, citations, etc.) accumulated during this probationary period will result in termination of the privilege to drive a motor vehicle on company business.

If the new hire candidate has accumulated seven (7) to eleven (11) points in the last twelve (12) months or nine (9) to fifteen (15) points in the last twenty-four (24) months, they will not be eligible for company driving privileges.

Employment can only be offered with the strict understanding of denial of the privilege to drive motor vehicles on company business. After the first twelve (12) months of employment, the employee can petition the appropriate business line Vice President and the Director of Safety and Health for reconsideration of driving privileges.

If a new hire candidate is expected to drive a vehicle, to fulfill the responsibilities of his/her role, and there has been an accumulation of twelve (12) points or more in the last twelve (12) months or sixteen (16) points or more in the last twenty-four (24) months, the candidate shall not be hired. See Table below:

Candidate's Driving Privilege Status Description	Past 12 Months	Past 24 Months
Can drive without restriction.	0 to 3 points	0 to 5 points
Can drive with understanding of probationary status.	4 to 6 points	6 to 8 points
Not eligible for company driving privileges for first 12 months of employment.	7 to 11 points	9 to 15 points
Candidate not eligible for hire.	12 points or more	16 points or more

5.3.2 Existing Employee Driving Record Point System

An acceptable traffic record is one requirement for continued driving privileges. Accordingly, all affected employee's MVR traffic record is subject to periodic and annual review to ensure compliance with state and federal regulations, as well as company policy.

WORK RELATED TRAFFIC VIOLATIONS

It is the responsibility of all affected employees to provide verbal notice to their supervisor of any work related traffic violations that have occurred as soon as practicable but not longer than 24 hours after the occurrence. This verbal notice shall be followed by the employee completing an updated "Company Rules for Motor Vehicle Operation & Employee Driving Record Certification" (Attachment 2), and "Notification of Work Related Citation" form (Attachment 3). Both Attachment 2 and 3 shall then be immediately forwarded to the Baton Rouge, LA Health and Safety Records office.

NON-WORK RELATED TRAFFIC VIOLATIONS

Employees have the responsibility to keep track of their non-work related vehicular citations and utilize the established evaluation criteria, as described below, to determine if their overall traffic citations exceed acceptable company limits. It is not necessary for employees to report non-work related citations to their supervisor as they occur. However, if an employee's overall MVR record (work related or not) exceeds the company's established points system criteria, the employee must verbally inform their supervisor as soon as practicable but not longer than the following business day after the occurrence. This verbal notice shall be followed by the employee completing an updated Attachment 2

(Company Rules for Motor Vehicle Operation & Employee Driving Record Certification), and it shall then be immediately forwarded to the Baton Rouge, LA Health and Safety Records office.

OVERALL DRIVING RECORD EVALUATION

If it is determined that an employee has accumulated three (3) points or less in the last twelve (12) months or five (5) points or less in the last twenty-four (24) months, they will be allowed to continue with the privilege to drive motor vehicles on company business without restrictions.

If an employee has accumulated four (4) to six (6) points in the last twelve (12) months or six (6) to eight (8) points in the last twenty-four (24) months, the employee will be placed on probation for a period of twelve (12) months. The employee can continue to drive motor vehicles on company business during this probationary period.

If the employee has accumulated seven (7) to eleven (11) points in the last twelve (12) months or nine (9) to fifteen (15) points in the last twenty-four (24) months, they will not be eligible for company driving privileges. Continued employment may only be extended with the strict understanding of denial of the privilege to drive company owned, leased or rented motor vehicles on company business. After the first twelve (12) months following driving privilege revocation, the employee can petition their respective Business Line VP and the Director of Safety and Health for reconsideration of driving privileges. See Table below:

Employee's Driving Privilege Status Description	Past 12 Months	Past 24 Months
Can drive without restriction.	0 to 3 points	0 to 5 points
Can drive with understanding of probationary status.	4 to 6 points	6 to 8 points
Company driving privileges are revoked.	7 to 11 points	9 to 15 points

5.4 Employee Evaluation Criteria

All employees who may operate a motor vehicle on company business will become familiar with the requirements of this procedure, complete the currently-designated company driver training class, and complete Attachment 2 prior to such operation. The employee driving evaluation criteria is based upon all infractions including those incurred while on company business and during off-work hours. It is imperative that employees notify their supervisors immediately as possible and no later than 24 hours following a work-related citation/accident. Once notified, the supervisor will ensure the completion of Attachment 2, forward it to the Baton Rouge, LA H&S Records Office, and initiate one of the following corrective actions as required. Additionally, as it relates to non-work related and work related

traffic violations, it is the employee's responsibility to ensure that their overall driving record does not allow for the exceeding of the driving records points system. Should the employee's driving record points exceed the system limits, that they must notify their supervisor immediately, complete an updated "Company Rules for Motor Vehicle Operation & Employee Driving Record Certification" (Attachment 2 & 3) and forward it to the Baton Rouge, LA Health & Safety Records Department.

5.4.1 Work-Related Minor Citation

When an employee is given a work related minor citation (i.e., speeding ticket, moving violation, failure to signal turn, loss of load, etc.), the employee's supervisor will meet with the employee to discuss the corrective action that must be taken so that further violations do not occur. At a minimum, the supervisor shall require the employee to attend a recognized course in defensive driving on his/her own time and the cost of this training will be borne by the employee. This course shall be pre-approved by the Division Health & Safety Manager. The supervisor will provide written direction to the employee regarding the assigned corrective action(s). The supervisor shall forward a copy of an updated Company Rules for Motor Vehicle Operation & Employee Driving Record Certification form (Attachment 2 & 3) and a form of verification showing the employee's successful completion of an approved defensive driving course to the appropriate regional Human Resources Department for inclusion in the employee's personnel file. These documents shall also be forwarded to the **Baton Rouge, LA Health & Safety Records Department.**

5.4.2 Work Related Major Citation

When an employee is given a work related major citation (i.e., reckless driving, tailgating, suspended license, speed contest, etc.), the supervisor will hold a meeting with the employee, at which time the supervisor will complete the company Disciplinary Action Form (Procedure HR207) thereby informing the employee that any additional infractions will lead to more severe disciplinary action. In addition, the employee will be required to attend a recognized defensive driving course on his/her own time, as described in section 5.4.1, and will be suspended from work for one day without pay. A copy of the Disciplinary Action Form shall be forwarded to the appropriate Human Resources Department for their information and inclusion in the employee's personnel file.

5.4.3 Failure to Notify

Should an employee fail to notify his/her supervisor of any work or non-work related citation or accident within the required reporting time, his/her company driving privilege may be revoked. The supervisor will also take disciplinary action that is appropriate for the unreported event. If the unreported event is work related and is either an at-fault accident, driving under the influence case or a hit and run violation,

the termination process will be initiated. All disciplinary actions shall be documented to the employee by the supervisor. This copy, and any written response by the employee, shall be forwarded to the appropriate Human Resources Department for their information and inclusion in the employee's personnel file.

5.4.4 At-Fault Accident

Whenever an employee is operating a company owned/leased/rented vehicle or their personal vehicle on company business and is involved in an at-fault vehicle accident, an Accident Review Board shall be convened and recommend the corrective action to be taken. At a minimum, the action shall include the completion of a recognized driver safety course on their time and at their expense, as described in section 5.4.1. All disciplinary actions resulting from at-fault vehicle accidents will be reviewed for consistency by the appropriate Safety Council.

Depending upon the circumstances and severity of the accident, termination of the employee can be considered. As above, this must be approved by the appropriate Human Resources Department. All communication to the employee regarding the accident and resulting action shall be in writing with a copy to the appropriate Human Resources Department for their information and inclusion in the employee's personnel file.

5.4.5 Driving Under the Influence, Hit & Run (Leaving The Scene) and Open Container

If an employee is charged with Driving Under the Influence, Hit and Run or an Open Alcohol Container violation, he/she will have their driving privileges temporarily suspended pending final resolution of the charge. If the charge is resolved in the employee's favor, with a final adjudication holding no penalty, driving privileges may be re-instated. However, if any penalty is attached, such as probation, license restrictions, etc., the employee may be considered unqualified to drive for the company. Whenever an employee is convicted or pleads no contest to a company-related driving under the influence, hit and run or open container charge, he/she will be immediately terminated.

In a case that is not work related, and an employee is convicted or pleads no contest to a hit and run or driving under the influence charge, the employee shall notify his supervisor. Accordingly, the employee's company driving privileges will then be revoked for twelve (12) months. After the first twelve (12) months following driving privilege revocation, the employee can petition their respective Business Line VP and the Director of Safety and Health for reconsideration of driving privileges.

5.5 Training

All employees who will, or may reasonably be expected to, drive a company owned/leased/rented vehicle or their personal vehicle on company business shall review

this procedure and complete the currently-designated company driver training class prior to such operation. This class is designed to be taught either via the company's Web-based training program or by local Health and Safety personnel and must include the following elements: federal/state/local driving rules, company driving rules, emergency/accident procedures, and defensive driving techniques. Specific information on the vehicle to be operated will be provided locally. Personnel conducting this class shall provide the Knoxville Health and Safety Training Department with a copy of the course attendance sheet for inclusion in individual training records. All affected employees shall complete a driver safety training class at least once every two years.

5.6 Reinstatement of Driving Privilege

Any employee who has had his/her privilege to drive a motor vehicle on company business revoked or denied, and who desires to reinstate this privilege, must apply to the business line Vice President and the Director of Health and Safety for reinstatement. The Director of H&S, or his designee, shall specify rehabilitation program (if applicable), an external safe driving course, and any other requirements in which he/she deems appropriate. Once the employee completes the program, documentation of successful completion must be formally presented to the appropriate Vice President and the Director of H&S. If the documentation is accepted, the driving privilege may be reinstated. Copies of all documents shall then be forwarded, by the responsible H&S Manager, to Human Resources and to the Baton Rouge, LA Health & Safety Records Department.

Reinstatement of the driving privilege may occur one (1) time, at the discretion of the Director of Health & Safety and the responsible Business Line Vice President. If employee driving performance leads to a subsequent revocation of this privilege, such revocation shall be permanent.

5.7 Non-Shaw Employee Vehicle Use Requirements

Only approved non-Shaw employees (client, subcontractor or temporary/temp agency employees) who have completed and signed the "Non-Shaw Employee Driver Questionnaire" (HS800 Attachment 5) will be allowed to drive a Shaw owned, leased, or rented vehicle. Upon completing the questionaire and prior to the driver operating a Shaw vehicle, the subject questionnaire must be signed , dated and placed on file at the job site. The primary vehicle operator or the Shaw Project Management representative shall review the questionnaire and determine whether the non-Shaw employee satisfies the driver qualification requirements of HS800. The driver qualification point system can be found in section 5.3 of this policy.

In addition to the above requirement, it is also a requirement of the responsible Shaw Project Manager to forward a fully executed, company specific version of the correspondence that is found in Attachment 6, to the employer of the non-Shaw driver. This correspondence should not be modified except for the fields that specify the name and address of the subcontractor or client to which the letter is being written. This written correspondence will serve to notify that any employee that is assigned by their company to a Shaw project, and is required to operate/drive a Shaw owned, leased, or rented vehicle, will be subject to either meeting or exceeding the

operator requirements for Shaw employees.

As the employer of individuals who are assigned to a Shaw project, the authorized non-Shaw employer representative shall sign and return Attachment 6 to the respective Shaw Project Manager. By signing Attachment 6, the non-Shaw employer is acknowledging that they are either adopting the requirements set forth in this policy (HS800, Motor Vehicle Operation) or have developed a similar policy that meets or exceeds these requirements. Failure of a non-Shaw employer to comply with the requirements set forth in HS800 shall result in the prohibition of their employees driving any Shaw owned, leased or rented vehicles.

5.8 DRIVER SAFETY NOTIFICATION STICKER

A safety notification bumper sticker shall be applied to all Shaw owned / leased vehicles in an effort to ensure continued compliance with driving safety regulations. The notification service will be managed by a third party fleet safety management company and will serve as the recipient of all calls that are placed concerning unsafe driving behavior. The Findlay, OH equipment division will serve as the first point of contact as it pertains to notifications that are received from the third party company who administers the bumper sticker safety call in service. Upon receiving a report from the third party administrator, the equipment division shall determine what business line the vehicle / driver is located within and then contact the respective business line Divisional H&S Manager. The Divisional H&S Manager will then contact the affected employee and the employee's supervisor for a counseling/discussion meeting, concerning the complaint. Upon conclusion of the meeting, the information will be reviewed by the supervisor and the Divisional H&S Manager for determination of corrective or disciplinary action.

The company shall endeavor to ensure that all company owned/leased fleet vehicles shall have a safety notification bumper sticker applied to the rear of the vehicle. It is the responsibility of the driver, who is deemed the primary / responsible operator of the vehicle, to ensure that the sticker remains on the vehicle and remains legible and in no way defaced. If the vehicle is project or program assigned and there is no designated primary operator, then the Project Manager will be considered the primary / responsible operator. The primary / responsible operator shall contact the Equipment Division in Findlay, OH, at 1-800-225-6464 ext. 6051 or direct dial 419-425-605, immediately upon recognizing that the sticker is defaced or removed such that a new one can be re-applied. Failure, on the part of the primary operator, to ensure that a legible sticker remains on the vehicle shall result in disciplinary action, up to and including vehicle usage being revoked, in addition to possible termination of employment.

6.0 EXCEPTION PROVISIONS

Variances and exceptions, not explained herein, may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HR207 Employee Disciplinary Action
HS013 Health and Safety Procedure Variances
HS020 Accident Prevention Program: Reporting, Investigation, and Review
HS810 Motor Vehicle Operation: Federal Motor Carrier Safety Regulations for Driver Qualifications

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Company Rules for Motor Vehicle Operation
3. Driving Record Certification
4. Notification of Work-Related Citation
5. Non-Shaw Employee Driver Questionnaire
6. Memo Template for Employers of Non-Shaw Drivers
7. Vehicle Use Authorization Form

ATTACHMENT 1

MOTOR VEHICLE OPERATION: GENERAL REQUIREMENTS RESPONSIBILITY MATRIX

Action	Procedure Section	*Responsible Party*					
		Local Health & Safety Assistant	Business Line Health and Safety Manager	Supervisor	Accident Review Board	Corporate Human Resources	Director of H&S
Issue, Revise, and Maintain This Procedure	3.1						X
Ensure Employees Complete Attachment 2	5.1			X		X	
Distribute HS800 to New Hire Candidates for Completion of Attachment 2	5.2					X	
Request Evaluation of New Hire Driving Record	5.2	X		X		X	
Obtain Driving Record and Determine Driving Status	5.2	X					
Initiate Corrective Actions	5.4			X		X	
Ensure Completion and Distribution of Attachment 3	5.4	X					
Accident Review	5.4.4				X		
Ensure Drivers Meet Training Requirements	5.5		X	X			
Specify Program for Reinstatement of Driving Privilege	5.6						X
Reinstatement of Driving Privilege	5.6						X
Non-Shaw Employee Vehicle Use Requirements	5.7			X			
Contact Employee to discuss report from Safety Notification Sticker Service	5.8		X	X			

ATTACHMENT 2
COMPANY RULES FOR MOTOR VEHICLE OPERATION

1. Prior to motor vehicle operation, all motor vehicle operators are required to provide the company with current documentation of licensing for the motor vehicle(s) to be operated. Supervisors shall review and approve said documentation.

2. The motor vehicle operator is responsible for the vehicle, and for conducting a pre-trip, walk around inspection prior to use (including load evaluation, if applicable). No vehicle with any mechanical defect, which endangers the safety of the driver, passengers, or the public, shall be used. The motor vehicle operator is also responsible for the Driver Safety Notification sticker (Sec. 5.8)

3. All company owned/leased trucks, should have small convex mirrors attached to the side mirrors.

4. The operator shall drive defensively at all times and is responsible for complying with all state and local traffic laws, as well as customer regulations concerning motor vehicle operation.

5. The operator and all passengers shall use seat belts at all times when the vehicle is in motion.

6. No employee shall operate a motor vehicle when abnormally tired, temporarily disabled, or under the influence of alcohol or drugs.

7. No employee shall allow a company owned, leased, or rented motor vehicle to be operated by an unauthorized employee or non-employee. (See also: unauthorized personal use of company vehicles) (Sec. 5.7)

8. The operator shall not allow for any open alcoholic beverage containers within a company vehicle or within a personal vehicle while it is being utilized for company business.

9. No employee shall drive beyond any barricades or into any area with designations such as HAZARDOUS, DO NOT ENTER, etc.

10. Use caution when driving through congested areas, or near where personnel and equipment are working.

11. Whenever possible, a spotter shall be used for backing all vehicles. This may be a fellow company employee, or a non-company employee who is willing to help.

12. Unless required, such as on a client's property, keys shall not be left in an unattended vehicle.

13. Employees shall not leave the driver's seat of a vehicle while the motor is running. Exemption: Vehicles equipped with a power take-off device with parking brake set and chocks in place.

14. No motorcycles are to be operated on company business.

15. Radar detectors are prohibited in all company owned, leased, or rented vehicles or in personal vehicles while being used for company business.

16. Analytical samples will be transported in accordance with 49 CFR regulations. Regulated hazardous substances shall not be transported in personal vehicles.

17. In case of an accident, the following steps shall be taken:
    A. Stop.
    B. Call for medical assistance in case of injuries.

C. Notify police.
D. Complete Vehicle Accident Report and submit to your supervisor as soon as possible.

18. Whenever a vehicle is stopped upon the traveled portion of a highway or the shoulder of a highway, for any cause other than necessary traffic stops, the driver shall, as soon as possible, place or activate the warning devices with which the vehicle is equipped.

19. Employee must notify the supervisor as soon as possible, but not longer than 24 hours after occurrence, for work related citations, accidents, and license expiration, suspension, or revocation.

20. No employee is authorized to operate a company vehicle (including rentals) after having been on duty for a period of 16 hours. No employee may drive for more than 12 hours in any single on-duty period. Once either of these criteria has been met, a period of 8 consecutive hours off duty is required before driving duties may be resumed. These are maximum, not minimum, requirements and employees may be unfit to drive after shorter on-duty periods. Commercial DOT drivers are subject to the more restrictive hours of service regulations described in Procedure HS810.

21. Project-assigned employees are not permitted to operate company owned, leased, or rented vehicles after 10:00 p.m. without written authorization from their supervisor. (See section 5.1.1)

22. Employees shall not operate company vehicles for any type of personal use, no exceptions. Personal use includes any usage that is not directly related to company business. See section 5.1.1 for definitions concerning "daily life activities" for Project Assigned Employees.

23. Employees shall not use a company vehicle to visit an establishment that has a primary function of providing nighttime entertainment including the dispensing of alcoholic beverages.

24. Temporary or non-Shaw employees shall be allowed to utilize Shaw company vehicles only after the driver has completed Attachment 5 and has satisfied the point system requirements set forth in Section 5.3 of this policy. In addition, the employer of that driver shall have satisfied the requirement set forth in section 5.7 of this policy and signed a copy of the memo set forth in Attachment 6. This includes clients or subcontractors.

25. Employees shall not transport family members, friends or any other unauthorized guest passenger unless it is arising out of course and scope of company business.

26. Employees may not drive company owned, leased, or rented vehicles home when off of duty except when authorized in writing by a designated business line manager and in accordance with Sec. 5.1.1.

27. Employees needing to use a mobile phone or engage in other potentially distracting activity while operating a Motor Vehicle are advised to pull off the road when safe to do so for the duration of the activity.

