

Phase II Addendum to Work Plan for Additional Groundwater Delineation Activities at Site 21, St. Juliens Creek Annex, Chesapeake, Virginia

PREPARED FOR: SJCA Tier I Partnering Team
PREPARED BY: CH2M HILL
DATE: January 12, 2007

Introduction

This technical memorandum work plan provides the approach for further chlorinated volatile organic compound (CVOC) groundwater plume delineation activities at Site 21 at St. Juliens Creek Annex (SJCA), Chesapeake, Virginia, to address existing data gaps. Data gaps comprise four areas in the northern portion of the plume where CVOCs were detected during the most recent sampling event (October 2006) at locations that are not bounded by upgradient sample locations. This memorandum is an addendum to the *Final Work Plan for Additional Groundwater Delineation Activities at Site 21* (CH2M HILL, August 2005). The specific objectives of the additional investigation activities are to:

- Refine the northern and eastern boundaries of the known groundwater CVOC plume
- Characterize the nature of the CVOC contamination in the northwestern, northern, and eastern areas of the CVOC plume
- Establish permanent monitoring wells in the northwestern, northern, and eastern portions of the site to support monitoring in association with the proposed treatability study

These objectives will be achieved by:

- Installing temporary wells in the northern and eastern areas of the site and analyzing samples collected from these wells for CVOCs
- Comparing analytical data to the maximum contaminant levels (MCLs) for trichloroethene (TCE) and TCE daughter products [cis-1,2-dichloroethene (DCE), trans-1,2-DCE, 1,1-DCE, and vinyl chloride]
- Installing permanent monitoring wells in the areas identified based on the temporary well analytical data
- Collecting samples for CVOC analysis from the newly installed permanent monitoring wells

Summary of Comments on TECHNICAL MEMORANDUM

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Site Description

Site 21 is located in a former industrial area in the central portion of SJCA (Figure 1). Although the site was initially identified as Building 187, the Site 21 boundary has been expanded based on investigation data, to encompass the CVOC groundwater plume that underlies a number of nearby industrial buildings (Figure 2). Buildings at Site 21 were historically used for machine, vehicle, and locomotive maintenance; electrical shops; and munitions loading facilities. Railroad tracks were present throughout the industrial area and a fuel service station was located in the vicinity. Several of the buildings and/or surrounding areas were former Installation Restoration (IR) sites (Sites 9, 10, 11, 12, 13, 14, 17, 18, and Area of Concern [AOC] E). Waste oils and degreasers (including TCE) were reportedly disposed of on the ground surface and railroad tracks in the industrial area. Many of the older buildings at the site have been demolished. The existing buildings and the Site 21 area are currently used for storage and maintenance activities. An active warehouse, Building 1556, used by Mid-Atlantic Regional Maintenance Center (MARMC) was constructed in 1992. A storm sewer system runs through the site and drains to a downstream inlet (IR Site 2) to St. Juliens Creek (Figure 1).

Field Investigation Activities

The technical approach for the proposed field activities at Site 21 is detailed in the following subsections. The *Final Master Project Plan (MPP), St. Juliens Creek Annex, Chesapeake, Virginia* (CH2M HILL, July 2003) addresses the protocols and standard operating procedures (SOPs) to be used for all investigations at SJCA. An updated health and safety plan (HASP) is provided in Attachment A.

Mobilization Activities

As part of the field mobilization, CH2M HILL will procure the following types of subcontractors to support investigation activities:

- Utility clearance
- Direct-push technology (DPT) with temporary well installation
- Drillers with hollow stem auger and well construction capabilities
- Onsite mobile analytical laboratory
- Offsite analytical laboratory
- Data validation
- Investigation-derived waste (IDW) handler with hazardous waste disposal capabilities
- Licensed surveyor

Upon procurement and prior to mobilization, subcontractor-specific training and health and safety policies will be reviewed and approved of by the CH2M HILL Health & Safety Manager.

Mobilization for the field effort includes procurement of necessary field equipment and initial transport to the site. Equipment and supplies will be brought to the site when the CH2M HILL field team mobilizes for field activities.

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Prior to beginning any phase of work, CH2M HILL and its subcontractors will have field meetings to discuss the work items, worker responsibilities, and familiarize workers with the HASP. Prior to any intrusive activities, all appropriate approvals (i.e. site approval) will be obtained and the site will be marked for utilities. CH2M HILL will coordinate subsurface utility clearances with Miss Utility. A separate utilities subcontractor will be procured to ensure the accuracy of the utility markings. No intrusive activities will be initiated until the utility clearance has been completed. A photo-ionization detector (PID) will be used for monitoring sample locations for volatile organic compounds (VOCs) as a health and safety precaution (refer to Attachment A).