I have read and understand company procedure HS800 and the company rules for Motor Vehicle Operation and agree to abide by all requirements

Employee's Name (Printed)	Employee Signature	Date

ATTACHMENT 3
DRIVING RECORD CERTIFICATION

Fair Credit Reporting Act Disclosure Statement

In accordance with the provisions of Section 604 (b)(2)(A) of the Fair Credit Reporting Act, Pubic Law 91-508, as amended by the Consumer Credit Reporting Act of 1996 (title II, Subtitle D, Chapter I, of Pubic Law 104-208), you are being informed that reports verifying your driving record may be obtained on you for employment purposes. These reports are required by Sections 382.413, 391.23 and 391.25 of Federal Motor Carrier Safety Regulations. You have the right to receive a copy of the reports and have the prescribed allotment of time by law to have any errors corrected and the reports obtained after corrections have been posted.

	Assigned Point Value
Overweight, loss of load, vehicular equipment infraction, etc.	1
Moving violation: speeding, failure to stop, failure to signal turn, etc.	2
At-fault accident	3
Major citation: reckless driving, tailgating, suspended license, speed contest, improper lane usage, open container, etc.	6
Driving under the influence or Hit and Run (Leaving the Scene)	8

In the space provided below, please list all violations and accidents currently listed on your driving record by the state issuing your driver's license (include all states for which you have held a driver's license during the last two [2] years). Determine the number of points assigned from the table above, and write in column labeled Points.@ Finally, write the sum total of all points where indicated.

Violations/Accidents	**Driver License #/State**	**Date (mo/yr)**	**Points**

Total Points _____

I hereby certify that the information provided is a complete and accurate statement of my driving record for the previous twenty-four (24) months. I authorize the company to obtain a copy of my driving record from the state of issuance of my license(s). I understand that falsification of data will disqualify me from being hired or may result in revocation of my company driving privileges.

Driver's License No. _____ Driver's Lic. State of Issuance _____

Expiration Date _____ Date of Birth _____

_____ _____

Print Name Social Security Number

_____ _____

Signature Date

PLEASE FAX THIS FORM TO THE BATON ROUGE H & S RECORDS DEPARTMENT AT (225) 987-3714

ATTACHMENT 4

NOTIFICATION OF WORK-RELATED CITATION

This form is to be completed by employees incurring a work-related vehicular citation. Once complete, it is to be signed by the employee's supervisor and forwarded to the appropriate Human Resources Department for inclusion in the employee's personnel file.

Employee Name _____ Employee No. _____ Date _____

Nature of Citation _____

_____

Location of Citation (City, State) _____

Date/Time Citation Received _____

Is Citation Being Contested? ☐ No ☐ Yes Details _____

_____

_____

Employee Signature _____ Date _____

Corrective Action Being Taken _____

_____

_____

Supervisor Signature _____ Date _____

PLEASE FAX THIS FORM TO THE BATON ROUGE H & S RECORDS DEPARTMENT AT (225) 987-3714

ATTACHMENT 5

Non-Shaw Employee Driver Questionnaire

_____ _____

Date *Time*

_____ _____

Vehicle is assigned to what Shaw Employee? *Signature of Shaw Employee*

_____

Non-Shaw Driver's Name

Do you have a valid driver's license? Yes No

State in which license was issued, DL Number and Exp Date_____

Have you had any citations or accidents in the past 24 months? Yes No

If yes, please list type of citations and the associated dates below:

_____

_____

_____

_____

(Refer to HS800, Section 5.3, to determine driver eligibility based on the points system provided)

By signing below, I, the temporary driver, am acknowledging that the above information is true and accurately represents my driving record. I understand and agree that any misrepresentation or omission of material fact on this questionnaire will constitute sufficient grounds for your removal from the project site and will restrict the future use of Shaw vehicles.

I have read and fully understand the above:

_____

Signature of Non-Shaw Driver

_____

Date

ATTACHMENT 6

Address
Address
Phone
Fax:

Memorandum

Date:

To:

CC:

From: Project Manager

RE: Requirements for Motor Vehicle Operation

Attached is Shaw Environmental & Infrastructure, Inc. (Shaw) policy HS800 - Motor Vehicle Operation: General Requirements. As you can see, this policy applies to all operators of Shaw owned, leased, or rented vehicles, as well as personal vehicles used on Shaw business.

Accordingly, you are hereby notified that any employee that is assigned by your company to a Shaw Environmental & Infrastructure, Inc project and is required to operate/drive Shaw owned, leased, or rented vehicles, will be subject to either meeting or exceeding the operator requirements for Shaw employees. Please be aware that as the employer of individuals who are assigned to a Shaw project, you must ensure that your company either adopts the requirements set forth in policy HS800 (Motor Vehicle Operation) or develop a similar policy that meets or exceeds those requirements

Only approved non-Shaw employees, who have completed and signed the "Non-Shaw Employee Driver Questionnaire" (HS800 Attachment 5) will be allowed to drive a Shaw vehicle. Furthermore, prior to the driver operating a Shaw vehicle, the subject questionnaire must be completed and placed on file at the job site. The primary vehicle operator or responsible Shaw management representative shall review the questionnaire and determine whether the non-Shaw employee satisfies the driver qualification requirements of HS800.

Failure to comply with the requirements of this correspondence or the requirements set forth in HS800 shall result in disciplinary action up to and including driving privilege revocation or removal of an affected non-Shaw employee from a project site. If the duties of your employees are expected to include driving a Shaw owned, leased or rented vehicle, please complete Attachment 5, for all of your affected personnel, and provide these to Shaw's site management. Alternatively, please be aware and make your employees aware that they are not authorized to drive a Shaw owned, leased, or rented vehicle without such compliance.

By signing this document, I, an authorized employee and agent of the subject company/employer, am acknowledging acceptance of the above information and agree to my employer's compliance with the referenced requirements stated herein.

_____
Signature / Title

_____
Date

ATTACHMENT 7
AUTHORIZATION FOR ASSIGNMENT FORM

I, the hereby undersigned Supervisor / Manager, give my consent and approval for the Employee listed below to be assigned a Company Owned and/or Rented vehicle ("Company Vehicle") as specified herein and in accordance with the Company Motor Vehicle Use Policy and the Company Rules for Motor Vehicle Operation. I have given a copy of the Rules and the Policy to the Employee listed below and the Employee has signed and agreed to be bound by the Vehicle Usage Agreement.

Employee Name_____
VIN Number of Vehicle_____
Company Vehicle ID Number_____
Period of Allowance_____
Phone:_____
Company by which employed:_____

I, the undersigned Supervisor, personally attest that the following things have been done and are in proper order: *(Please check off when complete and attach appropriate documents)*

- □ Employee Driving Record Complete within the last six months
- □ Employee Driving Record rating allows operation of motor vehicle in accordance with policy (*List Rating* _____ *Date Completed*_____)
- □ Employee has presented a valid driver's license *(attach a copy)*
- □ Employee has signed the Vehicle Use Agreement and a copy has been obtained by the Company *(attach a copy)*
- □ Employee has been given a copy of Motor Vehicle Use Policy and Company Rules for Motor Vehicle Operatio
- □ Employee has provided sufficient Proof of Insurance as required by the Policy *(attach a copy)*

SUPERVISOR SIGNATURE: _____
Printed Name:_____
Date:_____
Phone Number:_____

FAX A COPY OF THIS FORM TO THE EQUIPMENT DIVISION IN FINDLAY, OHIO @ 419-425-6295. ALSO NOTE THAT THE AUTHORIZED EMPLOYEE AND THE AUTHORIZING MANAGER IS RESPONSIBLE FOR MAINTAINING COPIES OF THIS FORM FOR FUTURE REFERENCE AND AUDITING.

DO NOT FAX THIS FORM TO THE BATON ROUGE H & S RECORDS DEPARTMENT

ATTACHMENT 8

VEHICLE USE AGREEMENT

THIS VEHICLE USE AGREEMENT made and entered into this _____ day of _____, _____, between the undersigned Employee listed below ("Employee") and the undersigned Company below ("Company")

WITNESSETH:

WHEREAS, Employee has been granted permission to be assigned a Company owned/leased vehicle ("Company Vehicle") as is set forth and approved on the AUTHORIZATION FOR ASSIGNMENT FORM

In consideration of being assigned use of a Company Vehicle, Employee agrees to the following:

1. Employee will not use the Company Vehicle for personal use. .
2. Employee will follow all rules and requirements set forth in the Company's Motor Vehicle Use Policy, a copy of which Employee has received;
3. Employee certifies that Employee has automobile insurance on a personal vehicle of Employee, Employee has provided to Company a copy of such insurance, and a copy is attached to this agreement;
4. Employee agrees that for any claims for damage, injury or death related to Employee's operation of the Company Vehicle while operating the vehicle on non-company business (personal use), that Employee's own personal automobile liability insurance will be primary and will pay the claim **FIRST AND BEFORE** any insurance of Company. In the event that Employee fails to secure and maintain personal automobile insurance coverage and there is a claim for damage or injury related to Employee's operation of the vehicle for personal use, the Employee will then be responsible and accepts liability for any claims paid by Company up to the minimum limits of insurance required in the state of the Employee's permanent residence.
5. Employee understands that violation of this Agreement or any policy or provision or rule contained in the Motor Vehicle Use Policy or any other Policy of the Company will subject the Employee to discipline including the potential loss of driving privileges for the Company or suspension or termination.

I am a person who is able to read in English and I have read this document and agree to all of its terms and conditions. I understand that the privilege to be assigned a Company Vehicle to take home can be withdrawn by the Company at any time for any reason (and without cause) with notice to me. I agree to comply with return of the vehicle when requested by the Company.

Employee_____
Date:_____
Address:_____
Phone:_____

COMPANY Supervisor / Manager:
Name (Print & Sign):_____ Date:_____

FAX A COPY OF THIS FORM TO THE EQUIPMENT DIVISION IN FINDLAY, OHIO @ 419-425-6295. ALSO NOTE THAT THE AUTHORIZED EMPLOYEE AND THE AUTHORIZING MANAGER IS RESPONSIBLE FOR MAINTAINING COPIES OF THIS FORM FOR FUTURE REFERENCE AND AUDITING.

DO NOT FAX THIS FORM TO THE BATON ROUGE H & S RECORDS DEPARTMENT

APPENDIX C
ACTIVITY HAZARD ANALYSES

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/ Facility Set-up	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation and debris • Exit equipment slowly and maintain three point contact • Mark, identify, or barricade other obstructions		
	Spills	• Clean up spills before initiating maintenance • Review maintenance procedures for safety practices		
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket. • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds	Warning vests, Hard hat, Safety glasses, Steel toe work boots	
	Pinch points	• Review equipment adjustment procedures, identify pinch points • Isolate/block pinch points to limit motion when inserting pins, fasteners, closing tackles	Leather gloves	
	Equipment failure	• Perform daily maintenance inspections on operating equipment		

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/facility set-up (continued)	Electrical Shock	• De-energize or shut off utility lines at their source before work begins • Use double insulated or properly grounded electric power-operated tools • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters • Use qualified electricians to hook up electrical circuits • Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation • Cover or elevate electric wire or flexible cord passing through work areas to protect from damage • Keep all plugs and receptacles out of water • Use approved water-proof, weather-proof type if exposure to moisture is likely • Inspect all electrical power circuits prior to commencing work • Follow IT procedure HS315, Control of Hazardous Energy and the Site Specific Lockout/Tagout/Try Plan	Lockout/Tagout Devices	Voltage Meter or Tic Tracer
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level • Avoid manual lifting/carrying tasks		

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment/facility setup (continued)	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition	Leather gloves	
	Ladders	• Inspect ladders before use for mud buildup on treads • Clean mud from boots before climbing on ladders • Follow the three point of contact rule		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Ear plugs	
	Burns associated with loading/unloading equipment on trucks	• Identify heavy objects for loading that may have hot surfaces • Allow objects to cool or cover hot surfaces with non-combustible material to protect workers from buns		
	Walking on machine tracks	• Avoid walking on machine tracks whenever possible; clean tracks for safe walking/working surfaces • Observe track surfaces when walking, move cautiously on uneven, slippery surfaces • Avoid sudden awkward motions (pulling/jerking fuel hoses)		
	High/Low Ambient Temperature	• Provide fluids to prevent worker dehydration • Monitor for Heat/Cold stress in accordance with IT Health and Safety Procedures # HS400, HS401	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Forklifts/hand carts • Ladders • Hand tools		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Site Specific Health and Safety Plan. • Review operations/safety manuals for all equipment utilized	

ACTIVITY HAZARD ANALYSIS FOR SITE RESTORATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Site Restoration	Struck by/ Against Heavy Equipment, Protruding Objects	X Wear reflective warning vests when exposed to vehicular traffic X Avoid equipment swing areas X Make eye contact with operators before approaching equipment X Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times X Understand and review hand signals	Warning vests, Hard hat, Safety glasses, Steel toe work boots	
	Slips, Trips, Falls	X Clear, walkways of equipment, tools, debris, other materials X Mark, identify, or barricade other obstructions		
	High Noise Levels	X Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)	Ear plugs	
	Handling Heavy Objects	X Observe proper lifting techniques X Obey sensible lifting limits (60 lb. per person for manual lifting) X Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		

ACTIVITY HAZARD ANALYSIS FOR SITE RESTORATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Site Restoration (continued)	High/Low Ambient Temperature	X Provide fluids to prevent worker dehydration X Monitor for Heat/Cold stress in accordance with IT Health and Safety Procedures # HS400, HS401	Insulated Clothing (subject to ambient temperature	Meteorological Equipment

EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
• Bob Cat or Forklift for moving bulky loads • Grass Seed	• Equipment inspections • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review HASP • Review site-specific AHA with all task personnel • Review operation manuals for the pumps and related equipment

ACTIVITY HAZARD ANALYSIS FOR FIELD SAMPLING AND OFFSITE ANALYSIS				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Sampling	Handling Heavy Objects (coolers)	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris • Mark, identify, or barricade other obstructions		
	Spills	• Wear splash protection as necessary to prevent dermal contact • Ensure spill cleanup equipment/material on hand/ready for use (i.e.: Baking soda to neutralize and sample preservative spills) • Cleanup spills immediately	Full face shield /guard and goggles	
	Inhalation and Contact with Hazardous Substances	• Review hazardous properties of site contaminants with workers before operations begin • Monitor breathing zone air and work area to determine levels of contaminants • Dampen material using light water spray to prevent fugitive dust emissions	Modified Level 'D'; Upgrade per section 8.1 of SSHSP	FID/PID

ACTIVITY HAZARD ANALYSIS FOR FIELD SAMPLING AND OFFSITE ANALYSIS				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
	High/Low Ambient Temperature	• Monitor for Heat / Cold stress in accordance with Shaw Health and Safety Procedures HS400, HS401 • Provide fluids to prevent worker dehydration • Take adequate rest periods in a cool/warm shaded area • During rest breaks, replenish body fluids by drinking plenty of fluids (water and Gatorade type liquids). Do not drink caffeinated beverages • Remove PPE if possible during rest periods • Include plenty of salt in your food intake, however, do not take salt tablets	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Sample supplies • PID/FID		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Site Specific Health and Safety Plan	

ACTIVITY HAZARD ANALYSIS FOR SAMPLING (DIRECT PUSH)				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Sampling	Struck by/ Against Heavy Equipment, Flying Debris, Protruding Objects	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Barricade or enclose the sampling area • Restrict entry to the work area to authorized personnel during drilling activities • Understand and review hand signals	Warning vests, hard hat, safety glasses and steel toe work boots	
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects (i.e. cutting open sample tube) • Keep guards in place during use • Observe work area and location of other personnel before lifting or moving objects with sharp edges	Leather gloves	
	Overhead Utilities	• Maintain at least 10 feet from overhead power lines, up to 50 kV • For voltages over 50 kV, add 0.4 inches per kV to obtain the safe distance between equipment and power lines • If voltage is unknown, remain at least 20 feet from overhead power lines. • Do not drive the drill rig from hole to hole with the mast in the raised position. Before raising the mast, check for overhead obstructions.		
Soil Sampling (continued)	Underground Utilities	• Identify all underground and overhead utilities around the excavation site before work commences • Complete the underground utility permit in accordance		

ACTIVITY HAZARD ANALYSIS FOR SAMPLING (DIRECT PUSH)				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
		with Health and Safety procedure HS308 • Cease work immediately if unknown utility markers are uncovered		
	Equipment Malfunction/Damage	• Conduct daily equipment inspections. • Shut down equipment to make repairs or adjustments. Release all pressure on the hydraulic systems, the fluid system, and the air pressure systems of the equipment prior to performing maintenance • Maintain all equipment in a safe condition • Keep all guards in place during use • De-energize and lock-out machinery before maintenance or service		
	Horseplay	• Prohibit horseplay on all project sites • Review rules about horseplay with subcontract supervisors and workers • Remind workers not to respond/participate in horseplay started by others		
	Slips, Trips, Falls	• Clear walkways and work areas of equipment of debris and other materials • Mark, identify, or barricade other obstructions		
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin	Modified Level D as outlined in HASP (as necessary to prevent contact with hazardous materials)	PID/FID

ACTIVITY HAZARD ANALYSIS FOR SAMPLING (DIRECT PUSH)				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Sampling (continued)	Fire/ Explosion	• Eliminate sources of ignition from the work area • Prohibit smoking • Provide ABC (or equivalent) fire extinguishers in all work areas, flammable storage areas, generator and compressor locations • Store flammable liquids in well ventilated areas • Prohibit storage, transfer of flammable liquids in plastic containers • Post "NO SMOKING" signs • Store combustible materials away from flammables • Separate Flammables and Oxidizers by 20 feet minimum	Portable ABC dry chemical fire extinguishers	
	Drum Handling	• Drums will be safely transported onsite using conventional drum handling techniques including a bobcat, dump truck, or front-end loader. • Extreme care will be taken during drum handling operations to prevent release and to ensure safe working conditions. Once at the staging cell, drums will be placed on wooden pallets to facilitate drum movement and to protect the liner of the staging cell. All drums will be staged and labeled in accordance with the RCRA drum storage regulations. • Ensure that your body, material, tools and equipment are safe from such unexpected movement as falling, slipping, rolling, tripping, blowing, or any other uncontrolled motion.	Leather gloves, and chemical protection as required by HASP	
	High/Low Ambient Temperature	• Monitor for Heat Stress in accordance with Shaw Health and Safety Procedures #HS400 and 401 • Provide fluids to prevent worker dehydration		Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR SAMPLING (DIRECT PUSH)				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT TO BE USED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Sample Rig • Sample supplies • PID/FID		• Inspect the sampling rig • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review HASP with all site personnel • Review AHA with all task personnel • Review site specific contamination	

ACTIVITY HAZARD ANALYSIS FOR SITE GEO-PHYSICAL AND GENERAL SITE SURVEY ACTIVITIES				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Geo-physical and General Site Survey	Struck By/ Against Motor Vehicles/ Operating Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Avoid/isolate survey activities in high traffic areas, warehouse shipping/receiving areas • Make eye contact with vehicle operators before approaching/crossing high traffic areas • Understand and review hand signals • Emphasize the "Buddy System" where injury potential exists	Reflective vest, hard hat, safety glasses and steel toe work boots	
	Slips, Trips, Falls	• Clear walkways, work areas of equipment and tools • Mark, identify, or barricade other obstructions		
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Warm up muscles before engaging in manual lifting activities • Avoid actions/activities that contribute to over exertion • Review lifting posture/techniques regularly at safety meetings		
Geo-physical and General Site Survey (continued)	Insect/Animal Bites	• Review injury potential with workers • Avoid insect nests areas, habitats outside work areas • Emphasize The Buddy System where such injury potential exists • Use insect repellant to protect against sting injuries	Tyvek® coveralls, duct tape bottom of coveralls to boots or latex boot covers when there is a potential for	

ACTIVITY HAZARD ANALYSIS FOR SITE GEO-PHYSICAL AND GENERAL SITE SURVEY ACTIVITIES				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
		• Wear PPE and tape joints to keep insects away from the skin • Use protective insect repellents containing 25% DEET to prevent insect bites • Check limbs/body for insects/ insect bites during decontamination and/or shower	insect/animal bite	
	Contact Dermatitis/ Poison Ivy	• Wear long sleeve shirts / trousers to avoid skin contact with plants or other skin irritants • Identify and review poisonous plants with workers • Avoid unnecessary clearing of plant/vegetation areas • Cover vegetation with plastic (visqueen) where survey position raises exposure potential • Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions • Identify workers who are known to contract poison ivy	Tyvek® coveralls, duct tape bottom of coveralls to boots or latex boot covers when there is a potential for contact dermatitis/ poison ivy	
	High/Low Ambient Temperature	• Monitor for heat/cold stress in accordance with Shaw Health and Safety Procedures HS400 and HS401 • Provide fluids to prevent worker dehydration		Meteorological Equipment

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Survey equipment • Warning vests	• Equipment inspections • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review SSHP • Review site-specific AHA with all task personnel

ACTIVITY HAZARD ANALYSIS FOR SURFACE WATER/SEDIMENT SAMPLING				
Task Breakdown	**Potential Hazards**	**Hazard Control Measures**	**Personal Protective Equipment**	**Air Monitoring**
Sampling	Inhalation and Contact with Hazardous Substances	• Review hazardous properties of site contaminants with workers before operations begin • Ensure hazardous levels of vapors are not present • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present	Modified Level D: nitrile or rubber over gloves over surgical type nitrile gloves	PID/FID
	Musculoskeletal Disorders (MSD)	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Ensure proper body positioning, do not work in awkward positions		
	Slips, Trips, Falls	• Mark, identify, or barricade other obstruction • Work areas, platforms, and walkways should be kept free of materials, debris, and obstructions such as grease or oil that could cause a surface to become slick or otherwise hazardous • Clear walkways of tools and debris		
	Fire/ Explosion	• Eliminate sources of ignition from the work area • Prohibit smoking near wells and in work area. • Ground the interface probe to the well box/metal casing		
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition	Leather gloves	

ACTIVITY HAZARD ANALYSIS FOR SURFACE WATER/SEDIMENT SAMPLING				
Task Breakdown	**Potential Hazards**	**Hazard Control Measures**	**Personal Protective Equipment**	**Air Monitoring**
	Adverse weather conditions:	• Monitor weather forecast • Shut down operations should severe weather conditions exist		
	High/Low Ambient Temperature	• Monitor for Heat Stress in accordance with Shaw Health and Safety Procedures #HS400 and 401 • Provide fluids to prevent worker dehydration		Meteorological Equipment
	Insect/ Snake Bites	•... Review injury potential and types of snakes with workers •... Avoid insect nests areas, likely habitats of snakes outside work areas •... Emphasize The Buddy System where such injury potential exists •... Use insect repellant, wear PPE to protect against sting/bite injuries	Use Tyvek coveralls or duct tape bottom of slacks to boots; wear light colors and long sleeves	
	Contact Dermatitis	•... Wear PPE to avoid skin contact with contaminated soil, plants, or other skin irritants •... Identify and review poisonous plants with workers •... Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions	Use Tyvek coveralls or duct tape bottom of slacks to boots; use Ivy Block	
	Vehicular Traffic Areas	•... Use traffic cones or barricades •... Position your vehicle adjacent to the well as a barrier	Wear reflective traffic vest	

ACTIVITY HAZARD ANALYSIS FOR SURFACE WATER/SEDIMENT SAMPLING				
Task Breakdown	**Potential Hazards**	**Hazard Control Measures**	**Personal Protective Equipment**	**Air Monitoring**
	Work near Water	• Wear USCG Approved personal flotation devices for work activities on or near water where potential for drowning exists • Conduct work during low tide • Provide a floating ring buoy with at least 90 feet in the immediate boat launch/land areas • Place ring buoys not more than 200 feet apart	USCG approved flotation device	
EQUIPMENT TO BE USED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Miscellaneous hand tools • PID/FID • Safety Equipment • Sampling Equipment		• Equipment inspections • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review HASP • Review site-specific AHA with all task personnel	

ACTIVITY HAZARD ANALYSIS FOR SOIL GAS SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Sampling	Handling Heavy Objects (coolers)	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward load		
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris • Mark, identify, or barricade other obstructions • Watch footing on uneven surfaces, sloped surfaces, grassy areas, wet leaves		
	Inhalation and Contact with Hazardous Substances	• Review hazardous properties of site contaminants with workers before operations begin • Monitor breathing zone air and work area to determine levels of contaminants • Position up-wind of sampling point to avoid inhalation of gases that may be released during sampling.	Modified Level 'D': inner/outer nitrile sample gloves	PID/FID

ACTIVITY HAZARD ANALYSIS FOR SOIL GAS SAMPLING

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment	Monitoring Devices
	High/Low Ambient Temperature	• Monitor for Heat / Cold stress in accordance with Shaw Health and Safety Procedures HS400, HS401 • Provide fluids to prevent worker dehydration • Take adequate rest periods in a cool/warm shaded area • During rest breaks, replenish body fluids by drinking plenty of fluids (water and Gatorade type liquids). Do not drink caffeinated beverages • Remove PPE if possible during rest periods • Include plenty of salt in your food intake, however, do not take salt tablets	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment

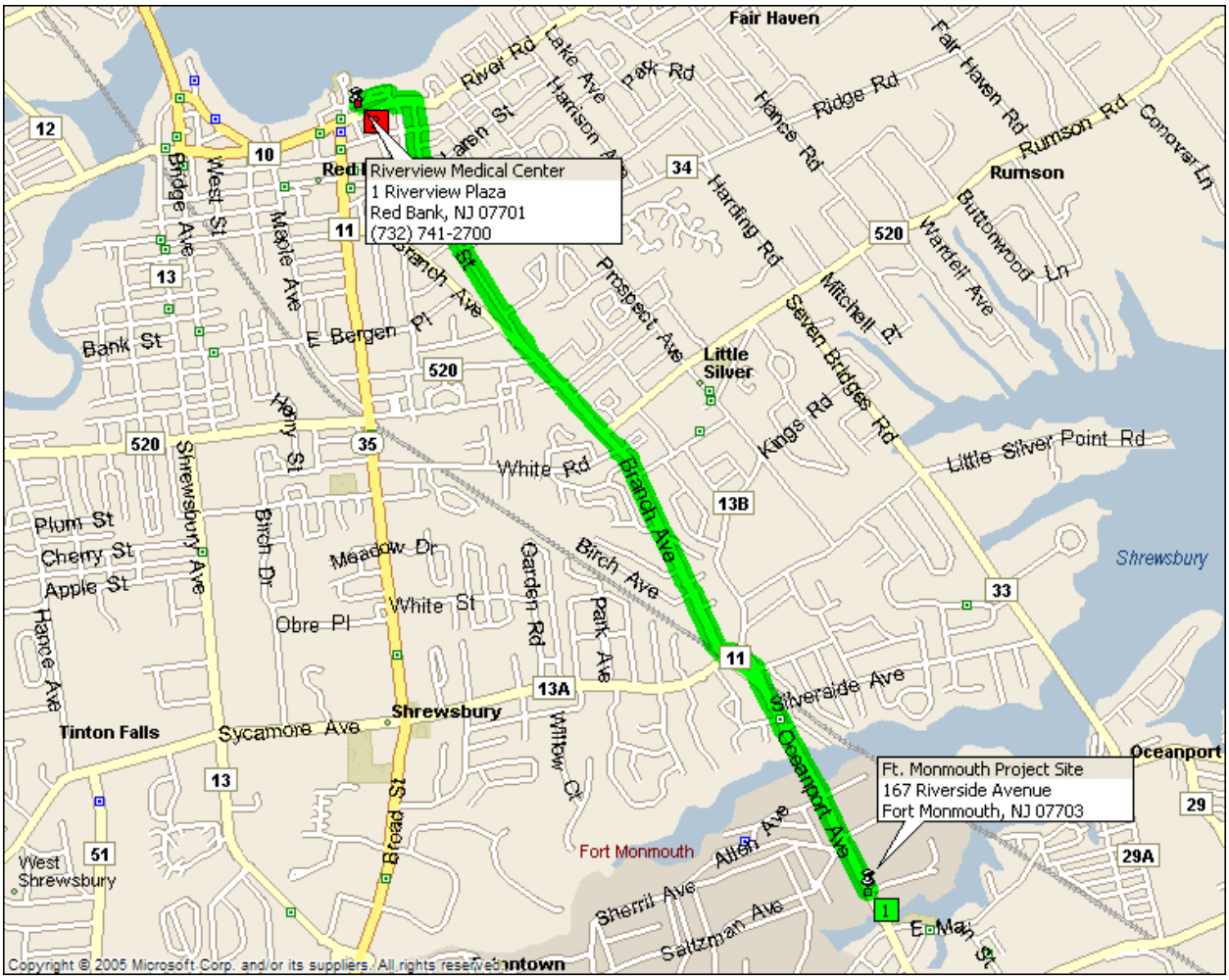
EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Sample supplies • PID/FID	• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Site Specific Health and Safety Plan

ACTIVITY HAZARD ANALYSIS FOR INDOOR AIR SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Sampling	Handling Heavy Objects (coolers)	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward load		
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris • Mark, identify, or barricade other obstructions • Watch footing on uneven surfaces, sloped surfaces, grassy areas, wet leaves		
	Use of Ladders/Elevated Work	• Evaluate fall hazards above 4 ft.; use fall protection equipment (harness/lanyard), standard guardrails or other fall protection systems when working on elevated platforms above 6 ft. • Use heavy duty industrial (type IA) ladders • Install and inspect scaffolds according to manufacturers requirements • Only trained operators are permitted to use aerial lifts • Tie-off all straight/extension ladders or manually hold by co-worker at base • Anchorage points for fall arrest systems must support at least 5,400 pounds for each worker	Fall Protection	
	Inhalation and Contact with Hazardous Substances	• Review hazardous properties of site contaminants with workers before operations begin • Monitor breathing zone air and work area to determine levels of contaminants	Modified Level 'D': inner/outer sample gloves	

ACTIVITY HAZARD ANALYSIS FOR INDOOR AIR SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
		• Position up-wind of sampling point to avoid inhalation of gases that may be released during sampling.		
	High/Low Ambient Temperature	• Monitor for Heat / Cold stress in accordance with Shaw Health and Safety Procedures HS400, HS401 • Provide fluids to prevent worker dehydration • Take adequate rest periods in a cool/warm shaded area • During rest breaks, replenish body fluids by drinking plenty of fluids (water and Gatorade type liquids). Do not drink caffeinated beverages • Remove PPE if possible during rest periods • Include plenty of salt in your food intake, however, do not take salt tablets	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment
EQUIPMENT REQUIRED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Sample supplies		• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Site Specific Health and Safety Plan	

APPENDIX D
DIRECTIONS TO THE HOSPITAL AND HEALTH RESOUCE CLINIC

Directions to Hospital (Main Post Area)
Riverview Medical Center
1 Riverview Plaza
Red Bank, NJ 07701
(732) 741-2700



Summary: 3.3 miles (8 minutes)

Time	Mile	Instruction	For	Toward
9:00 AM	**0.0**	**Depart Riverside Ave, Fort Monmouth, NJ 07703 on CR-11 [Oceanport Ave] (North)**	**0.8 mi**	
9:01 AM	0.8	Bear LEFT (North-West) onto CR-11 [Branch Ave]	0.9 mi	
9:02 AM	1.8	Keep STRAIGHT onto CR-11 [CR-520]	0.3 mi	
9:03 AM	2.1	Keep STRAIGHT onto CR-11 [Branch Ave]	43 yds	
9:03 AM	2.1	Keep RIGHT onto Spring St	0.9 mi	
9:06 AM	3.1	Turn LEFT (West) onto CR-10 [E Front St]	120 yds	
9:06 AM	3.1	Turn RIGHT (North) onto N Washington St, then immediately turn LEFT (West) onto Riverview Plaza	0.1 mi	
9:08 AM	**3.3**	**Arrive 1 Riverview Plaza, Red Bank, NJ 07701**		

Route To Clinic (Main Post Area)
Concentra Medical Center
135 Raritan Center Parkway
Edison, NJ 08837
(732) 225-5454



Summary: 26.0 miles (30 minutes)

Time	Mile	Instruction	For	Toward
9:00 AM	**0.0**	**Depart Riverside Ave, Fort Monmouth, NJ 07703 on CR-11 [Oceanport Ave] (North)**	**0.8 mi**	
9:01 AM	0.8	Bear LEFT (North-West) onto CR-11 [Branch Ave]	0.9 mi	
9:02 AM	1.8	Keep STRAIGHT onto CR-11 [CR-520]	0.3 mi	
9:03 AM	2.1	Bear LEFT (West) onto CR-520 [Pinckney Rd]	0.6 mi	
9:04 AM	2.7	Turn LEFT (South) onto SR-35 [CR-520]	0.1 mi	
9:05 AM	2.8	Turn RIGHT (West) onto CR-520 [Newman Springs Rd E]	0.6 mi	
9:07 AM	3.4	Keep STRAIGHT onto CR-520 [Newman Springs Rd]	0.7 mi	
9:08 AM	4.1	Road name changes to CR-50 [CR-520]	0.6 mi	
9:09 AM	4.7	Keep RIGHT onto Ramp	0.5 mi	Garden State Parkway North
9:10 AM	5.1	*Toll road* Merge onto Garden State Pky	6.4 mi	
9:15 AM	11.5	*Toll road* Take Ramp (LEFT) onto Garden State Pky Express Ln	8.6 mi	Express / Woodbridge / North Jersey
9:22 AM	20.2	*Toll road* Merge onto Garden State Pky	1.5 mi	

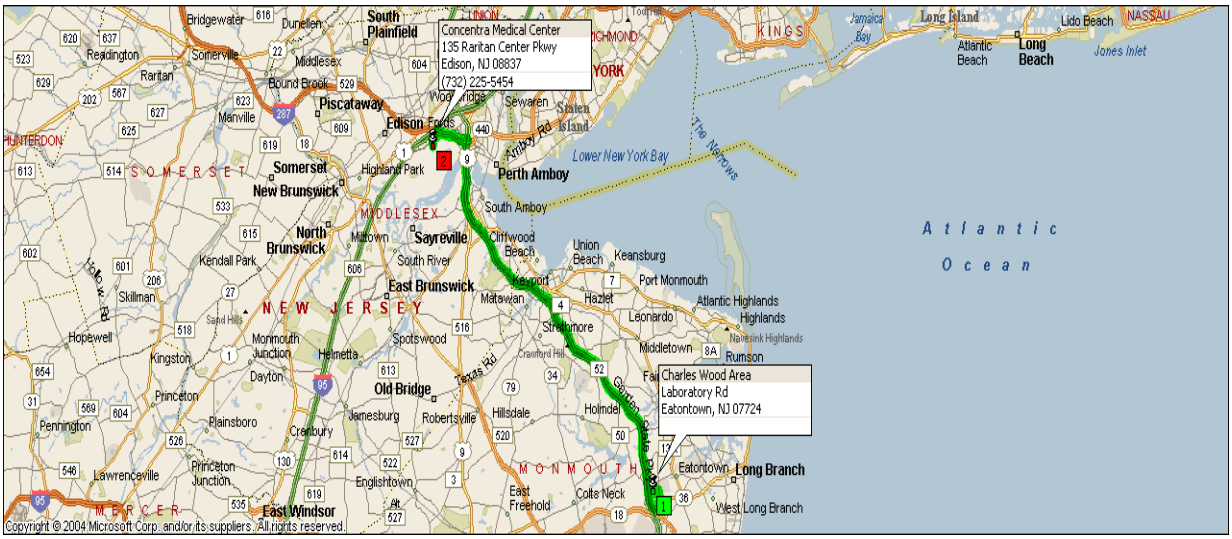
9:24 AM	21.7	*Toll road* Road name changes to Alfred E. Driscoll Bridge [Driscoll Bridge]	0.4 mi	
9:24 AM	22.1	*Toll road* Road name changes to Garden State Pky	0.4 mi	
9:24 AM	22.5	At exit 127, keep RIGHT onto Ramp	0.1 mi	RT-9 / RT-440 / I-287 / Woodbridge / Staten Island
9:25 AM	22.6	Keep RIGHT to stay on Ramp	0.1 mi	RT-440 / Industrial Ave / I-287 N
9:25 AM	22.7	Keep LEFT to stay on Ramp	0.4 mi	RT-440 / Industrial Ave / I-287 N
9:25 AM	23.1	Take Ramp (LEFT) onto SR-440	1.2 mi	RT-440 / I-287
9:27 AM	24.3	Turn RIGHT onto Ramp	0.2 mi	CR-514 / I-95 / New Jersey Turnpike / Woodbridge
9:27 AM	24.5	Keep LEFT to stay on Ramp	0.4 mi	CR-514 / I-95 / New Jersey Turnpike
9:28 AM	24.9	Keep LEFT to stay on Ramp	0.3 mi	CR-514
9:28 AM	25.2	Bear RIGHT (West) onto CR-514 [Woodbridge Ave]	0.2 mi	
9:29 AM	25.4	Keep RIGHT onto Ramp	0.3 mi	Raritan Center
9:30 AM	25.8	Keep LEFT to stay on Ramp	43 yds	
9:30 AM	25.8	Keep STRAIGHT onto Raritan Center Pky	0.2 mi	
9:30 AM	**26.0**	**Arrive 135 Raritan Center Pkwy, Edison, NJ 08837**		

Directions to Hospital (Charles Wood Area)
Riverview Medical Center
1 Riverview Plaza
Red Bank, NJ 07701
(732) 741-2700



Time	Mile	Instruction	For
9:00 AM	**0.0**	**Depart Charles Wood Area [Laboratory Rd, Eatontown, NJ 07724] on Laboratory Rd (North)**	**0.1 mi**
9:00 AM	0.1	Turn RIGHT (East) onto Corregidor Rd, then immediately turn LEFT (North) onto Bataan Ave	0.3 mi
9:02 AM	0.4	Turn RIGHT (East) onto CR-537 [Tinton Ave]	1.4 mi
9:04 AM	1.8	Turn LEFT (North-West) onto SR-35 [Main St]	3.2 mi
9:10 AM	5.0	Turn RIGHT (East) onto CR-10 [E Front St], then immediately turn LEFT (North) onto Wharf Ave	131 yds
9:12 AM	5.0	Bear RIGHT (East) onto Riverview Plaza	65 yds
9:12 AM	**5.1**	**Arrive Riverview Medical Center [1 Riverview Plaza, Red Bank, NJ 07701]**	

Route To Clinic (Charles Wood Area)
Concentra Medical Center
135 Raritan Center Parkway
Edison, NJ 08837
(732) 225-5454



Time	Mile	Instruction	For	Toward
9:00 AM	**0.0**	**Depart Charles Wood Area [Laboratory Rd, Eatontown, NJ 07724] on Laboratory Rd (South)**	**0.5 mi**	
9:02 AM	0.5	Turn RIGHT (South) onto CR-51 [Hope Rd]	0.6 mi	
9:03 AM	1.1	Turn RIGHT (West) onto SR-36	0.3 mi	
9:04 AM	1.4	Turn off onto Ramp	87 yds	
9:04 AM	1.4	Keep RIGHT to stay on Ramp	0.2 mi	Local / All Exits / N. Jersey
9:04 AM	1.6	*Toll road* Merge onto Garden State Pky	20.6 mi	
9:22 AM	22.2	*Toll road* Road name changes to Alfred E. Driscoll Bridge [Driscoll Bridge]	0.4 mi	
9:22 AM	22.6	*Toll road* Road name changes to Garden State Pky	0.4 mi	
9:23 AM	23.0	At exit 127, keep RIGHT onto Ramp	0.1 mi	RT-9 / RT-440 / I-287 / Woodbridge / Staten Island
9:23 AM	23.1	Keep RIGHT to stay on Ramp	0.1 mi	RT-440 / Industrial Ave / I-287 N
9:23 AM	23.3	Keep LEFT to stay on Ramp	0.4 mi	RT-440 / Industrial Ave / I-287 N
9:24 AM	23.6	Take Ramp (LEFT) onto SR-440	1.2 mi	RT-440 / I-287
9:25 AM	24.8	Turn RIGHT onto Ramp	0.2 mi	CR-514 / I-95 / New Jersey Turnpike / Woodbridge
9:26 AM	25.0	Keep LEFT to stay on Ramp	0.4 mi	CR-514 / I-95 / New Jersey Turnpike
9:26 AM	25.4	Keep LEFT to stay on Ramp	0.3 mi	CR-514
9:27 AM	25.7	Bear RIGHT (West) onto CR-514 [Woodbridge Ave]	0.2 mi	
9:27 AM	26.0	Keep RIGHT onto Ramp	0.3 mi	Raritan Center
9:28 AM	26.3	Keep LEFT to stay on Ramp	43 yds	
9:28 AM	26.3	Keep STRAIGHT onto Raritan Center Pky	0.2 mi	
9:28 AM	**26.5**	**Arrive Concentra Medical Center [135 Raritan Center Pkwy, Edison, NJ 08837]**		

APPENDIX E
HEALTH AND SAFETY PLAN
AMENDMENT DOCUMENTATION FORM

Site-Specific Health & Safety Plan
Amendment Documentation

Project Name: **Project No.**

Amendment No. **Date:**

The Amendment Addresses the Following Sections:

Task(s) Amendment Affects:.