Based on the site history and findings during investigations conducted to-date, there is a low probability of encountering munitions and explosives of concern (MEC). Therefore, a modification to the initial explosive safety submission (ESS) waiver was submitted to Naval Ordnance Safety and Security Activity (NOSSA) for implementation of ordnance/explosives (O/E) awareness training prior to the field activities and maintenance of a qualified MEC technician on-call for the duration of the project. The waiver was approved (Attachment B) and will be implemented. The O/E awareness training will be incorporated into the initial meetings and will involve participation by all field staff and subcontractors performing intrusive activities. The Procedures for Communicating Potential Live MEC to Navy if any suspected live MEC is encountered at SJCA is provided in Attachment B.

Field Investigation and Sampling Activities

Field activities will consist of temporary and permanent monitoring well installation and sampling. Samples collected from temporary wells will be analyzed at an on-site laboratory to provide rapid turnaround of data and guide selection of sample locations to ensure adequate delineation of the plume while the investigation crew is still on site.

Temporary Well Installation



Temporary wells will be installed in five areas in which existing data are insufficient to adequately determine the extent of CVOCs in groundwater. These areas are shown on Figure 2 and are referred to in the remainder of this section as:

- Building 63 Area
- Building 187 Area
- Building 47/81 Area
- Building 193 Area

The temporary wells will be installed using DPT, extending from the ground surface to the Yorktown Confining Unit, approximately 20 feet (ft) below ground surface (bgs). Two-inch (in.) casings with disposable end points will be driven to the total well depth. A 1-in. polyvinyl chloride (PVC) well with a 10-ft screen will be installed in the casing and subsequently the casing will be removed, leaving only the well and disposable endpoint in the ground. Any remaining annular space will be filled with #1 silica pack sand.

Temporary wells will be installed in each area as described in the paragraphs that follow. Samples collected from each of the temporary wells will be analyzed by the on-site

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laboratory for VOCs by SW-846 8260. Analytical results for each temporary well will be utilized to determine the locations of the other temporary wells and permanent monitoring wells.

Building 63 Area

During the previous field investigation, TCE was detected at a concentration of 100 micrograms per liter ($\mu\text{g/L}$) in groundwater just south of Building 63 (GW102). Based on the existing groundwater flow model, groundwater is flowing to the southeast in this area. However, due to the limited number of permanent monitoring wells in the vicinity, there is a significant level of uncertainty in the groundwater flow model and the actual flow direction may be to the south or east. Therefore, in order to evaluate the possibility of an upgradient source of contamination in this area from all potential directions, three initial temporary wells (TW205 through TW207) will be installed northwest, north, and west of GW102 as shown on Figure 2. If CVOCs are not detected or are detected at concentrations below the MCLs in samples from these locations, no additional temporary wells will be installed and a permanent monitoring well (MW17S) will be installed close to the location of GW102. If CVOCs are detected at concentrations greater than MCLs in one or more of the three initial samples, one or more additional temporary wells ("contingency wells") will be installed in the assumed upgradient direction of the initial location(s) in which the MCL exceedance was identified as shown on Figure 2. Spacing of the "contingency wells" will be determined by the field team based on the concentrations detected. This process will be repeated until CVOCs are not detected at concentrations greater than the MCLs in the assumed upgradient direction(s). Upon completion of the temporary well sampling, a minimum of one permanent monitoring well (MW17S) will be installed near the location of the highest detected concentration of TCE in the Building 63 Area.

Building 187 Area

During the previous field investigation, TCE was detected in groundwater just north of demolished Building 187 at a concentration of 420 $\mu\text{g/L}$ (GW101). In order to evaluate a possible upgradient source of CVOCs, one temporary well (TW208) will be installed approximately 100 ft north of this location (Figure 2). The consideration of "contingency" temporary wells is not necessary in this area because the existing upgradient samples (TW202 and TW204) exhibit TCE concentrations below the MCL. Following installation of the temporary well, one additional permanent monitoring well (MW18S) will be installed in the former Building 187 Area near the location of the highest concentration of TCE in this area.

Building 47/81 Area

During the previous field investigation, TCE was detected at a concentration of 83 $\mu\text{g/L}$ in groundwater southwest of Building 81 (GW104). Based on the existing groundwater flow model, groundwater is flowing to the southwest in this area. In order to evaluate the possibility of an upgradient source of CVOCs and further define the impacted area, three initial temporary wells (TW209 through TW211) will be installed northeast, east, and southeast of GW104 as shown on Figure 2. If CVOCs are not detected at concentrations greater than the MCLs in samples from these locations, no additional temporary wells will be installed. If CVOCs are detected at concentrations greater than the MCLs in one or both of the initial temporary wells installed north and northeast of GW104, two additional

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temporary well(s) (“contingency wells”) will be installed on the northeast side of Building 81 in the assumed upgradient direction (Figure 2). If CVOCs are detected at concentrations greater than the MCLs in the temporary well southeast of GW104, one additional temporary well (“contingency well”) will be installed southeast of the initial location. Spacing of the “contingency well” will be determined by the field team based on the concentration detected. If CVOCs are detected in any of these “contingency” temporary wells at concentrations greater than the MCLs, additional temporary wells may be installed in the assumed upgradient direction to delineate the plume. This process will be repeated until CVOCs are not detected at concentrations greater than the MCLs in the assumed upgradient direction(s). Following well installation, sampling, and on-site laboratory analysis of the temporary well samples, a minimum of one permanent monitoring well (MW19S) will be installed near the location of the highest concentration(s) of TCE in the Building 47/81 Area (Figure 2).