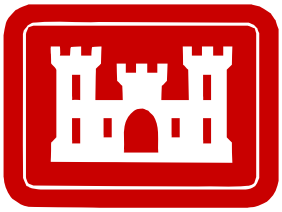
Reason For Amendment:

Amendment:

Completed by: **Approved by:**

APPENDIX F
HURRICANE PREPAREDNESS PLAN

HURRICANE PREPAREDNESS PLAN
FORT MONMOUTH SITE INVESTIGATION



Prepared for:

U.S. Army Corps of Engineers
Baltimore District

Contract No.
W912DR-05-D-0026

Prepared by:

Shaw Environmental, Inc.
111 Howard Blvd., Suite 110
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SHAW PROJECT NUMBER 135065

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A Hurricane Preparedness Responsibility Punch List
B Emergency Phone Numbers
C Hurricane Tracking Map

LIST OF ACRONYMS

COR	Conditions of Readiness
mph	miles per hour
NOAA	National Oceanic and Atmospheric Administration
SSO	Site Safety Officer
USACE	U.S. Army Corps of Engineers

1.0 INTRODUCTION

PURPOSE

This Hurricane Preparedness Plan outlines the general responsibilities and actions to be taken in preparation for and response to a hurricane or hurricane warnings at Fort Monmouth, NJ. All personnel should understand that predicting the occurrence and path of a hurricane is difficult; however, the risk can be minimized and controlled by following the procedures in this plan.

SCOPE

This procedure is applicable to all site personnel, including subcontractors and all equipment utilized at the project sites.

DISCUSSION

This procedure provides information on how to protect personnel and property in the event of a hurricane. In the Monmouth County, New Jersey area, attention must be paid to all hurricanes, since there is no way to determine with 100 percent accuracy whether a hurricane will actually hit the area until a few hours before landfall.

The following table demonstrates that the accuracy of forecasting where a hurricane landfall will occur is very low more than 24 hours in advance of a storm.

Hours Before Landfall	Maximum Probability Values
72 Hours	10 Percent
48 Hours	13-18 Percent
36 Hours	20-25 Percent
24 Hours	35-45 Percent
12 Hours	60-70 Percent

2.0 DEFINITIONS

The following definitions apply to various terms used in this document.

Conditions of Readiness (COR):

Condition V - Destructive winds are possible at the Fort Monmouth, NJ site within 96 hours. Normal daily job-site cleanup and good housekeeping practices.

Condition IV - Destructive winds are possible at the Fort Monmouth, NJ site within 72 hours. Normal daily job-site cleanup and good housekeeping practices. Collect and store in piles or containers, scrap lumber, waste material, and rubbish for removal and disposal at the end of each work day. Maintain the construction site, including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all trash debris and other objects which could become missile hazards. Contact Contracting Officer In Charge of Construction (Tim Peck, U.S. Army Corps of Engineers [USACE] Baltimore District – 410-962-3416) for Condition requirements, updates, and completion of required actions.

Condition III - Destructive winds are possible at the Fort Monmouth, NJ site within 48 hours. Maintain Condition IV requirements. Begin securing the job site for and taking those actions necessary for Condition I that cannot be completed within 18 hours. Cease all routine activities that might interfere with securing operations. Begin collecting and stowing all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to Condition II and continue action as necessary to attain Condition III readiness.

Condition II - Destructive winds are possible at the Fort Monmouth, NJ site within 24 hours. Curtail or cease routine activities until securing operations are complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment and materials, or remove from job site. Expend every effort to clear all missile hazards and loose equipment from the job site. Contact Tim Peck, USACE Baltimore District (410-962-3416) for weather and COR updates and completion of required actions.

Condition I - Destructive winds are possible at the Fort Monmouth, NJ site within 12 hours. Perform and complete all remaining actions required for lower conditions of readiness. Secure the job site and leave the government premises.

Destructive Winds - Generally winds reaching or exceeding the force of a tropical storm ($\geq$ 39 miles per hour [mph] or 34 knots). Winds from any storm system (tropical or otherwise) that are determined to have the potential to cause property damage or personal injury that would warrant a Condition IV alert.

Gale - Non-tropical windstorm with winds 38 to 63 mph (33 to 55 knots).

Hurricane Watch - An announcement for specific areas where a hurricane or an incipient hurricane poses a possible threat to a coastal area, generally within 36 hours.

Hurricane Warning - A warning that sustained winds of 74 mph (64 knots) or higher, associated with a hurricane are expected in a specified coastal area in 24 hours or less.

Hurricane - A tropical cyclone in which the maximum sustained surface wind is 74 mph (64 knots) or greater.

Missile Hazard - Any object that may become airborne during high winds.

Severe Weather - Any storm of tropical or non-tropical origin that has the capacity to produce destructive winds.

Small Area Storms - Thunderstorms or tornadoes.

Small Area Storms Condition I - Destructive winds, heavy rain, lightening and hail are imminent within 1 hour.

Small Area Storms Condition II - Destructive winds, heavy rain, lightening and hail are expected within 6 hours.

Storm - Non-tropical windstorm with winds 38 to 63 mph (33 to 55 knots).

Storm Surge - An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the storm.

Storm Tide - The actual sea level resulting from the astronomical tide combined with the storm surge. This term is used interchangeably with "Hurricane Tide."

Tornado - Violent rotating columns of air with winds 115 to 288 mph (100 to 250 knots).

Tropical Depression - A tropical low pressure system in which the maximum sustained surface wind is 38 mph (33 knots) or less.

Tropical Storm - A tropical low pressure system in which the maximum surface wind ranges from 39 to 73 mph (34 to 63 knots) inclusive. This is the strength at which the National Hurricane Center applies a name to the storm.

Tropical Storm Watch - Tropical storm conditions pose a threat to a coastal area generally within 36 hours.

Tropical Storm Warning - A warning for tropical storm conditions with sustained winds within the range of 39 to 73 mph (34 to 63 knots) that are expected in a specified coastal area within 24 hours or less.

3.0 RESPONSIBILITIES

Project Manager – Mark Magness

The Project Manager is responsible for ensuring that all adequate measures have been taken to prepare for hurricanes and to protect site personnel and property in the event of a hurricane. The Project Manager will ensure that ample resources are available to implement this plan and that all personnel are aware of this plan and their responsibilities.

Site Superintendent – Dan Duh

The Site Superintendent will communicate all hurricane information to site personnel and keep the site personnel continually informed of the measures to be taken. The Site Superintendent is responsible for the coordination and direction of site equipment shut-down and will oversee the preparation of site facilities for any imminent storm. The Site Superintendent will oversee the coordination of both pre- and post-storm operations and will ensure that the proper material, equipment, and supplies are utilized to implement this procedure.

Site Safety Officer (SSO) – Dan Duh

The SSO will monitor weather information, including the National Weather Service probability values for landfall. The SSO will maintain the necessary emergency supplies, and will periodically tour the site to ensure that proper steps are being taken to protect site personnel and property. The SSO will develop the emergency contact list, which will be maintained in a site-dedicated vehicle.

Note: When personnel identified in Section 3.0 leave the site, they are responsible for notifying the Site Superintendent or a designated back-up person. The back-up person will be instructed in their responsibilities in the event of a hurricane.

4.0 EMERGENCY OPERATING PROCEDURES

Condition V - Early Preparedness.

The Site Superintendent will notify the Project Manager when a tropical storm has been named and/or any severe weather has the potential to produce destructive winds at Fort Monmouth within 96 hours. This will initiate COR Condition V. This phase will continue until:

- The storm or condition is downgraded.
- The storm track poses no threat to the site.
- Condition IV applies.

During Condition V, the progress of the storm will be monitored and tracked. The Program Manager will be contacted at least twice daily for Condition Requirements updates and to inform him of completion of required actions for Condition V.

See Attachment A for the Hurricane Preparedness Responsibility Punch List - Condition V.

Condition IV - (Destructive winds are possible within 72 Hours).

This COR starts when severe weather is within 72 hours of posing a threat to the project location. The SSO will ensure that the following steps are taken:

- Monitor the storm and inform the Project Manager of its progress.
- Check Personal Protective Equipment supplies and equipment to determine if any shipments are required or if pending shipments should be advanced or postponed.

During Condition IV, the progress of the storm will be continuously monitored and tracked. The Site Superintendent will instruct site personnel to begin general cleanup of all loose materials that may pose a hazard during high winds or rain. This will include removal of all debris, trash, and other items that may become missile hazards. All lumber will be stacked in neat piles less than 4 feet high. The Program Manager will be contacted at least twice daily for Condition Requirements updates and to inform him of completion of required actions for Condition IV.

The Site Superintendent will keep all site personnel advised of the status of the storm and site preparation activities. Due to the urgency and amount of work involved in preparing for a threatening storm, all construction operations that might interfere with securing operations, such as starting a major excavation, will cease.

The Site Superintendent will ensure that the following steps are taken:

- Fuel tanks in all equipment on site are filled.
- Stockpiled material on site is secured.
- Requirements for Condition II are reviewed with all site personnel.
- Condition IV requirements are maintained.

See Attachment A for the Hurricane Preparedness Responsibility Checklist - Condition IV.

Condition III - Tropical Storm Warning (Destructive winds are possible Within 48 Hours).

This COR starts when severe weather places the project site under a tropical storm warning. Condition III activities will also start if a threatening tropical storm is upgraded to a hurricane, or a severe storm approaching Fort Monmouth has generated destructive winds in other locations. The Project Manager, Site Superintendent and SSO will determine when to cease all operations based upon current weather conditions and/or as directed by Tim Peck, USACE Baltimore District (410-962-3416). If the storm or Condition is downgraded, the Project Manager and Site Superintendent will meet with the Program Manager and Tim Peck, USACE Baltimore District (410-962-3416) to decide if a downgrade of the COR is appropriate. Actions for Condition III will be maintained and the following shall also be completed:

- Machinery, tools, equipment, and materials will be secured or removed form the site.
- Actions to secure job site necessary for Condition II that cannot be completed within 18 hours will be taken.

See Attachment A for the Hurricane Preparedness Responsibility Checklist - Condition III.

Condition II - Destructive Winds are anticipated <u>within 24 hours</u> or a Small Area Storm is anticipated <u>within 6 hours</u>.

Condition II begins when destructive winds are anticipated within 24 hours, a small area storm within 6 hours, and/or as directed by Tim Peck, USACE Baltimore District (410-962-3416). The Project Manager and Site Superintendent will determine when to demobilize from the site based upon weather conditions. During this phase, the Site Superintendent will direct the following actions:

- Machinery, tools, equipment and materials will be secured or removed from the job site.
- A roll call of personnel on-site will be conducted and the SSO informed.
- Personnel on leave will be notified of schedule changes.
- Personnel needing to leave the project to attend to personal matters will notify their Site Superintendent immediately.
- Heavy equipment will be secured according to the manufacturer's recommendations.
- All small field equipment will be secured.
- All visitors from the site will be evacuated.
- A final site walk-through will be made to determine that the site is secure and all missile hazards are cleared from the job site.
- The Project Manager will be informed that all personnel are being released from the site.

If the storm or Condition is downgraded, the Project Manager and Site Superintendent will meet to decide if a downgrade of the phase is necessary.

See Attachment A for the Hurricane Preparedness Responsibility Checklist - Condition II.

Condition I - Destructive winds are anticipated <u>within 12 hours</u> or a Small Area Storm is imminent <u>within 1 hour</u>.

- Complete all remaining actions required for lower conditions of readiness.
- Secure job site access and evacuate to safe refuge.

See Attachment A for the Hurricane Preparedness Responsibility Checklist - Condition I.

Resume Site Operations

The Project Manager will contact the Program Manager to determine when site operations will resume. Although the hurricane/severe weather has passed, hazards may still exist because of water damage, other hazardous conditions, dangers from electric shock, poisonous snakes, etc.

The Site Superintendent and SSO will conduct a damage survey with the Project Manager. Photographs of the storm damage at the site will be taken by the Site Superintendent or SSO. They will develop a prioritized recovery plan from the survey findings. Subsequently, all site personnel will be notified when it is safe to return to work. Required personnel and subcontractor expertise will be mobilized to the site to repair any damaged equipment.

See Attachment A for the Hurricane Preparedness Responsibility Checklist - Resume Site Operations.

5.0 DEBRIEFING

Following the return to work of site personnel, the Site Superintendent will conduct a debriefing with site personnel. The debriefing will accomplish the following objectives:

- Finalize a recovery plan.
- Review the Hurricane Plan for effectiveness.
- Suggest and agree on improvements to the plan.
- Incorporate plan changes.

When completed, the Project Manager and Site Superintendent will meet with site personnel to discuss any corrective actions or changes in this plan.

6.0 REFERENCES

The list of emergency telephone numbers is included as Attachment B. In addition, an example of a Hurricane Tracking Chart is presented in Attachment C.

The following references and sources of information may be consulted for additional guidance on hurricane preparedness and response:

- Disaster Planning Guide for Business and Industry, Federal Emergency Management Administration.
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA).

ATTACHMENT A
HURRICANE PREPAREDNESS RESPONSIBILITY CHECKLISTS

HURRICANE PREPAREDNESS CHECKLIST

Condition V

Date/Time Entered Condition V:_____

Severe Weather/Tropical Storm: _____

Action Items

☐ Project Manager Notified.

☐ Track of Storm Poses No Threat.

☐ Storm or Condition is Downgraded.

☐ Upgrade to Condition IV.

Storm Location

Date/Time:_____ Date/Time:_____

Location/Coordinates:_____ Location/Coordinates:_____

Date/Time:_____ Date/Time:_____

Location/Coordinates:_____ Location/Coordinates:_____

Condition V Action Items Complete:_____ Date:_____

HURRICANE PREPAREDNESS CHECKLIST

Condition IV (Landfall within 72 hours)

Date/Time Entered Condition IV:_____

Action Items:

- ☐ Notify Project Manager.
- ☐ Notify Project Superintendent.
- ☐ Notify Site Personnel.
- ☐ Assemble shift personnel to begin preparation.
- ☐ Track storm on hurricane tracking map (Attachment C) (if applicable).
- ☐ Secure all heavy equipment located at the site in accordance with manufacturer's specifications. All equipment will be moved to a secured site location.
- ☐ All equipment fuel tanks will be filled.
- ☐ All subcontractors with equipment or supplies on-site will be notified to begin removal procedures.

Condition IV Action Items Complete:_____ Date:_____

HURRICANE PREPAREDNESS CHECKLIST

Condition III (Landfall within 48 hours)

Date/Time Entered Condition III:_____

Action Items:

☐ Provide the status of the storm to site personnel on an hourly basis.

☐ Take actions to secure job site necessary for Condition I that cannot be accomplished in 18 hours.

☐ Recheck all items on checklist IV to ensure they are complete (i.e. gas tanks are still filled).

See itemized equipment checklist (itemized list of equipment to be secured/removed and COR for action).

Condition III Action Items Complete:_____ Date:_____

HURRICANE PREPAREDNESS CHECKLIST
Itemized Equipment Checklist, Condition III

Equipment	Secure in Place	Remove from Project Site

HURRICANE PREPAREDNESS CHECKLIST

Condition II

Date/Time Entered Condition II:_____

Action Items:

- ☐ Evacuate all visitors from the site.
- ☐ Conduct a role call of site personnel and inform the Project Manager.
- ☐ Check the status all incoming shipments of supplies and equipment.
- ☐ Remove all unnecessary vehicles from the site.
- ☐ Secure heavy equipment in accordance with manufacturer's specification.
- ☐ Secure all valuable records and equipment.
- ☐ Release personnel from the site.
- ☐ Recheck all items on checklist IV and III to ensure they are complete (i.e., gas tanks are still filled).

Condition II Action Items Complete:_____ Date:_____

HURRICANE PREPAREDNESS CHECKLIST

Condition I

Date/Time Entered Condition I:_____

Action Items:

☐ Complete all action items for lower conditions of readiness.

☐ Secure job site access and evacuate to safe refuge.

Condition I Action Items Complete:_____ Date:_____

HURRICANE PREPAREDNESS CHECKLIST

Resume Site Operations

Date/Time Resume Site Operations:_____

Action Items:

- ☐ Conduct a damage survey.
- ☐ Notify all site personnel when to return to work.
- ☐ Develop a prioritized recovery plan.
- ☐ Inspect electrical equipment before re-energizing to detect and repair damage.
- ☐ Provide bottled water for drinking until normal drinking water is deemed safe to drink.
- ☐ Remove storm debris from site.
- ☐ Notify Program Manager of the resumption of site activities.

Resume Site Operations Action Items Complete:_____ Date:_____

ATTACHMENT B
EMERGENCY PHONE NUMBERS

Local Agencies – Ambulance Fire Police	 911 911 911
Hospital Riverview Medical Center 1 Riverview Plaza Red Bank, NJ 07701 Health Resource Clinic Concerta Medical Center 135 Raritan Center Parkway Edison, NJ 08837 Directions to the Health Resource Clinic and the hospital are located in Appendix D of the SSHSP	 Emergency – 911 (732) 741-2700 (732) 225-5454
Regional Poison Control Center	800-552-6337
Federal Agencies Agency for Toxic Substances and Disease Registry National Response Center	 (404) 639-0615 (24 hr.) 800-424-8802
Army **John Buck, USACE Baltimore District** **Wanda Green, Fort Monmouth DPW**	 (410) 962-6735 (office) (732) 532-8341 (office)
Shaw Personnel Project Manager – Mark Magness Site Superintendent/Site Safety Officer – Dan Duh Program Safety Manager – Winston (Doug) Russell Regional Health & Safety Manger – Winston (Doug) Russell,	 (973) 770-5302 (office) Redacted - Privacy Act (cellular) (732) 346-2921 (office) Redacted - Privacy Act (cellular) Redacted - Privacy Act (cellular) (865) 692-3584 (office)
Shaw Corporation (24 hour)	866-299-3445

ATTACHMENT C
HURRICANE TRACKING MAP

This map will be posted on the job site in the event of an actual hurricane. The map will be updated daily for the NOAA web site.