Building 193 Area

Three temporary wells (TW212 and TW213) will be installed northeast and east of existing permanent monitoring well MW07S, southeast of the former location of Building 193, to refine the eastern plume boundary in this area and better determine the magnitude of CVOC concentrations in the vicinity (Figure 2). If CVOCs are detected at concentrations greater than the MCLs in one or both of the initial temporary wells, an additional temporary well (“contingency well”) will be installed near the northern corner of Building 46 (Figure 2). If CVOCs are detected in any of the temporary wells at a concentration greater than the previous concentration (3,600 µg/L) detected in the sample from MW07S, a “contingency” permanent monitoring well (shown on Figure 2) will be installed to support monitoring in association with the planned treatability study.

Temporary Well Sampling

All groundwater samples will be collected using a peristaltic pump and low-flow purging and sampling techniques (EPA, April 1996). The groundwater samples will be collected by placing the sample tubing intake approximately 2-ft above the bottom of the well. Water quality parameters (specific conductance, pH, turbidity, temperature, salinity, dissolved oxygen [DO], and oxidation reduction potential [ORP]) will be measured and recorded (approximately every 5 minutes) prior to sampling using a Horiba U-22® water quality meter, calibrated daily and as-needed. DO measurements will be confirmed using Chemets® field test kits. At least one well volume will be purged from each well, and sampling will commence when water quality parameters have stabilized to within 10 percent for three consecutive readings. The water quality parameters, depth to water, approximate sampling depth, and total well depth measurements will be recorded in the log book.

Samples will be contained in laboratory-prepared, pre-preserved sample bottles (Table 1). For the collection of water samples for VOC analysis, the pre-preserved bottles will be filled completely so as to minimize aeration, and capped to prevent the entrapment of any air bubbles in the vial. The samples will be analyzed by the on-site laboratory for VOCs by SW-846 8260. The appropriate sample nomenclature and Quality Assurance/Quality Control (QA/QC) sample collection frequency are indicated on Table 2.

Permanent Monitoring Well Installation and Development

Approximately three to five permanent monitoring wells will be installed following the temporary well installation and evaluation of analytical results (Figure 2). Permanent monitoring well locations will be determined as described above.

Permanent monitoring well installation will be completed using 4 ¼-in. hollow stem augers. During the installation of the wells, a CH2M HILL geologist will observe and record soil descriptions that include grain size, color, moisture content, consistency, soil structure, mineralogy, and other relevant information concerning contamination. Soils will also be field screened for VOCs using a PID and the results will be logged in the logbook.

The well screens will be placed at a depth just above the Yorktown confining unit, estimated at 20 ft bgs. Each permanent monitoring well will be constructed with 2-in. nominal-diameter Schedule 40 PVC screen and riser. Permanent monitoring well screens will be machine-slotted 0.010-in. and 10-ft in length. A silica filter pack will be placed around the annular space of the well screen from the bottom of the boring extending to a depth of 2 ft above the top of the screen. A 2-ft bentonite layer will be placed above the top of the sand pack. After the bentonite has been hydrated, a cement-bentonite grout will be placed in the remaining annular space. The permanent monitoring wells will be completed flush to ground surface with a watertight steel cover. A locking watertight cap will be placed on the PVC pipe and the wells clearly marked.

Permanent monitoring wells will be developed using a submersible pump. At least three well volumes of water will be removed, in addition to the amount of water added during the installation process. Development will resume until the water clears or until six hours of development has passed, whichever comes first. Development information, including, specific conductance, pH, turbidity, temperature, salinity, DO, and ORP, will be recorded in the field logbook.

Permanent Monitoring Well Sampling

Groundwater samples will be collected from the newly installed monitoring wells for TCL VOCs analysis. The samples will be screened by the laboratory prior to analysis to determine the appropriate method, CLP OLM04. The groundwater samples will be collected using a peristaltic pump and low-flow purging in accordance with the same procedures outlined above for the temporary well samples. The appropriate sample nomenclature is indicated on Table 2.

Sampling Equipment Decontamination

All non-disposable sampling equipment will be decontaminated immediately after each use in accordance with the applicable SOPs. Heavy equipment such as drill rig and DPT equipment (augers, rods, or split spoons) will be steamed clean prior to each new DPT or monitoring well location. A decontamination pad will be set up to prevent the run-off of decontamination water and to allow for easy collection of decontamination fluids.

Demobilization Activities

Demobilization activities include general site restoration prior to the return transport of field equipment and crew, IDW disposal, and surveying of sample locations.

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Temporary Well Abandonment

The temporary wells will be abandoned immediately following sampling. The PVC portion of the well will be removed using a winch attached to the DPT rig. Once the PVC is removed from the subsurface, the remaining void will be filled with bentonite chips or pellets. At locations paved with concrete or asphalt, the top 6 in. will be patched to match the existing ground surface.