APPENDIX G
ACCIDENT PREVENTION PLAN

ACCIDENT PREVENTION PLAN
FORT MONMOUTH BASELINE ECOLOGICAL EVALUATION

July 2009

Prepared for:

U.S. Army Corps of Engineers
Baltimore District

Contract No.
W912DR-05-D-0026

Prepared by:

Shaw Environmental, Inc.
111 Howard Blvd., Suite 110
Mt Arlington, NJ 07856

SHAW PROJECT NUMBER 135065

APPROVALS:

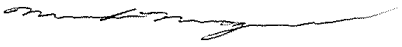
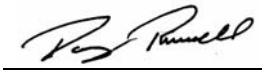
Mark C. Magness		23 July 2009
Project Manager, Shaw Environmental	Signature	Date
Winston Russell		23 July 2009
Program H&S Manager, Shaw Environmental	Signature	Date
Dan Duh		23 July 2009
Site Supervisor, Shaw Environmental	Signature	Date

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LIST OF ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
APP	Accident Prevention Plan
ASTM	American Society for Testing and Materials
CD	Compact Disc
CFR	Code of Federal Regulations
EH&S	Environmental Health and Safety
EMR	Experience Modification Rate
HAZWOPER	Hazardous Work Operations
HSM	Health and Safety Manager
NIOSH	National Institute for Safety and Health
OSHA	Occupational Safety and Health Administration
PM	Project Manager
PPE	Personal Protective Equipment
Shaw	Shaw Environmental, Inc.
SSHSP	Site-Specific Health and Safety Plan
SS/SSO	Site Supervisor/Site Safety Officer
USCG	U.S. Coast Guard

1.0 BACKGROUND INFORMATION

The U.S. Army Corps of Engineers (USACE), Baltimore District, tasked Shaw Environmental, Inc. (Shaw) to perform a Baseline Ecological Evaluation (BEE) at Fort Monmouth (FTMM) to fulfill requirements as set forth in New Jersey Department of Environmental Protection (NJDEP) Technical Requirements for Site Remediation [New Jersey Administrative Code (N.J.A.C.) 7:26E-3.11]. This Accident Prevention Plan (APP) has been prepared under the Baltimore Architectural and Engineering Services Contract Number W912DR-05-D-0026 (Task Order 40) and is based on the Scope of Work (SOW) dated June 3, 2008, and information obtained through consultation with FTMM, U.S. Army Environmental Command, and USACE personnel.

The primary site tasks include the following:

- Mobilization and Site Preparation.
- Surface Soil Sampling.
- Surface Water/Sediment Sampling.
- Site Restoration/Demobilization.

Activity Hazard Analyses (AHAs) have been prepared for the above activities and are included in Attachment C of the Site-Specific Health and Safety Plan (SSHSP).

Shaw Environmental, Inc. Accident Experience

YEAR	Experience Modification Rate (EMR) (Interstate)	OSHA Recordable Incident Rate
2008	0.57	0.76
2007	0.61	1.03
2006	0.52	0.83

2.0 STATEMENT OF SAFETY AND HEALTH POLICY

CORPORATE POLICY

Subject: SAFETY

PURPOSE AND SUMMARY

It is the policy of Shaw Environmental, Inc. (Shaw) to provide a safe and healthful workplace for all employees, subcontractors, and consultants in compliance with governmental requirements. Additionally, the requirements of our clients shall take precedence provided that their requirements exceed those of Shaw and governmental regulations.

We believe in two fundamental principles of safety: all accidents, injuries, and occupational illnesses are preventable; and if an operation cannot be done safely, we will not do it. To put these principles into practice, every associate will receive the appropriate training, equipment, and other resources necessary to complete assigned tasks in a safe and efficient manner.

Safety, industrial hygiene, and loss prevention are the direct responsibility of all members of management, who must create an environment in which everyone shares a concern for their own safety and the safety of their associates. Safety shall take precedence over expediency or shortcuts. It is a condition of employment that all employees work safely and follow established safety rules and procedures. No individual(s) may pose a direct threat to the health and safety of other individuals in the workplace.

Managers must conduct their businesses in compliance with governmental safety regulations and company procedures. All Shaw health and safety procedures shall be implemented for all Shaw employees on all projects where Shaw is the subcontractor, or a joint venture partner. If Shaw is the prime contractor, Shaw procedures shall be applied to all Shaw and subcontractor personnel.

The implementation of effective safety and health practices is a key measure of managerial performance. Management, with the assistance of the internal health and safety professional staff, will conduct audits to assess the effectiveness of the safety program(s) in place, and to identify areas for improvement. All deficiencies shall be corrected promptly.

All injuries, occupational illnesses, vehicle accidents, and incidents with potential for injury or loss will be investigated. Appropriate corrective measures will be taken to prevent recurrence, and to continually improve the safety of our workplace.

3.0 RESPONSIBILITIES AND LINES OF AUTHORITY

Safety responsibilities, accountability and lines of authority are discussed in Section 2.0 of the SSHSP. The Project Manager (PM), Site Supervisor/Site Safety Officer (SS/SSO), and Health and Safety Manager (HSM) are responsible for formulating and enforcing health and safety requirements, and implementing the SSHSP.

4.0 SUBCONTRACTORS AND SUPPLIERS

Each subcontractor working on the project site will be required to adhere to the SSHSP and the requirements presented below.

4.1 SUBCONTRACTOR/SUPPLIER COORDINATION AND CONTROL

All subcontractors will be screened for safety performance and compliance with Federal alcohol and drug testing requirements prior to being issued any contract for site work. Subcontractors will comply with the requirements for site safety as outlined in Shaw's Health and Safety Procedure HS011 (Attachment B of the SSHSP). The SS/SSO will be responsible for the conduct and control of Shaw subcontractors.

4.2 SUBCONTRACTOR/SUPPLIER SAFETY RESPONSIBILITIES

All subcontractor employees are subject to the same training and medical surveillance requirements as Shaw personnel depending on job activity. All activities involving the potential for exposure to hazardous waste materials will require medical and training certification as mandated by 29 Code of Federal Regulations (CFR) 1910.120 and 29 CFR 1926.65. All subcontractor personnel will be required to sign in daily and attend a daily meeting discussing operations and safety issues. All subcontractors involved in construction/remedial activities will complete a Subcontractor Pre-Job Safety Checklist prior to the start of work at the site. Subcontractors will submit AHAs for their work activities to the SS/SSO. The subcontractor reports directly to the PM. All incidents involving subcontractor employees shall be reported to the SS/SSO and a copy of the subcontractor's injury/illness report shall be submitted to the SS/SSO within 24 hours.

Subcontractors are required to read and sign the SSHSP and comply with all requirements of this Accident Prevention Plan (APP). Contractors not in compliance will be immediately dismissed from the site.

Suppliers delivering various materials to the project site or providing equipment/ equipment maintenance will comply with all Naval Facility rules and regulations. Supplier personnel will not be permitted into contaminated areas unless training and medical surveillance is in accordance with 29 CFR 1910.120/1926.65. Contractors will not ride on tractors, forklifts or similar vehicles unless specific seats are provided. They will follow facility hot work rules if hot work is required for vehicle or equipment maintenance. Trucks will be loaded and unloaded in a safe and effective manner, and materials will be stored safely in designated locations only. Associated packaging will be properly disposed of, and litter will not be permitted to be scattered or blown from truck beds. Operators of mobile equipment on site must observe all traffic rules such as speed limits and right-of-ways of pedestrians.

5.0 TRAINING

Outlines of the site safety orientation and training for site personnel, subcontractors, and visitors are provided in Section 10.0 of the SSHSP.

5.1 MANDATORY TRAINING AND CERTIFICATIONS

Mandatory training and certifications are discussed in Section 10.0 of the SSHSP.

5.2 EMERGENCY RESPONSE TRAINING

All Shaw personnel who have completed the Shaw 40-hour Hazardous Work Operations (HAZWOPER) Training are qualified as emergency responders per 29 CFR 1910.120/1926.65 (e)(3)(iv). Site-Specific Emergency Response Procedures will be reviewed with all site personnel as a part of site indoctrination.

5.3 SUPERVISORY AND EMPLOYEE SAFETY MEETINGS

The Shaw SS/SSO will conduct daily safety meetings at the start of each work shift for on-site personnel and will require subcontractors to follow similar meeting procedures or participate in the Shaw daily safety meetings. Daily safety meetings will comply with HS051 (Attachment B of the SSHSP).

6.0 HEALTH AND SAFETY INSPECTIONS

6.1 INSPECTIONS

The Shaw Project Manager and SS/SSO are required to conduct bi-monthly inspections of the sites using the Project Safety Inspection Report. The SS/SSO is responsible for conducting and preparing reports of daily safety inspections of work processes, site conditions, and equipment conditions and submitting them to the HSM. The SS/SSO will discuss any necessary corrective actions with the SS/SSO and review new procedures. Copies of these reports are maintained on file at the project locations.

The Shaw HSM representative may periodically conduct site visits and perform Site Safety Assessments. These reports are kept on file at the Mount Arlington, New Jersey, office and are tracked in a database for each Shaw PM and SS/SSO, including the number of action items noted during the visit and written confirmation of the corrective actions for each item. These responses are compiled and provided to program management for review.

6.2 EXTERNAL INSPECTIONS/CERTIFICATIONS

Shaw does not anticipate the use of outside sources for safety inspections, but may consider their use should it become necessary.

As required, safety equipment will comply with appropriate regulations of OSHA (Occupational Safety and Health Administration), NIOSH (National Institute for Occupational Safety and Health), ANSI (American National Standards Institute), ASTM (American Society for Testing and Materials), U.S. Coast Guard (USCG), or other recognized certification organizations.

7.0 SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE

Shaw considers safety the highest priority during work at a site containing potentially hazardous materials and has established a goal of **zero incidents** for all projects. All projects will be conducted in a manner that minimizes the probability of near misses, equipment/property damage or injury. Shaw will establish programs to recognize people and projects that demonstrate excellence in safety performance. Shaw will use safety observation programs to identify and correct unsafe acts and conditions. Safety awareness programs will be used to provide continuous training and development of good safety practices. Shaw site supervision will investigate all incidents to determine root causes and institute corrective actions to prevent recurrence. Shaw will provide and enforce safety rules to protect employees, subcontractors, clients, and the public.

7.1 SHAW SAFETY INCENTIVE PROGRAMS

A copy of the Shaw Safety Incentive Award Program will be available at each project. The Shaw PM will develop a site-specific program for approval by the HSM and the Program Manager within 10 days of project mobilization.

7.2 SHAW EMPLOYEE SAFETY RESPONSIBILITY REQUIREMENTS

Each employee is responsible for personal safety as well as the safety of others in the area and is expected to participate fully in the ***Safety Improvement Process***, particularly the Safety Observation Program. The employee will use all equipment provided in a safe and responsible manner as directed by the SS/SSO. All Shaw personnel will follow the policies set forth in the Shaw Health and Safety Procedures HS001-999 (Available on site on compact disc [CD]). Site personnel concerned with any aspect of health and safety shall bring it to the attention of the SS/SSO. If not satisfied, they should contact the HSM. All project personnel have the authority to stop work if in their judgment serious injury could result from continued activity. The SS/SSO shall be notified immediately if this becomes necessary. To protect the health and safety of all personnel, employees that knowingly disregard safety policies/procedures may be subject to disciplinary actions up to and including termination. Shaw Employee Safety Responsibility is fully detailed in HS010 Employee Safety and Health Work Rules (Attachment B of the SSHSP).

7.3 MANAGERS AND SUPERVISORS SAFETY ACCOUNTABILITY

It is the duty of the first line supervisor to motivate employees to adhere to Shaw's safety policy in each work situation. A first line supervisor for these purposes is defined as that person designated to give immediate on-site supervision to personnel involved in a task.

All supervisors shall have complete knowledge of the safe procedure for all jobs and tasks under their supervision, or when in doubt, shall seek assistance prior to initiating a task. This is the only acceptable manner in which to perform the task. If the task cannot be accomplished safely, it will not be attempted.

Supervisors will:

- Explain the safety procedure involved with a task to each employee and check frequently to see that the employee understands and works as instructed.
- Allocate sufficient time for the training and coaching of all employees to insure that everyone knows the correct procedure for safely accomplishing required tasks.
- Prevent new employees from performing any tasks until required training is completed.
- Immediately correct unsafe conditions that involved site employees or contractors.
- Ensure that the employees are outfitted with and wear personal protective equipment (PPE) as specified by this APP, SSHSP, other Shaw procedures, or as directed by the HSM.
- Set a good safety example.
- Obtain the cooperation of employees and contractors.
- Provide a safe work environment for employees and contractors.
- Confirm contractor safety performance records have been verified prior to contract award and monitor contractor performance during operations.
- Report all accidents, near misses, and property damage in accordance with the Incident Management and Reporting Procedure.
- Establish a safety culture, using the elements of the Shaw Safety Improvement process, which promotes awareness, encourages participation, and recognizes excellence.

8.0 ACCIDENT REPORTING

8.1 EXPOSURE DATA (MAN-HOURS WORKED)

Shaw's Environmental Health and Safety (EH&S) Manager tracks and maintains incident records as to Federal reporting requirement. Incident rates are reported monthly to Shaw's EH&S Manager. Incident Rates and Workers Compensation losses are tracked for each business line.

8.2 ACCIDENT INVESTIGATIONS, REPORTS AND LOGS

The SS/SSO conducts accident/incident investigations. A report is completed by the SS/SSO and it must be submitted to the Shaw Baton Rouge, Louisiana, Safety Department within 24 hours. All incident reporting forms are provided in HS020.

8.3 IMMEDIATE NOTIFICATION OF MAJOR INCIDENTS

Shaw will immediately notify the client of any major incident, including injury, fire, equipment/ property damage, and environmental incident. A full report will be provided within 24 hours. The following procedure will be followed in response to any major personal injury.

8.4 ACCIDENT RESPONSE

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the SS/SSO to alert him of a medical emergency situation. The work crew supervisor will advise the following information:

- Location of the victim at the work site.
- Nature of the emergency.
- Whether the victim is conscious.
- Specific conditions contributing to the injury, if known.

9.0 MEDICAL SUPPORT

On-site Medical Support/Off-site Medical Arrangements will be outlined in Section 9.0 of the SSHSP.

10.0 PERSONAL PROTECTIVE EQUIPMENT

Protection levels provided in the SSHSP will be established for the site work activities based on the levels of site contaminants and the scope of work. Once on site, results of air monitoring and visual inspection of the work activities may indicate the need for changes in these PPE level(s). Any significant change in the PPE level will be approved by the SS/SSO in consultation with the Certified Industrial Hygienist and/or HSM. PPE selection criteria are outlined in HS600 and HS601 (Attachment B of the SSHSP).

All personnel using respiratory protection will be cleared by a physician for use of a respirator and will be fit-tested to assure they can achieve an acceptable fit. Physician clearance and results of fit testing will be documented as required by HS100 (Attachment B of the SSHSP).

11.0 PLANS REQUIRED BY THE SAFETY MANUAL

11.1 HAZARD COMMUNICATION PROGRAM

The Site-Specific Hazard Communication Program is included Section 4.2 of the SSHSP. Shaw Hazard Communication Program complies with 29 CFR 1926.59/1910.1200 and is outlined in HS060 (Attachment B of the SSHSP).

11.2 EMERGENCY RESPONSE PLANS

The Emergency Response and Contingency Plan is included in Section 9.0 of the SSHSP.

11.3 LAYOUT PLANS

Work zones are defined in Section 5.0 of the SSHSP.

11.4 RESPIRATORY PROTECTION PLAN

The primary objective of respiratory protection is to prevent employee exposure to atmospheric contamination. When engineering measures to control contamination are not feasible, or while they are being implemented, personal respiratory protective devices will be used.

The criteria for determining respirator need have been evaluated based on the site contaminants. Air monitoring will be conducted to confirm that respiratory protection levels are adequate. All respirator users will be OSHA trained in proper respirator use and maintenance. The SS/SSO will observe workers during respirator use for signs of stress. The SS/SSO and HSM will also periodically evaluate the implementation of the SSHSP to determine its continued effectiveness with regard to respiratory protection. All persons assigned to use respirators will have medical clearance to do so.

11.5 CONTINGENCY PLAN FOR SEVERE WEATHER

Contingency plans for severe weather are included in Section 9.0 of SSHSP. A Hurricane Preparedness Plan is located in Attachment F of the SSHSP.

11.6 ALCOHOL AND DRUG ABUSE PREVENTION PLAN

Shaw substance abuse procedures are outlined in Shaw HS101 – Drug and Alcohol Testing.

12.0 CONTRACTOR INFORMATION TO MEET THE REQUIREMENTS OF THE MAJOR SECTIONS OF EM 385-1-1

In addition to this APP, Shaw has prepared a SSHSP to meet the major requirements of United States Army Corps of Engineers Manual 385-1-1. Additional procedures for major requirements are provided in the Shaw Health and Safety Procedures Manual HS001-999 (Available on site on CD).

APPENDIX H
SAFETY PLAN ACKNOWLEDGEMENT

WORKER ACKNOWLEDGEMENT TO HEALTH-AND-SAFETY PLAN

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I have been informed of, and will abide by, the procedures set forth in the SSHSP developed for the Fort Monmouth BEE activities. I have also been provided with an opportunity to read this SSHSP and the hazard communication program. I have been properly trained, medically monitored, and fit tested for the work that I am to perform.

Name	**Date**

WORKER ACKNOWLEDGEMENT TO HEALTH-AND-SAFETY PLAN

.

I have been informed of, and will abide by, the procedures set forth in the SSHSP developed for the Fort Monmouth BEE activities. I have also been provided with an opportunity to read this SSHSP and the hazard communication program. I have been properly trained, medically monitored, and fit tested for the work that I am to perform.

Name	**Date**

WORKER ACKNOWLEDGEMENT TO HEALTH-AND-SAFETY PLAN

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I have been informed of, and will abide by, the procedures set forth in the SSHSP developed for the Fort Monmouth BEE activities. I have also been provided with an opportunity to read this SSHSP and the hazard communication program. I have been properly trained, medically monitored, and fit tested for the work that I am to perform.

Name	**Date**

APPENDIX I
OSHA 300 LOG

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 2009

U.S. Department of Labor
Occupational Safety and Health Administration

You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Form approved OMB no. 1218-0176

Establishment name Shaw Environmental & Infrastructure, Inc.

City Fort Monmouth State NJ

Identify the person				Describe the case			Classify the case											
							CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:					
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	Business Line - Project/Site	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	Death	Days away from work	Remained at work		Away From Work (days)	On job transfer or restriction (days)	(M)					
									Job transfer or restriction	Other record-able cases			Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
							(G)	(H)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)	(6)
						Page totals	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Injury (1) | Skin Disorder (2) | Respiratory Condition (3) | Poisoning (4) | Hearing Loss (5) | All other illnesses (6)

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 2009

U.S. Department of Labor

Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of… (M)			
(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Establishment information

Your establishment name

Street

City State Zip

Industry description (e.g., Manufacture of motor truck trailers)

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

OR North American Industrial Classification (NAICS), if known (e.g., 336212)

Employment information

Annual average number of employees

Total hours worked by all employees last year

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Company executive Title

Phone Date

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

APPENDIX J
BLOOD BORNE PATHOGENS EXPOSURE CONTROL PLAN

Blood-Borne Pathogen Exposure Control Plan

Blood-borne pathogens are microorganisms (i.e., bacteria, virus) sometimes present in blood and certain body fluids, which are capable of causing human disease or death. These pathogens can also be present on objects and surfaces that have had contact with infected blood or certain body fluids. Blood-borne pathogens are also capable of causing human disease or death to unprotected people who are exposed to infected blood or body fluids. Diseases caused by blood-borne pathogens include, but are not limited to, hepatitis A, hepatitis B, hepatitis C, malaria, acquired immunodeficiency syndrome (AIDS), and other sexually transmitted diseases. The most significant of these and of greatest concern are hepatitis B and AIDS.

Hepatitis B is a serious disease caused by the hepatitis B virus (HBV), which attacks the liver. The virus can cause lifelong infection, cirrhosis (scarring) of the liver, liver cancer, liver failure, and death. Exposure symptoms include fever, fatigue, nausea, vomiting, muscle aches, loss of appetite, and jaundice (yellowing of the eyes or skin). Hepatitis diagnosis is difficult because some symptoms are similar to the flu and may remain mild for an extended period. The HBV can remain infectious for up to 10 days, even in dried blood. Hepatitis B vaccine is available for all age groups to prevent HBV infection.