Investigation-Derived Waste Handling and Disposal

IDW generated during the field activities is expected to consist of drill cuttings from the soil borings completed for monitoring well installations, purge water (from well development and groundwater sampling) and decontamination fluids. Aqueous and soil IDW will be containerized in 55-gallon drums, which will temporarily be stored adjacent to Site 2. Secondary containment will be provided by the drilling subcontractor. IDW drums will be labeled in accordance with the procedures outlined in the MPPs.

The IDW will be properly disposed of by subcontractors within 90-days of generation, based on the results of the waste characterization. Disposable equipment, including personal protective equipment (PPE), poly sheeting, and paper towels, will be disposed of as solid waste. Test kit equipment will be disposed of properly.

Surveying

Each monitoring well will be surveyed both vertically and horizontally using the Virginia State Plane Coordinate System. The vertical elevation accuracy will be ± 0.01 ft, while the horizontal location will have an accuracy of ± 0.1 ft. Specifically, the elevation for each monitoring well shall be established at the top of the monitoring well's inner PVC casing (this elevation point shall be designated by a permanent notch placed on top of each well's inner casing) and at ground surface. Additionally, the surveying subcontractor will provide locations (horizontal control) of temporary wells.

Sample Analysis and Data Validation

CH2M HILL will track the samples from collection through analysis and obtain results from the subcontracted laboratories. The on-site laboratory for groundwater VOC analysis will have National Environmental Laboratory Accreditation program (NELAP) certification. The off-site analyses will be conducted at a laboratory that fulfills all requirements of the Navy's QA/QC Program Manual and U.S. Environmental Protection Agency's (EPA's) Contract Laboratory Program (CLP). A signed certificate of analysis will be provided with each laboratory data package, along with the applicable federal, state, and local regulations.

On-site analysis QC will include duplicate sample analysis. The on-site laboratory will submit the data in hard copy and an electronic format that can be amended and readily incorporated into the geographic information system (GIS) management system for SJCA.

Off-site analyses will include the proper ratio of field QC samples recommended by Navy Facilities Engineering Service Center (NFESC) guidance for the data quality objectives (DQOs). The off-site laboratory will submit the data in hard copy and an electronic format that can be amended and readily incorporated into the geographic information system (GIS)

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management system for SJCA. The off-site laboratory has not been determined for this sampling event, however once the laboratory is identified, EPA will be notified.

On-site and off-site analytical results for VOCs will be validated by a CH2M HILL subcontractor. Procedures used for the validation process will be in accordance with *Region III Modifications to National Functional Guidelines for Organic Data Review Mutli-media, Multi-concentration* (EPA, September 1994) and the *Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review* (EPA, 2001). Data that should be qualified will be flagged appropriately. Results for QA/QC samples will be reviewed and the data will be qualified further, if necessary. Finally, the data set as a whole will be examined for consistency, anomalous results, reasonableness, and utility.

The data validator will be provided with the hard copy and electronic version of the laboratory results and will add data validation qualifiers to both versions. The electronic version will be examined for completeness and accuracy and downloaded into the CH2M HILL master database.

Project Staff and Schedule

The CH2M HILL Activity Manager for SJCA is Ms. Kimberly Henderson and the Project Manager is Ms. Janna Staszak. Activity and project management responsibilities include daily technical support and guidance, budget and schedule review and tracking, preparation and review of invoices, personnel resources, planning and allocation of resources, subcontractor coordination, preparation of monthly progress reports, and communication and coordination of events with the Navy and the project team.

Prior to initiating field activities, CH2M HILL will notify the Navy of the CH2M HILL staff and subcontracted personnel that will conduct the field investigations. The field activities are scheduled to be conducted mid February 2007 (tentatively scheduled to begin February 19, 2007). It is estimated that it will require a maximum of six days to complete the field activities.

Data Evaluation and Reporting

Following receipt of the validated data from the analytical laboratory, the results of the Site 21 groundwater investigation will be used to determine an appropriate course of action for addressing site groundwater contamination. All groundwater investigation results will be summarized in a Supplemental Site Investigation Report. The report will include a narrative explanation of the activities conducted, data evaluation, a revised CVOC groundwater plume map, revised groundwater direction/gradient, revised conceptual site model, and considerations for a treatability study at Site 21.

References

CH2M HILL, July 2003. *Final Master Project Plan, St. Juliens Creek Annex, Chesapeake, Virginia.*

CH2M HILL, August 2005. *Final Work Plan for Additional Groundwater Delineation Activities at Site 21, St. Juliens Creek Annex, Chesapeake, Virginia.*

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CH2M HILL, April 2006. *Draft Supplemental Site Investigation for Site 21, St. Juliens Creek Annex, Chesapeake, Virginia.* EPA, September 1994. *Region III Modifications to National Functional Guidelines for Organic Data Review Multi-media, Multi-concentration.*

EPA, September 1994. *Region III Modifications to National Functional Guidelines for Organic Data Review Mutli-media, Multi-concentration.*

EPA, April 1996. *Groundwater Issue: Low-Flow (Minimal Drawdown) Ground-water Sampling Procedures.* EPA/540/S-95/504.