Human immunodeficiency virus (HIV) is the virus that causes AIDS. People with HIV have what is called HIV infection. Some of these people will develop AIDS because of their HIV infection. Humans may be infected with HIV for many years without experiencing any symptoms. Upon development of AIDS, symptoms may include weight loss, skin lesions, dry cough, fever, fatigue, diarrhea, swelling of the lymph glands, and death. Presently, no cure exists for HIV or AIDS, and no vaccination is currently available.

A hazard exists for blood and other bodily fluids to be infected with dangerous, infectious pathogens. Employees could become infected if they are exposed to these blood-borne pathogens.

The purpose of this Blood-borne Pathogen Exposure Control Plan is to provide the information, procedures, and requirements necessary to prevent employee exposure to blood-borne pathogens.

Regulatory, Requirement, and Policy Compliance

This Blood-borne Pathogen Exposure Control Plan has been prepared in compliance with:

- 29 CFR 1910.1030, Blood-borne Pathogens
- *EM 385-1-1, Safety and Health Requirements Manual* (USACE, 2003a), Section A.03.06
- Shaw E & I Procedure No. HS512

Exposure Determination

The OSHA requires employers to perform an exposure determination, identifying employees who may incur occupational exposure to blood or other potentially infectious materials. The exposure determination is made without regard to the use of PPE. For exposure determination purposes, employees are considered to be exposed, even if they wear PPE.

Activities at this project do not present a high risk of employee exposure to blood or other body fluids. An exception to this would be under circumstances when personnel administer first aid care or CPR to injured workers and when personnel clean-up areas and equipment that may have been exposed to blood because of the incident. In these cases, there is reasonable potential for employee skin, eye, mucous membrane, or potential contact with blood or other bodily fluids.

The OSHA requires a listing of job classifications with identification of tasks performed in which some employees may have potential for occupational exposure. This requirement is for employees to clearly understand the tasks that they may perform have a potential for occupational exposure to infectious materials. The job classifications and associated tasks with an exposure potential are as follows:

- Field Supervisor—Administer first aid or CPR; decontaminate or disinfect surfaces and articles that have contacted infectious materials, and prepare biohazard waste for temporary storage and subsequent disposal.
- Site Safety and Health Officer—Administer first aid or CPR; decontaminate or disinfect surfaces and articles that have contacted infectious materials, and prepare biohazard waste for temporary storage and subsequent disposal.
- Laborer—Administer first aid or CPR; decontaminate or disinfect surfaces and articles that have contacted infectious materials, and prepare biohazard waste for temporary storage and subsequent disposal.

These employees have potential for exposure to blood-borne pathogens when administering first aid or CPR and when performing post-accident clean-up operations due to the following:

- Contact or absorption of blood or blood-contaminated objects through open or broken skin (i.e., cuts, scratches, and rashes)
- Blood splashes to their eyes, nose, or mouth, or other mucous membranes
- Punctures through the skin with a contaminated sharp object (such as, scissors)

Workers can reduce their risk of contacting blood-borne pathogens by implementing the recommended work practices (outlined in this plan) before, during, and after responding to emergency medical incidents primarily involving personal injuries.

Schedule of Implementation

The procedures in this Blood-borne Pathogen Exposure Control Plan are to be implemented immediately.

Implementation includes:

- Verifying personnel who are available to voluntarily provide first aid care and CPR hold a valid training certificate from a reputable training provider (American Red Cross or American Heart Association).

  The SSHO is responsible for verifying that an appropriate number of personnel have been trained in and hold valid certification to perform first aid and CPR.

- Verifying that personnel voluntarily providing first aid care, CPR, post-accident clean-up operations, and biohazard waste handling have received the specialized training meeting the requirements of 29 CFR 1910.1030; *EM 385-1-1, Safety and Health Requirements Manual* (USACE, 2003a), Section A.03.06; and Shaw E & I Procedure No. HS512. This training is required for applicable personnel prior to the commencement of work and at least annually thereafter. This training shall cover the following elements:

  - Copy of 29 CFR 1910.1030 and this procedure including an explanation of the contents
  - General explanation of the epidemiology and symptoms of blood-borne diseases
  - Explanation of the modes of transmission of blood-borne pathogens

- Explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials

- Explanation of the use and limitations of practices that will prevent or reduce exposure including appropriate engineering controls, work practices, and PPE

- Information of the types, proper use, location, removal, handling, decontamination, and/or disposal of PPE

- Explanation of the basis for selection of PPE

- Information on the hepatitis B vaccine, including information on its efficacy, safety, and the benefits of being vaccinated

- Information on the appropriate actions to take and persons to contact in an emergency

- Explanation of the procedure to follow if an exposure incident occurs including the method of reporting the incident and the medical follow-up that will be made available

- Information on the medical counseling that is provided for exposed individuals

- Explanation of required signs and labels

The SSHO is responsible for verifying that this blood-borne pathogen training has occurred.

- Verifying that engineering controls are readily available at the project for use in an emergency. Engineering controls for this project include the following:

  - (5) Red-bags for temporary storage of contaminated PPE and cleaning materials

  - (1) Appropriately labeled, 30-gallon hard-plastic container for the temporary storage of red-bagged waste

  - (1) Whisk-broom and dust pan for cleaning up contaminated broken glass

  - (1) Gallon container of Clorox® household bleach

  - (1) Large utility sponge

- (2) Rolls of paper towels
- (1) Container of liquid disinfectant hand soap
- (10) "Biohazard" warning labels
- (10) Individually packaged disinfectant towelettes
- (2) CPR barriers

The SSHO is responsible for verifying that this inventory of engineering controls is readily available at the project site for emergency use.

- Verifying that the appropriate PPE for use in an emergency is readily available at the project site.

Personal protective equipment is necessary to prevent employee exposures to infectious materials. The necessary PPE, which shall be maintained separately for use in an emergency include the following:

- (Five) P-100 Particulate filtering face-piece respirator (3-M 8293 or equivalent)
- (Two) Face-shields with ratcheting head-suspension
- (Three-pair) Safety glasses with clear lens
- (Box of 100) Disposable nitrile examination gloves
- (Three-pair) PVC Monkey Grip work gloves
- (Four) Poly-coated or Saran-coated disposable Tyvek® coveralls with attached hood
- (Eight-pair) Vinyl or latex disposable boot covers
- (Eight) Fluid-resistant surgical hoods

The SSHO is responsible for verifying that the above inventory of PPE is readily available at the project site for emergency use.

Work Practice Controls

Work practice controls reduce the likelihood of exposure by altering the manner in which a task is performed. The work practice controls outlined in this section are applicable to the administration of first aid and the subsequent clean-up operations.

Work practice controls shall be instituted whenever there is potential for employee contact with blood and bodily fluid. Situational examples where these controls are to be implemented include, but are not limited to:

- The voluntary administration of first aid care, such as application of bandages to minor or major cuts and abrasions of another person. This care may allow for contact with sores, wounds, broken skin, blood, or other bodily fluids.
- The voluntary administration of first aid care, such as providing CPR.
- Clean-up activities involving handling soiled articles (e.g., gauze, bandages, compresses, etc.) and the decontamination or disinfecting of surfaces and articles that have contacted potentially infectious materials, such as blood or other bodily fluids.
- Prepare biohazard waste for temporary storage and subsequent disposal.

Based upon professional judgment, an employee may choose to temporarily forego the use of PPE if the employee determines that the use of the PPE will further jeopardize his well-being or that of the injured worker. This limited application must be carefully evaluated and considered by the employee. If this situation does occur, Shaw will investigate and document the circumstances in an effort to provide alternative means to avoid further occurrence.

The following are specific work practice controls that shall be implemented in the above noted situations or whenever an employee determines that the implementation of these work practices is prudent or necessary:

- The appropriate PPE shall be donned prior to engaging in any activities that have the potential for employee contact with potentially infectious materials, such as blood or other bodily fluids.
- Hands and face will be washed as soon as possible after engaging in any activities that have the potential for employee contact with potentially infectious materials, such as blood or other bodily fluids. If wash facilities are not readily available, individually packaged disinfectant towelettes may be used in the interim.
- Eating, drinking, or smoking is not allowed in any work area where a potential exists for occupational exposure to blood-borne pathogens.
- Open wounds or cuts shall be promptly bandaged.
- Work surfaces and areas shall be cleaned and disinfected immediately after being contacted by potentially infectious materials. A 10 percent bleach solution (one part bleach added to nine parts water) shall be applied and

allowed to have a contact time of 15 minutes. Non-disposable articles, equipment, or materials contaminated with potentially infectious materials shall be similarly cleaned/disinfected prior to reuse.

- All bins, pails, cans, and similar receptacles intended for reuse, which have become contaminated with blood or other potentially infectious materials shall be cleaned and disinfected immediately after use.

- Broken glassware, which may be contaminated, shall not be picked up directly by hand. Broken glass shall be picked-up using mechanical means, such as by using a whiskbroom and dustpan.

- All PPE shall be immediately removed upon leaving the potentially contaminated work area, or as soon as possible if visibly contaminated. The contaminated PPE shall be placed in a labeled "red-bag" and then placed in the 30-gallon container for temporary storage and subsequent disposal.

- Any clothing that has contacted blood or other potentially infectious fluids shall be removed as soon as possible.

- Any clothing that has contacted blood or infectious fluids shall be placed in a labeled "red-bag" and then placed in the 30-gallon container for temporary storage and subsequent disposal.

Universal Precautions

Universal precautions is a method of infection control, which operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be infectious for HIV, HBV, or other blood-borne pathogens. Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. Universal precautions consist of the following practices:

- All workers shall routinely use appropriate barrier precautions to prevent skin and mucous-membrane exposure when contact with blood or other bodily fluids is anticipated. Gloves should be worn for touching blood and bodily fluids, mucous membranes, or non-intact skin and for handling items or surfaces contaminated with blood or body fluids. Masks and protective eyewear or face shields shall be worn during procedures that are likely to generate droplets of blood or other body fluids to prevent exposure of mucous membranes of the mouth, nose, and eyes. Protective suits shall be worn during procedures that are likely to generate splashes of blood or other bodily fluids.

- Hands and other skin surfaces shall be washed immediately and thoroughly if contaminated with blood or other bodily fluids. Hands shall be washed immediately after gloves are removed, using a disinfectant soap.

- Cardiopulmonary resuscitation barriers or other ventilation devices should be available for use in areas in which the need for resuscitation is foreseeable.

- Workers who have exudative lesions or weeping dermatitis shall be excluded from handling potentially infectious materials until the condition resolves.

- Pregnant workers should be especially familiar with and strictly adhere to precautions to minimize the risk of transmission.

Personal Protective Equipment

The proper use of PPE is an effective work practice control. The following requirements for PPE are mandatory whenever there is potential for employee contact with blood and bodily fluid:

- Inspect PPE prior to use to verify it is in good working order and without defects.

- Blood or other potentially infectious materials.

- Disposable (single use) gloves, such as surgical or examination gloves shall be replaced when visibly soiled, torn, punctured, or when their ability to function as a barrier is compromised. Gloves should be changed as soon as possible after contact with blood or bodily fluids. After use, remove gloves from top to bottom inside out, not allowing unprotected skin to contact the exterior of the gloves. Hands and other skin surfaces shall be washed with disinfectant soap immediately after care has been rendered or clean up has been completed. Gloves reduce the incidence of blood contamination of hands, but they cannot prevent penetrating injuries caused by sharp objects. Do not reuse gloves once removed. A CPR barrier shall be used when administering CPR.

- Protection for the eyes, face, hands, body, feet, and against inhalation hazards shall be provided as appropriate for each job.

- Gloves shall be worn when employees have the potential for direct skin contact with or when handling items or surfaces soiled with blood, other potentially infectious materials, mucous membranes, and non-intact skin.

- Polyvinyl chloride work gloves may be disinfected for immediate reuse if the integrity of the glove is not compromised; however, gloves must be discarded if they are cracked, peeling, discolored, torn, punctured, or exhibit other signs of deterioration. All gloves shall be discarded at the conclusion of the activity or at the end of the shift – whichever comes first.

- Masks and eye protection or chin-length face shields shall be worn whenever splashes, spray, splatter, droplets, or aerosols of blood or other potentially infectious materials may be generated and there is a potential for eye, nose, or mouth contamination.

- Fluid-resistant clothing (e.g., coated Tyvek® suits) shall be worn if there is a potential for splashing or spraying of blood or potentially infectious materials. Coated Tyvek® coveralls shall also be worn during clean-up activities involving decontamination or disinfecting of surfaces and articles that have contacted potentially infectious materials, and when preparing biohazard waste for temporary storage and subsequent disposal.

- Fluid-resistant clothing (e.g., coated Tyvek® suits) shall be worn if there is a potential for clothing becoming soaked with blood or other potentially infectious materials.

- Surgical caps or hoods shall be worn if there is a potential for splashing or splattering of blood or potentially infectious materials on the head.

- Fluid-proof coverings shall be worn if there is a potential for shoes or boots to contact blood or other potentially infectious materials.

- Disposable nitrile or vinyl gloves shall be worn for touching blood and bodily fluids requiring universal precautions, mucous membranes, or non-intact skin and for handling items or surfaces soiled with blood or bodily fluids to which universal precautions apply.

Waste Handling

All wastes generated because of administering emergency first aid care and the subsequent clean-up activities shall be placed in red-bags, labeled as a biohazard, and kept separately from other trash. Wastes used in medical emergency treatment (i.e., gloves, towels, and gauze) shall also be bagged and stored in an identical manner. Red-bagged, biohazard waste shall be placed in the 30-gallon collection container, labeled, and secured for temporary storage and disposal. Additional containers shall be obtained as needed and containers shall not be overfilled.

Biohazard Waste Disposal

A Shaw Transportation and Disposal Coordinator shall be contacted to arrange for proper disposal of biohazard wastes. The waste shall remain secured on site in labeled container(s) until disposal arrangements have been made at an approved disposal facility. Disposal of the infectious waste container(s) shall be in accordance with applicable local, state, and federal regulations.

Medical Requirements

Employees receive medical evaluations in accordance with Shaw E & I Procedure No. HS100. The medical requirements of this exposure control plan include provisions for vaccinations to all exposed employees as well as for post-exposure procedures and evaluations. All employees with potential for occupational exposure to blood-borne

pathogens shall receive the hepatitis B vaccination and tetanus vaccination prior to workplace exposure, unless they read and sign a Hepatitis B and Tetanus Vaccination Declination form .

Hepatitis B Vaccination

All potentially exposed employees will have made available to them, at no cost, a hepatitis B vaccination. Recombivax or Accelerated Recombivax vaccines shall be utilized. If the employee has previously received the hepatitis B vaccination and/or antibody testing reveals that the employee is immune, a new vaccination is not required. Employees may be subjected to occupational exposure immediately after receiving the first shot in the hepatitis B vaccination series. Antibody testing shall be performed 30-days after completing the hepatitis B vaccination series. Employees unable to develop immunity shall be precluded from further occupational exposure. If a physician recommends a booster dose(s), the doses shall be provided according to standard recommendations for medical practice. The employee will also receive training as to the vaccine's efficacy, safety, benefits, and consequences prior to administration. The vaccination series may also be initiated within 24-hours of an incident with exposure potential.

Tetanus Vaccination

All employees subject to this policy shall maintain current status documentation of their tetanus vaccination [current status for tetanus vaccination is within five (5) years]. All potentially exposed employees shall be offered a tetanus vaccination at no cost.

Post-Exposure Procedures and Evaluation

All exposure incidents shall be reported as required by Shaw E & I Procedure No. HS020, "Accident Prevention Program: Reporting, Investigation and Review." The Corporate Medical Director shall be advised in addition to standard notification procedures.

Following a report of an exposure incident, each involved employee shall be offered a confidential medical evaluation and follow-up, which includes at least the following elements:

- Documentation of the route(s) of exposure.
- Hepatitis B virus and HIV antibody status of the source patient(s) (if known), and how the exposure occurred.
- The medical confidentiality rights of the source patient shall be preserved at all times.

- If the source patient can be determined and permission is obtained, collection of and testing of the source patient's blood to determine the presence of HIV or HBV infection shall be conducted under the direction of the attending physician.

- Collection of blood from the exposed employee as soon as possible after the exposure incident for the determination of HIV and/or HBV status. Actual core antibody and surface antigen testing of the blood or serum sample may be done at that time or later if the employee so requests. If the test is deferred, arrangements shall be made through the attending physician to properly archive the specimen.

- Follow-up of the exposed employee including antibody and antigen testing, counseling, illness reporting, and safe and effective post-exposure prophylaxis, according to standard recommendations for medical practice as defined by the Corporate Medical Director.

Where applicable laws require employee consent, documented consent shall be obtained prior to testing. If an employee refuses the blood test, documentation of the refusal will be made. Documentation of the test results shall be made available to the exposed employee(s). All test results shall be kept confidential.

Physician Information

The following information shall be provided to the evaluating physician:

- Copy of 29 CFR 1910.1030 and its appendices

- Description of the affected employee's duties as they relate to the employee's occupational exposure

Physician Opinion

For each potentially exposed employee evaluation, the employee shall receive a copy of the evaluating physician's written opinion within 15 working days of the completion of the evaluation. The written opinion shall be limited to the following information:

- The physician's recommended limitations upon the employee's ability to receive the hepatitis B vaccination.

- A statement that the employee has been informed of the results of the medical evaluation and that the employee has been told about any medical conditions resulting from exposure to blood or other potentially infectious materials, which require further evaluation or treatment.

- Specific findings or diagnoses, which are related to the employee's ability to receive the HBV vaccination. Any other findings and diagnoses shall remain confidential.

Hazard Communication

There are regulatory requirements for labels, signs, and training. The provisions and exceptions for these are contained in the subsections below.

Warning Labels

Containers used for disposal of blood-contaminated supplies and waste will be labeled in accordance with the word "biohazard." The following symbol shall be an integral part of the label:



Warning Signs

There are no designated areas for medical treatment on site, because first aid is provided on an emergency basis only; therefore, warning signs are not applicable. In cases of potential exposure, observers and nonessential personnel should be verbally warned to keep a safe distance from injured personnel.

Employee Training Program

All employees who are first aid/CPR trained and may provide assistance shall be trained in the requirements for voluntary providers as described in Shaw E & I Procedure No. HS512, this SHERP and its addenda, and the general provisions of this procedure.

Recordkeeping

There are federal record-keeping requirements for training, medical, and incident reporting documentation. The provisions for keeping these records are contained in the subsections below.

Training Records

All employees covered under this exposure plan shall be trained as required. A record of the training shall be appropriately generated. The training record will contain the date of the training session(s), the contents or a summary of the training session(s), the names of

persons conducting the training, and the names of all persons attending the training sessions.

The training records will be maintained by the Shaw Training Department for at least five (5) years from the training date.

Medical Records

Medical records necessary for Shaw employees will include documentation of HBV vaccination status, medical follow-up, post-exposure testing, and a medical professional's written evaluation.

The employee medical records will be forwarded to and maintained by Health Resources, 600 West Cumming Park, Suite 3400, Woburn, Massachusetts 01801-6350 for inclusion in the employee's medical file. Confidentiality of all medical records shall be maintained.

Shaw Environmental, Inc. maintains employee medical records for the duration of the employee's employment plus 30 years thereafter. If, for whatever reason, Shaw no longer does business and no successor exists, Shaw will notify the director of NIOSH in writing three (3) months prior to the disposal of records. If so directed, the records shall be transferred to the director of NIOSH.

Incident Recording

An incident that occurs because of rendering emergency medical care will be recorded on the OSHA 300 log as OSHA defines work-related injuries and illnesses. All injuries involving the release of blood or bodily fluids must be immediately reported to the Project CIH for proper reporting and follow-up.