EPA, 2001. *Contract Laboratory Program National Guidelines for Low Concentration Organic Data Review.*

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Table 1
Analytical Methods and Required Containers, Preservatives, and Holding Times for Samples
Site 21 Supplemental Site Investigation Addendum Phase II
St. Juliens Creek Annex, Chesapeake, Virginia

Analysis	Method	Sample Container	Holding Time	Volume of Sample
Groundwater Samples and Aqueous QC Samples				
TCL VOCs	CLP OLM04/OLC03	Three 40-mL glass vial with Teflon-lined cap	14 days	Fill completely; no air bubbles
TCL VOCs	SW-846 8260	Two 40-mL glass vial with Teflon-lined cap		Fill completely; no air bubbles

Acronyms:
CLP: Contract Laboratory Program
TCL: Target Compound List
VOCs: volatile organic compounds

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Table 2 Groundwater Sampling Site 21 Supplemental Site Investigation Addendum Phase II St. Juliens Creek Annex, Chesapeake, Virginia			
Station ID	Sample ID	TCL VOCs (SW-846 8260)	TCL VOCs (OLM04/OLC03)
Groundwater Samples			
Temporary Wells¹			
SJS21-TW205	SJS21-TW205-07A	X	
SJS21-TW206	SJS21-TW206-07A	X	
SJS21-TW207	SJS21-TW207-07A	X	
SJS21-TW208	SJS21-TW208-07A	X	
SJS21-TW209	SJS21-TW209-07A	X	
SJS21-TW210	SJS21-TW210-07A	X	
SJS21-TW211	SJS21-TW211-07A	X	
SJS21-TW212	SJS21-TW212-07A	X	
SJS21-TW213	SJS21-TW213-07A	X	
SJS21-TW214	SJS21-TW214-07A	X	
SJS21-TW215	SJS21-TW215-07A	X	
SJS21-TW216	SJS21-TW216-07A	X	
SJS21-TW217	SJS21-TW217-07A	X	
SJS21-TW218	SJS21-TW218-07A	X	
		X	
Permanent Wells			
SJS21-MW17S	SJS21-MW17S-07A		X
SJS21-MW18S	SJS21-MW18S-07A		X
SJS21-MW19S	SJS21-MW19S-07A		X

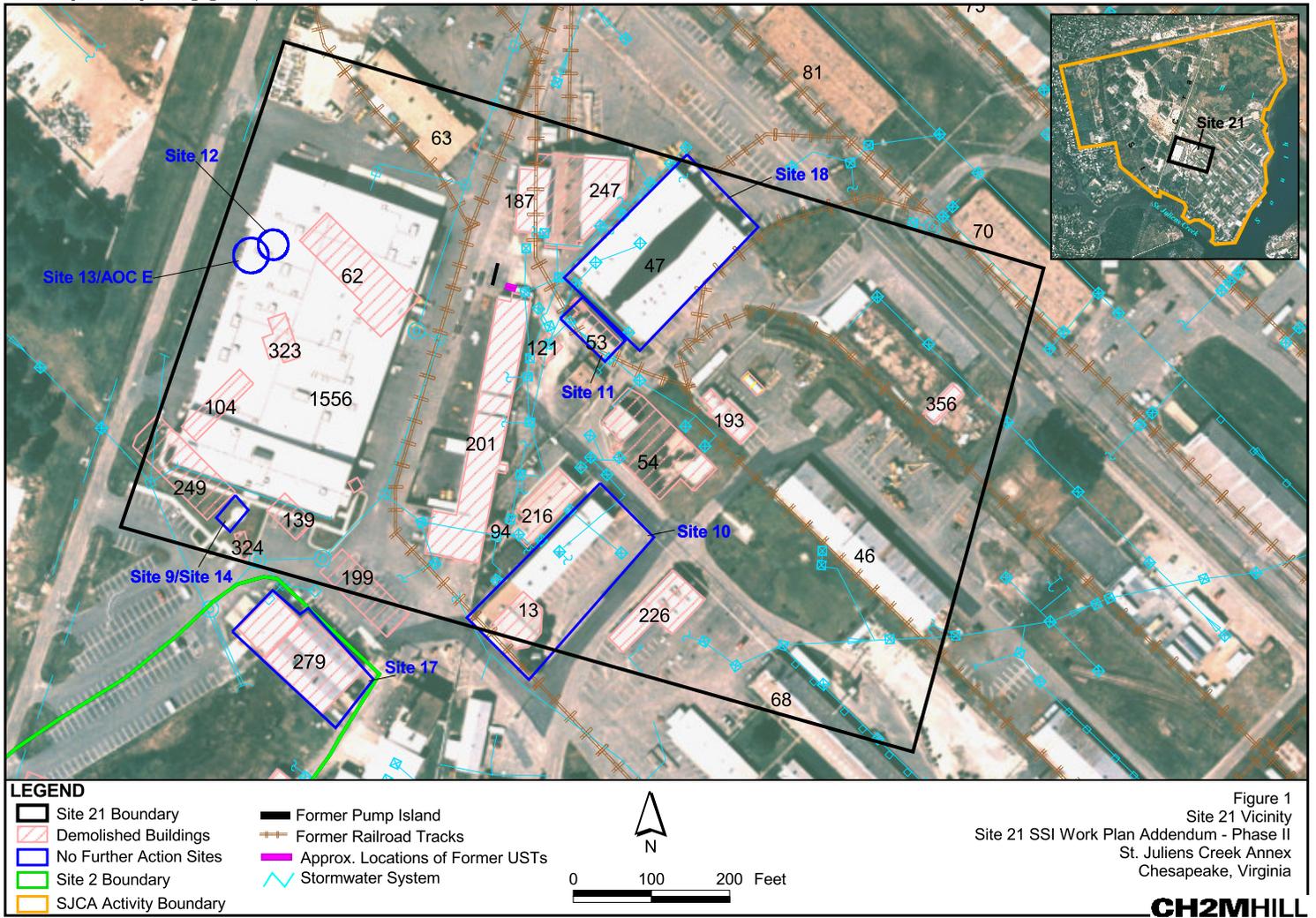
Notes:

¹ The number of temporary wells installed will be based on on-site mobile lab results

QA/QC

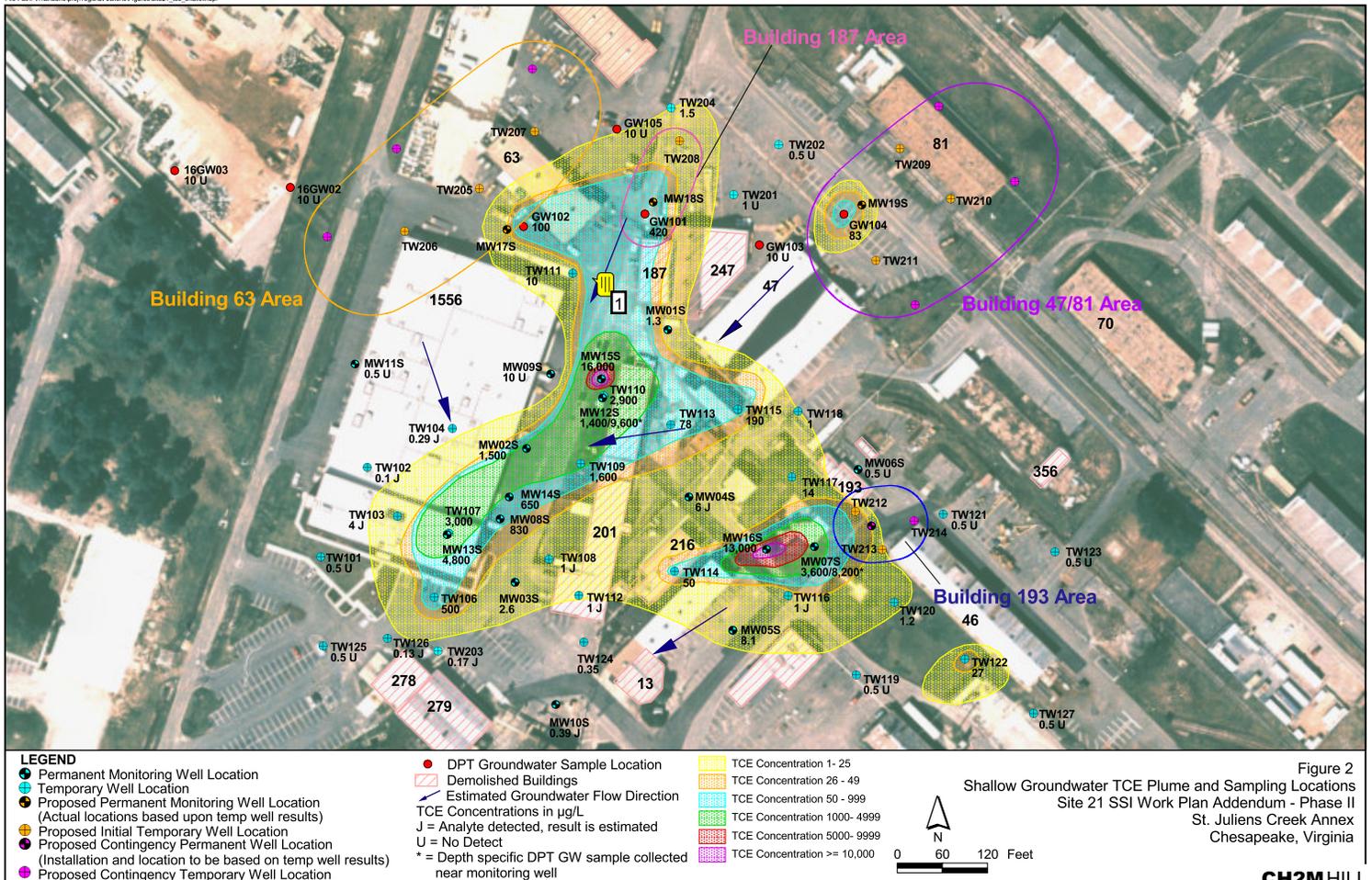
- 1 duplicate (Example: SJS21-TW205-07A-P)
- 1 MS/MSD (Example: SJS21-MW206-07A)
- 1 Field Blank by OLC03 (Example: SJS21-FBmmdyy)
- 1 Equipment Blank (Example: SJS21-EBmmdyy)
- 1 trip blank per cooler (Example: SJS21-TBmmdyy)
- 1 temperature blank per cooler

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Have you all considered installing a temporary well in between MW15S and GW101? It isn't necessary but may help define that hot source area for future remediation efforts.

Attachment A
Project Specific Health and Safety Plan

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Project-Specific Health and Safety Plan

Introduction

This Project-Specific Health and Safety Plan (HASP) presents the hazards known or anticipated to be present at the St. Juliens Creek Annex/Site 21 during the SSI field effort scheduled to take place in the late summer/fall of 2006. This Project-Specific HASP will be used by CH2M HILL and its subcontractors to identify and mitigate task-specific hazards and to select appropriate health and safety protective measures not otherwise covered in the Master HASP.

The St. Juliens Creek Master HASP has been previously developed and must accompany/supplement this Project-Specific HASP. The Master HASP contains information pertinent to the general conditions at St. Juliens Creek, such as general site information, hazard evaluation and control, personnel responsibilities and requirements, a general description of personal protective equipment, customary decontamination procedures, and emergency response procedures. On-site personnel must review both the Master-HASP and the site-specific HASP and sign an agreement to comply with its provisions prior to commencing on-site work. The Master-HASP and site-specific HASP are considered operational documents that are subject to revisions in response to various site-specific conditions that may be encountered. However, these documents may be modified or updated only with the approval of the PHSO and Project Manager.

Policy

CH2M HILL's policy is that on-site hazardous waste management activities be performed in conformance with both the Master HASP and a Project-Specific HASPs. The documents are written based on the anticipated hazards and expected work conditions, and apply to field activities to be performed under the Work Plan. Applicability of this Master-HASP and the Project-Specific HASPs extends to all CH2M HILL employees, CH2M HILL's subcontractors, and visitors entering the site. CH2M HILL subcontractors must follow an established health and safety plan; in most cases, either adopting this master plan with appropriate site-specific HASP (e.g., surveyor), or adopting same and amending both with safety and/or health requirements specific to their work (e.g., driller). HASPs authored by a subcontractor must be reviewed by CH2M HILL's Project Health and Safety Officer (PHSO) before commencing on-site work. After being reviewed, this information will become part of the appropriate site-specific HASP.

This Project-Specific HASP in combination with the Master HASP will, at a minimum, meet the requirements under Occupational Safety and Health Administration (OSHA) Standard *29 Code of Federal Regulations* (CFR) 1910.120 (Hazardous Waste Operations and Emergency Response).

PRE-ENTRY REQUIREMENTS

During site mobilization, the Site Health and Safety Officer (SHSO) will perform a reconnaissance of each site as identified in the site-specific Work Plan (WP) to evaluate and determine the chemical, physical, and environmental hazards; establish or confirm emergency points of contact and procedures; and review any other issues deemed necessary to address site safety and health. The SHSO will then conduct a health and safety briefing with the site personnel to discuss data obtained from the previous site reconnaissance, provisions outlined in this Master HASP and site-specific HASP, and appropriate safety and health procedures and protocols.

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CH2M HILL HEALTH AND SAFETY PLAN

This **Project-Specific Health and Safety Plan (HASP)** will be kept on the site during field activities and will be reviewed as necessary. The plan will be amended or revised as project activities or conditions change or when supplemental information becomes available. The plan adopts, by reference, the Standards of Practice (SOPs) in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual*, as appropriate. In addition, this plan adopts procedures in the project Work Plan. The Site Safety Coordinator (SSC) is to be familiar with these SOPs and the contents of this plan. CH2M HILL's personnel and subcontractors must read **both** the **Master HASP** and this **Project-Specific HASP**, and sign **Attachment 1** of both documents.

Project Information and Description

PROJECT NO:	314808
CLIENT:	Department of the Navy
PROJECT/SITE NAME:	St. Juliens Creek Annex/Site 21
SITE ADDRESS:	Victory Blvd. Chesapeake, VA
CH2M HILL ACTIVITY MANAGER:	Kim Henderson
CH2M HILL OFFICE:	Virginia Beach
DATE HSP PREPARED:	June 15, 2006
DATE(S) OF SITE WORK:	Late Summer/Fall 2006
SITE ACCESS:	Main Gate (military pass required)
DESCRIPTION OF SPECIFIC TASKS TO BE PERFORMED:	Drilling, Temporary and Permanent Monitoring Well Installation, Direct-Push sampling, Soil and Groundwater Sampling, and Storm Sewer Video Survey

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1 Tasks to be Performed Under this Plan

1.1 Description of Tasks

(Reference Field Project Start-up Form)

Refer to project documents (i.e., Work Plan) for detailed task information. A health and safety risk analysis (Section 1.2) has been performed for each task and is incorporated in this plan through task-specific hazard controls and requirements for monitoring and protection. Tasks other than those listed below require an approved amendment or revision to this plan before tasks begin. Refer to Section 8.2 for procedures related to “clean” tasks that do not involve hazardous waste operations and emergency response (Hawwoper).