Plan Review and Update

This Blood-borne Pathogen Exposure Control Plan shall be reviewed and updated on an annual basis.

APPENDIX K
ACCIDENT REPORTING PROCEDURE

PROCEDURE

Subject: ACCIDENT PREVENTION PROGRAM: REPORTING, INVESTIGATION, AND REVIEW

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish the requirements for incident reporting, investigation, and review. This procedure is an integral part of the company's overall accident prevention program and aids in the identification of potential causal factors and corrective actions. Key elements of this procedure include:

- **All occupational injuries/illnesses, vehicle accidents, and near miss incidents must be promptly reported and investigated.**

- All Occupational Safety and Health Administration (OSHA) recordable injuries/illnesses and chargeable vehicle accidents must be reviewed by an Accident Review Board. The Accident Review Board report is submitted to the Baton Rouge Corporate Safety Department, for production to and retention on behalf of the Legal Department.

- All incidents involving a fatality, major injury/illness, or resulting in significant property damage will be immediately reported to: the business line Health & Safety Manager; the Corporate Health and Safety Department; Business Line Vice President and the Legal Department.

- All investigations and associated materials obtained and/or produced, in association with OSHA recordable injuries/illnesses, chargeable vehicle accidents, fatalities, major injury/illness, or incidents resulting in significant property damage, are to be performed for & on behalf of the legal department and will be subject to being classified as Confidential Attorney-Client / Attorney Work Product.

- All business line Health & Safety Managers are required to prepare a Monthly Loss Report summarizing all current month, and year-to date, chargeable vehicle accidents, injury/illness cases (requiring outside medical care), lost work day totals and restricted work day totals. This report shall then be forwarded, by the 10th day of the following month, to the Baton Rouge Corporate Safety Office.

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3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Corporate Health & Safety Department is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Chargeable Vehicle Accident - Any **at-fault** vehicle accident meeting any **one** of the following criteria:

- An individual other than an employee of the company is a party in the accident
- Property owned by a person or entity other than the company is damaged
- When company owned, leased or rented vehicles are involved and damage exceeds $2,500.00.
- When an employee is driving a personal vehicle while on company business and damage exceeds $2,500.00.

Company - All affiliates, indirect and wholly owned subsidiaries of Shaw Environmental & Infrastructure, Inc. (Shaw E & I).

Days Away From Work - Days away from work are the number of **calendar** days following the injury or illness, excluding the date of the injury.

Job Safety Analysis (JSA) – The JSA is an effective management technique for identifying hazardous conditions and unsafe acts in the workplace. A JSA is intended to analyze the individual

steps or activities, which together create a job or specific work duty, and to detect any actual or potential hazards that may be present. (See HS045: Job Safety Analysis)

Restricted Work – Occurs when, as the result of a work-related injury or illness:

- A physician or other licensed health care professional recommends that the employee not perform one or more of the routine functions of his or her job, or not work the full workday that he or she would otherwise have been scheduled to work

Near Miss Incident - Any incident where no injury occurred, but where the potential for injury existed.

OSHA Recordable Case – See Attachment 8

Vehicle - Any passenger vehicle, including trucks, used upon the highway or in private facilities for transporting passengers and/or property. For the purpose of this procedure, off-road vehicles such as earthmoving equipment, forklifts, non-highway use trucks, etc., are not considered vehicles. (See HS800 Motor Vehicle Operation: General Requirements)

5.0 TEXT

5.1 Incident Reporting Process

Employees are required to immediately report to their direct supervisor all occupational injuries, illnesses, accidents and near miss incidents having the potential for injury. Site Business Line Managers or Supervisors (supervisor directly responsible for the employee involved in the incident) with first-hand knowledge of an incident is required to:

- Immediately arrange for appropriate medical attention and notify the responsible health and safety representative.

- **As soon as practical, but not longer than one hour after gaining knowledge of the occurrence**, notify the Shaw Notification Hotline/Helpdesk by calling 1-866-299-3445 (Attachment 10) of any injury requiring off-site medical treatment, any chargeable vehicle accident or equipment incident involving property damage exceeding $2,500 in value (Shaw or third party).

- Inform Health Resources of all incidents requiring off-site medical attention by calling 1-800-350-4511. This call should be made **prior** to transporting the employee such that they can coordinate physicians services prior to arrival of the employee to the clinic, and provide the following information:

  - Company Name (Shaw E&I) & Business Line (e.g. DOD, Commercial)
  - Employee Name
  - Name of anticipated, treating medical facility and phone number
  - Brief description of incident.

Health Resource's role is to interface with the treating physician, to ensure that appropriate care is provided to the injured employee.

- Complete the *Authorization for Treatment, Release of Medical Information*, and *Return to Work* (Attachment 9A, 9B, 9C) and the *Supervisor's Employee Injury Report* (Attachment 2) for all cases requiring off-site medical attention. The Site Safety and Health Representative or responsible supervisor shall ensure that the forms are completed and faxed to Health Resources at (800) 853-2641 prior to leaving the medical facility or as soon as reasonably possible.

- Post accident drug and alcohol testing shall occur in accordance with HS101 Drug and Alcohol Testing, immediately following an incident.

  NOTE: Prior to performing non-DOT post accident testing, it is the responsibility of the employee's supervisor to ensure that Health Resources has verified that this testing is not prohibited or restricted by state or local regulations.

- Prior to an injured employee returning to his/her job duties, a follow-up call by Health Resources will be made to the project site. The purpose of this call is to ensure work restrictions are clarified and planned work activities are consistent with medical recommendations.

- The Supervisor shall initiate/complete the appropriate company documentation in accordance with the following incident classifications: (note: if a Site Safety and Health Representative is on site, he should work in concert with the supervisor)

  - OSHA Recordable Cases
    a. Supervisor's Employee Injury/Illness Report (Attachment 2)
    b. Incident Investigation Report (Attachment 5)
    c. Witness Statement Form (Attachment 6)
    d. Accident Review Board (Attachment 7)

  - First Aid Cases
    a. Supervisor's Employee Injury/Illness Report (Attachment 2)
    b. Incident Investigation Report (Attachment 5)
    c. Witness Statement Form (Attachment 6)

  - Chargeable Vehicle Accidents
    a. Vehicle Accident Report (Attachment 3)
    b. Incident Investigation Report (Attachment 5)
    c. Witness Statement (Attachment 6)
    d. Accident Review Board (Attachment 7)
    e. Driving Record Certification (Procedure HS800)

  - Non-Chargeable Vehicle Accidents
    a. Vehicle Accident Report (Attachment 3)

b. Incident Investigation Report (Attachment 5)
c. Witness Statement (Attachment 6)

- Equipment, Property Damage and General Liability Incidents
  a. Incident Investigation Report (Attachment 5)
  b. Witness Statement Form (Attachment 6)
  c. Equipment, Property Damage and General Liability Loss Report (Attachment 4).

- Near Miss
  a. Incident Investigation Report (Attachment 5)

5.2 Supervisor's Employee Injury/Illness Report (Attachment 2)

The Supervisor's Employee Injury Report is to be completed for all incidents that result in an employee occupational injury or illness requiring off-site medical attention. It is to be initiated by the supervisor of the injured employee and forwarded to the respective Business Line Safety Manager for review / comments. Upon completion of review and comments the report should be forwarded, **within 24 Hours,** to the Shaw Corporate Claims department in Baton Rouge, via the corporate claims fax number (225.932.2636).

5.3 Vehicle Accident Report (Attachment 3)

The Vehicle Accident Report must be completed for any vehicle accident in which a company vehicle is involved. This includes company-owned or leased vehicles, rental vehicles, and personal vehicles being used for company business. This report is to be initiated by both the employee involved in the accident and his/her direct supervisor and forwarded to the respective Business Line Safety Manager for review / comments. Upon completion of review and comments the report should be forwarded to the Shaw Corporate Claims department in Baton Rouge (fax number 225.932.2636).

5.4 Equipment, General Liability, Property Damage, and Loss Report (Attachment 4)

The General Liability, Property Damage, and Loss Report is to be used for all losses or damage to company property in excess of $2,500.00. This form must be completed for all third party property, regardless of value, damaged as a result of company activities. The employee most familiar with the events that contributed to the loss or damage will complete the form, and then forward it to the project/location manager. The Corporate Claims Department and the respective Business Line Safety Manager must receive a copy of the report within one business day of the incident.

5.5 Incident Investigation Report (Attachment 5)

All injuries, illnesses, accidents, and near miss incidents will be investigated. Once arrangements for immediate medical care have been made, the employee's direct supervisor, with assistance from the health and safety representative and Business Line Health and Safety Manager, will:

- Collect the facts;

- Describe and document (include sketch, photos, etc.) how the incident occurred;

- Collect support documentation (JSA's, AHA's, Tailgate Safety Meetings, Work Orders, etc.);

- List witnesses and collect written statements;

  If applicable, contact the employee's Functional Manager in an effort to gain relevant information

- Identify the causative factors;

- Identify potentially unsafe acts or unsafe conditions that may have contributed to the incident;

- Identify potential curative action; and

- List the corrective actions which are to be executed, appropriate curative action, the person(s) responsible for the corrective action, and the date by which action is to be completed.

The investigation will be started as soon as possible following the incident and the relevant reports and support documentation (JSA's, AHA's, Tailgate Safety Meetings, Work Orders, etc.) shall be submitted to the appropriate Business Line Health and Safety Manager within 72 hours. In addition to the previous information, reports from external sources (police, insurance carriers, testing laboratories, etc.) are to be obtained as soon as they become available and forwarded by the Business Line Safety Manager to the Corporate Claims department in Baton Rouge.

5.6 Injured Employee Statement & Witness Statement Forms (Attachment 6a & 6b)

The Injured Employee and Witness Statement Forms allow for consistency in the development of the investigation process. The Injured Employee Statement must be completed in all cases where an employee injury results in off site medical treatment. If there are witnesses to the accident/incident, the Witness Statement form should be completed and signed by the subject witness. Both of these forms should be attached to the incident investigation report. It is essential that these statements are executed immediately following the incident to ensure an accurate account of the events.

5.7 Accident Review Board (ARB) (Attachment 7)

The purpose of the Accident Review Board is to collect and review the information gathered for each incident, report that information to the Legal Department and take appropriate curative action. In all cases, the purpose of the entire investigative process, inclusive of conducting an ARB, is to identify curative actions as it relates to the incident / injury. Accordingly, a diligent and concerted effort to accomplish these tasks must be established at the onset of all of the subject incidents.

In order to assist the Legal Department in evaluating the risk to, or liability of, the company, associated with OSHA recordable injuries, chargeable vehicle accidents, fatalities or incidents resulting in significant property damage, the responsible Project / Location Manager is required to coordinate with all parties and set up the ARB such that it occurs **within 10 days of the accident**. The respective Business Line Health and Safety Manager, whose project/location experiences accident is then required to conduct the subject ARB.

The Accident Review Board shall be composed of the project/location manager, the employee's direct supervisor (at time of incident), a health and safety representative, and the employee(s) involved in the incident.

Additionally, there may be cases that involve an employee that has been assigned to a project and the Functional Manager of that employee may not have direct knowledge of an incident. In cases such as these, the Functional Manager shall be notified of the incident and requested to participate in the ARB. Also, as determined by the Business Line Health and Safety Manager, a representative of other internal sources of expertise should be involved where applicable.

All investigations and associated materials obtained and/or produced, in association with injuries/illnesses resulting in OSHA recordable classification, chargeable vehicle accidents, fatalities or incidents resulting in significant property damage, are to be performed for and on behalf of the legal department and will be subject to being classified as Confidential Attorney-Client / Attorney Work Product. If the ARB is initiated under a Confidential Attorney-Client / Attorney Work Product status, all documents and other work product arising out of, or associated with, the investigation process, including the ARB, shall be prepared in anticipation of litigation. The Accident Review Board report, and associated documents, is submitted to the Corporate Safety Department, for production to and retention on behalf of the Legal Department.

The ARB report, and all associated documents, shall be completed as soon as practicable, but not more than 5 business days following the ARB meeting, and forwarded by the Business Line Safety Manager to the Corporate Safety Department, via the Corporate Claims fax number. The original documents shall then be mailed to the Corporate Safety Department. These documents shall then be filed in a lockable cabinet, separate from files not meeting the subject criteria, by the Corporate Safety Department, for production to and retention on behalf of the Legal Department. In the event that copies of these files are maintained by Business Line Safety Managers and / or the respective location in which the injury occurred, the same filing criteria shall be followed. The criteria shall be that these documents are filed in lockable cabinets, separate from files not meeting the subject Attorney-Client / Attorney Work Product criteria.

It is generally not acceptable to discipline an employee for having an accident. However, if in the opinion of the Accident Review Board, it is determined that the accident resulted from an intentional unsafe act or intentional violation of company procedure on the employee's part, the employee may be subject to disciplinary action in accordance with

the company's progressive disciplinary action system (see Human Resources Procedure HR207).

5.8 Monthly Loss Report

Each business line Health and Safety Manager is responsible to submit a Monthly Loss Report summarizing incidents that took place within their business line during the previous month. The business line Health and Safety Manager is responsible for submitting a consolidated package for the entire business line to the corporate health and safety office for **receipt no later than the 10th working day of the following month**.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HR207 Disciplinary Action
HS013 Health and Safety Procedure Variances
HS101 Drug and Alcohol Testing
HS800 Motor Vehicle Operations - General Requirements
HS810 Commercial Motor Vehicles

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Supervisor's Employee Injury/Illness Report
3. Vehicle Accident Report
4. Equipment, Property Damage and General Liability Loss Report
5. Incident Investigation Report
6. a. Injured Employee Statement
   b. Witness Statement
7. Accident Review Board Report
8. Injury/Illness Classification Guidelines
9. Medical Forms
   a. Authorization for Treatment of Occupational Injury/Illness
   b. Authorization for Release of Medical Information
   c. Return to Work Examination Form.
10. Help Desk / Hotline Notification Guidelines

ATTACHMENT 1

ACCIDENT PREVENTION PROGRAM: REPORTING, INVESTIGATION, AND REVIEW RESPONSIBILITY MATRIX

Action	Procedure Section	*Responsible Party*					
		Employee	**Supervisor**	**Project/ Location Manager**	**Site Health and Safety Rep. / Officer**	**Business Line Health and Safety Manager**	**Corporate Health & Safety Manager**
Issue, Revise, and Maintain Procedure	3.1						X
Report All Incidents to Supervisor	5.1	X					
Notify Health and Safety Representative	5.1		X				
Arrange Medical Care	5.1		X		X		
Notify Health Resources or Gates McDonald of Incident	5.1		X		X		
Initiate/Complete Company Forms	5.1		X		X		
Complete Investigation of incident	5.5		X	X	X	X	
Complete Equipment, Property Damage and General Liability Loss Report Incident	5.4	X					
Coordinate and Set up Accident Review Board	5.7			X			
Conduct Accident Review Board	5.7					X	
Participate in Accident Review Board	5.7	X	X	X	X	X	
Complete Monthly Loss Report	5.8					X	

Attachment 2

REPORT ALL WORKER'S COMPENSATION INJURIES TO SHAW CLAIMS DEPARTMENT
FAX REPORT WITHIN 24 HOURS OF INCIDENT TO **225-932-2636**.
Phone all injuries/ illnesses to Shaw Notification Hotline/Helpdesk
1-866-299-3445

Supervisor's Employee Injury/Illness Report Form

EMPLOYEE INFORMATION

Employee's Social Security Number:		Claim Number:	
Employee's Name:		Home Phone Number:	
Home Address:			Business Line Code:
Male Female	Date of Birth:	Hire Date:	
Dependents:	Dependents Under 18:	Marital Status:	
Occupation:		Department Name:	
State Hired:	Currently Weekly Wage:	Hourly Wage:	
Hours/Days Worked Per Week:	Days Per Week	Hours Worked Per Day:	
Employment Status:	Employee Report No.: N/A		Employee ID No.: N/A
Salaried Continued:	Paid For Date of Injury:		Education No. of Years:
Ever Injured on the Job:	Supervisor Name & Phone:		

EMPLOYER INFORMATION

Employer Name:	**The Shaw Group, Inc.**		
Work Location:			
Contact Name:	**John Mollere**	Telephone Number:	**(800)747-3322, Ext. 572**
Employer SIC:		Employer Location Code:	
Employer FED ID:		Employer Code:	N/A
Nature of Business:			
Policy Number:			

ACCIDENT INFORMATION

Date and Time of Injury:			
Did the Accident Occur at the Work Location:		If no, where did the accident occur?	N/A
Accident Address:			
Nature of Accident:			

Give a Full Description of the Accident: (Be as Factually Complete As Possible)

Are Other WC Claims Involved?	No	Date and Time Reported to Employer:	
Person Reported To:			

WITNESS INFORMATION

Were There Any Witnesses?

If Yes, List Names and How to Contact Them:

INJURY INFORMATION

Which Part of the Body Was Injured? (e.g. Head, Neck, Arm Leg)

What Was the Nature of Injury? (e.g. Fracture, Sprain, Laceration)

Part of Body Location: (e.g. Left, Right, Upper, Lower)

Injury Description:

Source of Injury: | Is Employee Hospitalized?

Lost Time: If Yes, What was First Full Day Out:

Date Last Day Worked: | Date Disability Began: N/A

Date Returned to Work: | Estimated Return Date: N/A

MEDICAL INFORMATION

ER Treated & Released: | Hospitalized: | Phy./Clinic:

Hospital - Name, Address, Phone Number: | Was Employee Transported via Ambulance: Yes No

N/A

Clinic - Name, Address, Phone Number:

ADDITIONAL COMMENTS & INFORMATION

REPORT PREPARED BY

Name: | Title:

Signature: | Phone:

ATTACHMENT 3
VEHICLE ACCIDENT REPORT
Page 1 of 2

ACCIDENT DESCRIPTION

This report is to be initiated by the employee involved in the accident or his/her direct supervisor. Please answer all questions completely. This report must be forwarded to the appropriate health and safety representative within 24 HOURS of the accident. Attach police report.

ACCIDENT DATE _____ TIME _____ ☐ A.M. or ☐ P.M.

LOCATION OF ACCIDENT (CITY, STATE) _____

DESCRIPTION OF ACCIDENT _____

_____

_____

WITNESS _____ PHONE NO. _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

POLICE OFFICER'S NAME AND BADGE # _____ DEPARTMENT _____

COMPANY VEHICLE

DRIVER _____ DRIVERS LICENSE NO. _____ STATE _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

WORK PHONE NO. _(____)_____ S.S. NO. _____ PROJECT NAME/NO. _____

VEHICLE NO. _____ YEAR _____ MAKE _____ MODEL _____ LICENSE PLATE NO. _____

STATE _____ VEHICLE OWNER: ☐ COMPANY ☐ LEASED/RENTED ☐ PRIVATE VEHICLE

VEHICLE TYPE: ☐ COMMERCIAL MOTOR VEHICLE ☐ NON-COMMERCIAL

IF NOT COMPANY-OWNED: OWNER _____ PHONE NO _(____)_____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

VEHICLE DAMAGE _____

NO. OF VEHICLES TOWED FROM SCENE _____ NUMBER OF INJURIES _____ NUMBER OF FATALITIES _____

WERE HAZARDOUS MATERIALS RELEASED? ☐ NO ☐ YES IF YES, DESCRIBE MATERIALS _____

_____

OTHER VEHICLE

DRIVER _____ DRIVERS LICENSE NO. _____ STATE _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

PHONE NO. _(____)_____ S.S. NO. _____

OWNER'S NAME (☐ CHECK IF SAME AS DRIVER) _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

INSURANCE COMPANY _____ POLICY NO. _____

AGENT'S NAME _____ PHONE NO. _(____)_____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

VEHICLE YEAR _____ MAKE _____ MODEL _____ PLATE NO. _____ STATE _____

VEHICLE I.D. NO. _____

VEHICLE DAMAGE _____

PASSENGERS: ☐ NO ☐ YES INJURIES: ☐ NO ☐ YES (If Yes, list names and telephone numbers below)

_____

_____

_____

VEHICLE ACCIDENT REPORT

WEATHER: ☐ Clear ☐ Cloudy ☐ Fog ☐ Rain ☐ Sleet ☐ Snow Other _____

PAVEMENT: ☐ Asphalt ☐ Steel ☐ Concrete ☐ Wood ☐ Gravel/Dirt ☐ Brick/Stone Other _____

CONDITION: ☐ Dry ☐ Wet ☐ Icy ☐ Pot Holes Other _____

TRAFFIC CONTROL: ☐ Traffic Light ☐ Stop Sign ☐ Railroad ☐ No Intersection ☐ No Control

ROADWAY: Number of Lanes Each Direction: _____ ☐ Residential ☐ Divided Highway ☐ Undivided Highway

Draw and name roadways showing each vehicle, direction of travel, and point of impact. Indicate travel before the accident with a solid line, and post-accident movement with a broken line.

SYMBOLS:

Your Vehicle ①

Other Vehicle(s) ②③

Pedestrian

Stop Sign

Yield

Railroad

ADDITIONAL INFORMATION:

_____

_____

_____

_____

EMPLOYEE _____ (Print) _____ (Signature) _____ (Date)

SUPERVISOR _____ (Print) _____ (Signature) _____ (Date)

HEALTH & SAFETY REP. _____ (Print) _____ (Signature) _____ (Date)

ATTACH POLICE REPORT TO VEHICLE ACCIDENT REPORT

REPORT MUST BE FAXED TO:
CORPORATE CLAIMS DEPARTMENT (FAX: 225-932-2636)
WITHIN 24 HOURS, OR NOT LATER THAN NEXT BUSINESS DAY.

REPORT ALL CHARGEABLE VEHICLE ACCIDENTS TO SHAW NOTIFICATION HOTLINE/HELPDESK
(PHONE: 1-866-299-3445)

ATTACHMENT 4

EQUIPMENT, PROPERTY DAMAGE AND GENERAL LIABILITY LOSS REPORT

This report is to be completed for all losses or damage to company property in excess of $2,500.00 and all third party damage, regardless of value, resulting from company activities.

PROJECT/LOCATION _____ PROJECT NO. _____ DATE _____

ADDRESS _____

HOW DID DAMAGE OR LOSS OCCUR: _____

_____

_____

DESCRIPTION AND VALUE ($) OF DAMAGED/LOST/STOLEN PROPERTY: _____

_____

LOCATION OF DAMAGED/LOST/STOLEN PROPERTY (Before Loss): _____

_____

DATE AND TIME OF DAMAGE, LOSS, OR THEFT: Date: _____ Time: _____ a.m./p.m.

OWNER OF DAMAGED/LOST/STOLEN PROPERTY:

Name _____ Phone No. (____) _____

Address _____ City _____

Employer and Address _____

INJURED PARTIES (Also complete a Supervisor's Employee Injury Report if a Company Employee):

Name _____ Phone No. (____) _____

Address _____ City _____

Employer and Address _____

Description of Injury _____

WITNESSES:

1. Name _____ Home Phone (____) _____

   Home Address _____ City _____

   Employer and Address _____

2. Name _____ Home Phone (____) _____

   Home Address _____ City _____

   Employer and Address _____

WERE PICTURES TAKEN? ☐ YES ☐ NO

WERE POLICE NOTIFIED? ☐ YES ☐ NO DEPT. _____ REPORT NO. _____

COMPLETED BY: _____ _____ _____

(Print) (Signature) (Date)

PROJECT/LOCATION MANAGER: : _____ _____ _____

(Print) (Signature) (Date)

REPORT MUST BE FAXED TO:
CORPORATE CLAIMS DEPARTMENT (FAX: 225-932-2636)
WITHIN 24 HOURS, OR NOT LATER THAN NEXT BUSINESS DAY

ATTACHMENT 5
INCIDENT INVESTIGATION REPORT

*** Must Be Completed Within 72 HOURS & Relevant Support Documentation Must Be Attached / Submitted***

Investigation Date _____ Date of Incident _____

Employee Name _____

Supervisor Name _____

Project Number/Name _____ / _____

Location of Incident _____

- Incident Classification

Injury	☐ First Aid	Vehicle	☐ Chargeable	DOT	☐ DOT Vehicle
	☐ OSHA Recordable		☐ Non-chargeable		☐ DOT Reportable
	☐ Lost Workday				
	☐ Restricted Workday	Near Miss	☐	General Liability	☐

- Description (Provide facts, describe how incident occurred, provide diagram [on back] or photos)

_____

_____

- Analysis (What unsafe acts or conditions contributed to the incident?)

_____

_____

_____

_____

- Corrective Action(s) (List corrective action items, responsible person, scheduled completion date)

_____

_____

_____

- Witness Names (Complete Attachment 6 – Employee Witness Statement)

_____

_____

_____

_____

Investigated By _____ (Print Name) _____ (Signature) _____ (Date)

Project/Location Mgr. _____ (Print Name) _____ (Signature) _____ (Date)

ATTACHMENT 6a
Injured Employee Statement
MUST BE COMPLETED WITHIN 24 HOURS OF THE INCIDENT

This form should be completed by the injured employee involved in the incident. Describe only the facts for which you have personal knowledge. If you have no knowledge of a particular question, write "no knowledge".

Company _____

Exact Location of Incident/Accident _____

Name of Injured Employee _____

Date of Incident/Accident _____ Time _____ am pm

Date of this Statement _____ Time _____ am pm

Time your shift begins? Time _____ am pm Time your shift ends? Time _____ am pm

Name of Known Witnesses:

Name _____

Name _____

Name _____

Name _____

Your Immediate Supervisors Name _____

If not employed by Shaw E&I, enter name of company and phone number _____

Have you had a prior injury similar to this injury? _____

Was it while you were at work? _____

What date did the prior injury occur? _____

Stating Only Factual Information, Describe in Detail What Happened and Include Any Applicable Events Leading to the Incident/Accident.

_____

_____

_____

_____

_____

_____

_____

_____

I certify that, to the best of my knowledge, all of the above information is complete, accurate and factual. I acknowledge that the intentional falsification or altering of facts or making misleading statements may be grounds for disciplinary action.

_____ _____

Signature/Date Print Name

ATTACHMENT 6b
Employee Witness Statement
MUST BE COMPLETED WITHIN 24 HOURS OF THE INCIDENT

This form should be completed by every employee working in the crew of the injured employee and by every other employee with knowledge of events or circumstances involved in the incident. This information is being solicited from you so that the company can accurately assess the reported incident to avoid similar occurrences in the future. Describe only the facts for which you have personal knowledge. If you have no knowledge of the incident, write "no knowledge".

Company _____

Exact Location of Incident/Accident _____

Name of Injured Employee _____

Date of Incident/Accident _____ Time _____ am pm

Date of this Statement _____ Time _____ am pm

Time your shift begins? Time _____ am pm Ends _____ am pm

Witness Information:

Name _____

Home Phone No. _____

Home Address _____

County _____ Zip _____

Witness' Supervisor Name _____

If not employed by Shaw E&I, enter name of company _____

Company Phone Number _____

Did You See the Incident/Accident? _____

How Far From You (approx., in feet) Did the Incident/Accident Occur? _____

Stating Only Factual Information, Describe in Detail What Happened and Include Any Applicable Events Leading to the Incident/Accident.

_____

_____

_____

_____

_____

_____

_____

_____

I certify that, to the best of my knowledge, all of the above information is complete, accurate and factual. I acknowledge that the intentional falsification or altering of facts or making misleading statements may be grounds for disciplinary action.

_____ _____

Witness Signature/Date Print Name

ATTACHMENT 7

ACCIDENT REVIEW BOARD

DATE:	LOCATION:
BOARD MEMBERS:	
ACCIDENT DATE:	EMPLOYEE(S) INVOLVED IN INCIDENT:
INVESTIGATION COMPLETE: YES ☐ NO ☐	ACCIDENT CLASSIFICATION:

THE FOLLOWING INFORMATION MUST BE PROVIDED BY THE REVIEW BOARD FOR THIS INCIDENT (PRINT):

SUPERVISOR: _____ **PROJECT/LOCATION MGR.:** _____

POTENTIAL CAUSE OF ACCIDENT:

ACTION BY BOARD*:

* ALL ACTIONS BY THE ACCIDENT REVIEW BOARD ARE SUBJECT TO FINAL REVIEW BY THE HUMAN RESOURCES AND LEGAL DEPARTMENTS.

ACCEPTED:

_____ (Employee Signature) _____ (Supervisor Signature)

APPROVED: _____ (Project/Location Manager) REJECTED FOR: _____

APPROVED: _____ (Business Line Health and Safety Manager or Designee) REJECTED FOR: _____

APPROVED: _____ (Business Line Vice President) REJECTED FOR: _____

ATTACHMENT 9B
MEDICAL FORMS

AUTHORIZATION FOR TREATMENT OF OCCUPATIONAL INJURY/ILLNESS

Employee Name: _____
Social Security #: _____ Injury: ☐ Illness: ☐
Job Title: _____ Incident Date: _____
Project/Location _____ Location of Accident/Exposure:
Telephone #: _____ _____
H&S Representative: _____
Body Part(s) Injured: _____
Describe in detail how incident occurred: _____
_____

TO TREATING PHYSICIAN:

In the case of occupational injury/illness, please examine the employee and render necessary conservative treatment directly related to the occupational injury/illness.

Light Duty Work:
It is the policy of our company to provide work assignments, whenever possible, for employees with physical activity restrictions resulting from an occupational injury/illness. If the employee will be subject to a restriction, please contact **Health Resources** before releasing the employee, so that a light duty assignment may be arranged.

Medically Unfit to Return to Work:
It is the policy of our company to assist employees unable to return to work, due to an injury/illness, in obtaining needed medical care and other available benefits. Medical findings are also used to help evaluate unsafe conditions that may have led to the incident. Please help us assist our employees by contacting **Health Resources** with your findings as soon as possible, preferably before the employee leaves your office, but not later than the close of business on the day of initial treatment.

Health Resources: Telephone: 1-800-350-4511 Fax: (800) 853-2641

Please Send Reports To Both of the Following: **Health Resources** 600 West Cummings Park, Suite 3400 Woburn, Massachusetts 01801 ***AND*** **The Shaw Group, Inc. Corporate Claims Department** 4171 Essen Lane Baton Rouge, LA 70809

Please Send Bills To: **The Shaw Group, Inc. Corporate Claims Department**
4171 Essen Lane
Baton Rouge, LA 70809

DOCTOR, Please provide:
Medical Diagnosis: _____
Treatment Provided: _____
_____
Recommended Work Limitation/Restriction: _____
Return Visit Needed: No ☐ Yes ☐ Date if Yes _____ First Aid Only ☐
Physician Name: _____ Physician Telephone: _____
Physician Signature: _____ Date: _____

YOU MUST CALL HEALTH RESOURCES FOR ALL OCCUPATIONAL INJURIES/ILLNESSES REQUIRING OUTSIDE MEDICAL TREATMENT: 1-800-350-4511.

FAX COMPLETED FORM TO HEALTH RESOURCES (800) 853-2641.

Send Bills to Shaw Corporate Claims Department

ATTACHMENT 8

INJURY/ILLNESS CLASSIFICATION GUIDELINES

First Aid Treatment – If the incident requires only the following types of treatment, consider it first aid. **Do Not** record the case if it involves only:

- Using non-prescription medications at non-prescription strength
- Administering tetanus immunizations
- Cleaning, flushing, or soaking wounds on the skin surface
- Using wound coverings such as bandages, Band-Aids™, gauze pads, etc., or using SteriStrips™ or butterfly bandages
- Using hot or cold therapy
- Using any totally non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc.
- Using temporary immobilization devices while transporting an accident victim (slings, neck collars, or back boards)
- Drilling a fingernail or toenail to relieve pressure, or draining fluids from blisters
- Using eye patches
- Using simple irrigation or a cotton swab to remove foreign bodies not embedded in or adhered to the eye
- Using irrigation, tweezers, cotton swab or other simple means to remove splinters or foreign material from areas other than the eye
- Using finger guards
- Using massages
- Drinking fluids to relieve heat stress

Medical Treatment – Includes managing and caring for a patient for the purpose of combating disease or disorder. The following are **not** considered medical treatments and are not recordable:

- Visits to a doctor or Licensed Health Care Professional (LHCP) solely for the purpose of observation or counseling
- Diagnostic procedures, including administering prescription medications that are used solely for diagnostic purposes
- Any procedure that can be labeled first aid (see above descriptions)

OSHA Recordable Injuries and Illnesses

Work related injuries and illnesses that result in the following should be recorded on the OSHA 300 Log:

- Death
- Loss of consciousness
- Days away from work
- Restricted work activity or job transfer
- Medical treatment beyond first aid.

You must also record any **work related** injury or illness that involves cancer, chronic irreversible disease, a fractured or cracked bone, or a punctured eardrum.

Additional Recordable Criteria

You must also record the following conditions when they are work related:

- Any needle stick injury or cut from a sharp object that is contaminated with another person's blood or other potentially infectious material
- Any case requiring an employee to be medically removed from a site under the requirements of an OSHA health standard
- Any Standard Threshold Shift (STS) in hearing (i.e., cases involving an average hearing loss of 10dB or more in either ear)
- Tuberculosis infection as evidenced by a positive skin test or diagnosis by a physician or other licensed health care professional after exposure to a known case of active tuberculosis.

ATTACHMENT 9B
MEDICAL FORMS
AUTHORIZATION FOR RELEASE OF PROTECTED MEDICAL INFORMATION

Printed Name: _____ Date of Birth: _____

Address: _____

Social Security #: _____ Home Telephone: _____

Authority to Release Protected Health Information

I hereby authorize the release of medical information, identified in this authorization form, and provide such information to:

HEALTH RESOURCES
600 West Cummings Park, Suite 3400
Woburn, Massachusetts 01801
Phone: (800) 350-4511
Fax: (800) 853-2641

AND

The Shaw Group Inc.
4171 Essen Lane
Baton Rouge, Louisiana 70809
Phone: 225-932-2500
Fax: 225-932-2636

The Information To Be Released includes the following:

Complete health record	Discharge summary	Progress notes
History and physical exam	Consultation reports	X-ray films / images
Laboratory test results	X-ray & Image reports	Itemized bill
Diagnosis & treatment codes	Complete billing record	

Other, (specify) _____

Purpose of the Requested Disclosure of Protected Health Information

I am authorizing the release of my Protected Health Information.

Drug and/or Alcohol Abuse, and/or Psychiatric, and/or HIV/AIDS Records Release

I understand if my medical or billing record contains information in reference to, psychiatric care, sexually transmitted disease, hepatitis B or C testing, previous drug and/or alcohol abuse and/or other sensitive information, I agree to its release. ***Check One:*** ☐ **Yes** ☐ **No**

I understand if my medical or billing record contains information in reference to HIV/AIDS (Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome) testing and/or treatment I agree to its release. ***Check One:*** ☐ **Yes** ☐ **No**

Right to Revoke Authorization

Except to the extent that action has already been taken in reliance on this authorization, the authorization may be revoked at any time by submitting a written notice to ***The Corporate Claims Dept.*** **at** ***The Shaw Group Inc., 4171 Essen Lane, Baton Rouge, Louisiana 70809***. Unless revoked, this authorization will expire at which time completion of treatment for the injury or illness has been accomplished.

Re-disclosure

I understand the information disclosed by this authorization may be subject to re-disclosure by the recipient and no longer be protected by the Health Insurance Portability and Accountability Act of 1996.

Signature of Patient or Personal Representative Who May Request Disclosure

I understand that I do not have to sign this authorization. However, if health care services are being provided to me for the purpose of providing information to a third-party (e.g. fitness-for-work test), I understand that services may be denied if I do not authorize the release of information related to such health care services to the third-party. I can inspect or copy the protected health information to be used or disclosed. **I hereby release and discharge** ***The Shaw Group Inc*** **of any liability and the undersigned will hold** ***The Shaw Group Inc*** **harmless for complying with this Authorization.**

Signature: _____ **Date:** _____

Description of relationship if not patient: _____

ATTACHMENT 9C
MEDICAL FORMS

RETURN-TO-WORK EXAMINATION FORM

Exam Date: _____ / _____ / _____ **Employee Name:** _____

Birth Date: _____ / _____ / _____ **Social Security #:** _____ - _____ - _____

Job Title: _____ **Sex:** ❑ Male ❑ Female

Examining Provider: **Please complete this form and fax to Health Resources at (800) 853-2641. Please contact Health Resources at (800) 350-4511 to report status of employee post-treatment.**

DIAGNOSIS: _____

TREATMENT PLAN: _____

MEDICATIONS: _____

PHYSICAL THERAPY: _____

OTHER: _____

❑ May return to full duty work effective ___/___/

❑ May return to limited duty from ___/___/___ to ___/___/

❑ Unable to return to work from ___/___/___ to ___/___/

WORK LIMITATIONS:

❑ Restricted lifting/pushing/pulling: maximum weight in lbs: _____ (company limits all lifting to ≤ 60 lbs).

❑ Work only with right/left hand. ❑ Restricted repetitive motion right/left hand.

❑ Sitting job only. ❑ Restricted operation of moving equipment.

❑ Other: _____

FOLLOW-UP PLAN:

❑ Release from care.

❑ Schedule for follow-up appointment on ___/___/___.
Time _____ AM/PM

❑ Referral to _____
Appointment date ___/___/___ Time _____ AM/PM

Comments: _____

Examiner's Name (*print*)	Examiner's Signature	Date

ATTACHMENT 10

HELP DESK / HOTLINE NOTIFICATION GUIDELINES

Any incident, as defined in the bulleted items below, requires corporate notification **as soon as practical but not longer than one hour after occurrence**, via the Health and Safety Help Desk / Hotline. This requirement is a corporate wide directive and applies to all Shaw Group companies, not just Shaw E&I. As such, the responsibility for whom makes this notification has purposefully not been defined. This is due to the various types of projects in which The Shaw Group performs activities. Some projects may only consist of three technicians at a site; others may involve multiple levels of site management and consist of 200+ employees. Therefore, the intent is for the supervisory/management person to communicate the notification requirements to his/her employees and make the appropriate determination as to how the notification takes place.

Immediate Corporate Notification via Help Desk: 1-866-299-3445

- Illness and/or injury (doctors cases and above);
- Property damage (dollar amount greater than $2,500);
- Automobile accidents (All);
- Criminal activity (i.e. bomb threat, theft);
- Natural disaster (i.e. earthquakes, flood, storm damage, hurricanes);
- Explosion and/or fires (that results in property damage greater then $2,500 or result in injury);
- Environmental spills/releases (incidents that requires regulatory notification or have an offsite impact);
- Regulatory visit (i.e. OSHA, EPA, DEQ, MSHA, etc.);
- Fatalities

Note:

- Help Desk / Hotline notification is in addition to the requirement to inform Health Resources of all incidents requiring off-site medical attention by calling 1-800-350-4511. This call should be made **prior** to transporting the employee such that they can coordinate physicians' services prior to arrival of the employee to the medical facility.

- As stated above, the notification requirements are a corporate directive and apply to the entire Shaw Group. . Accordingly, Shaw E&I managers/supervisors should use sound judgment as it pertains to the two bulleted items that have been highlighted above. Although they may not be desired events, some Environmental spills/releases that occur may not be an uncommon situation at a particular site. In addition, there may be projects in which the EPA or some other regulatory agency visits on some normal frequency. Events such as these, which would typically be unusual at a construction or fabrication site, are not so unusual to some of our environmental projects. As such, a notification to the helpdesk would not be required.