1.1.1 Hawwoper-Regulated Tasks

- Drilling & Direct Push Technology
- Oversight of well installation
- Soil Sampling
- Groundwater sampling
- Groundwater sampling
- Investigation-derived waste (drum) sampling and disposal
- Observation of material loading for offsite disposal

1.1.2 Non-Hawwoper-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state Hawwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hawwoper-trained personnel. Prior approval from the Health and Safety Manager (HSM) is required before these tasks are conducted on regulated hazardous waste sites.

TASKS

- Surveying
- Storm sewer video survey
- Supervising utility markings

CONTROLS

- Brief on hazards, limits of access, and emergency procedures.
- Post-contaminated areas, as appropriate (refer to Section 8.2 for details).
- Sample and monitor, as appropriate (Refer to Section 5.0)

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2 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the SSC for clarification.

In addition to the controls specified in this section, Project-Activity Self-Assessment Checklists are contained in **Attachment 6**. These checklists are to be used to assess the adequacy of CH2M HILL and subcontractor site-specific safety requirements. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. Self-assessment checklists should be completed early in the project, when tasks or conditions change, or when otherwise specified by the HSM. The self-assessment checklists, including documented corrective actions, should be made part of the permanent project records, and be promptly submitted to the HSM.

Project-specific frequency for completing self-assessments: **Weekly, during drilling.**

2.1 Project-Specific Hazards

2.1.1 Field Vehicle

- Familiarize yourself with rental vehicle features.
 - Mirror adjustments
 - Seat adjustments
 - Cruise control features, if offered.
 - Pre-program radio stations.
- Adjust headrest to proper position.
- Always wear seatbelt while operating vehicle.
- Inquire; and obtain, a vehicle pass from the client if required.
- Observe warning signs, yield to traffic, and observe all posted plant traffic signs.
- Pull off the road, put the car in park and turn on flashers before talking on a mobile phone.
- Maintain both a First Aid kit and Fire Extinguisher in the field vehicle at all times.
- Close car doors slowly and carefully. Fingers can get pinched in doors or the truck.
- The on sight speed limit is 15 MPH.

2.1.2 Drilling/Geoprobe

(Reference CH2M HILL SOP HS-204, *Drilling*)

- Only authorized personnel are permitted to operate drill rigs.
- Stay clear of areas surrounding drill rigs during every startup.
- Stay clear of the rotating augers and other rotating components of drill rigs.
- Stay as clear as possible of all hoisting operations. Loads shall not be hoisted overhead of personnel.
- Do not wear loose-fitting clothing or other items such as rings or watches that could get caught in moving parts. Long hair should have it restrained.
- If equipment becomes electrically energized, personnel shall be instructed not to touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party shall be contacted to have line de-energized prior to approaching the equipment.
- Smoking work area is prohibited.
- The SSC shall complete the H&S Self-Assessment Checklist – Drilling in **Attachment 5** of this plan to at least initially before drilling activities begin, and whenever site conditions change.

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2.1.3 Groundwater/Soil Sampling

- Tie down loose items if utilizing a van.
- Utilize a spotter if backing vehicles or equipment towards monitoring wells or equipment.
- Inspect the area around the well for obstructions and Poison Ivy and Poison Oak.
- If well locations are located in dense tall grassy areas consider utilizing a Bug-Out suit or Tyvek to mitigate the potential for tick bites.
- If lifting heavy equipment from vehicle, move items to the rear and get assistance when lifting.
- Be alert for bees, wasps and other insects when opening well housing.
- Ensure only personnel with current 40-hour HAZWOPER and 8 hour refresher training perform task.
- Log calibration of Direct Reading Instrument in either a field log book or on attached form.
- Notify others in area that task is going to be performed, delineate an exclusion zone as applicable.
- Don personal protective equipment (PPE) as specified in Section 4 of this Site Specific Health and Safety Plan.
- Position yourself upwind prior to sampling, and do not lean directly over the well when sampling.
- Review Material Safety Data Sheets for chemical preservatives, decontamination agents and calibration gas.
- Do not handle sample jars without nitrile gloves.

2.1.4 IDW Drum Sampling

Personnel are permitted to handle and/or sample drums containing investigation-derived waste (IDW) only; handling or sampling other drums requires a plan revision or amendment approved by the CH2M HILL HSM. The following control measures will be taken when sampling drums containing IDW:

- Minimize transportation of drums.
- Sample only labeled drums or drums known to contain IDW.
- Use caution when sampling bulging or swollen drums. Relieve pressure slowly.
- If drums contain, or potentially contain, flammable materials, use non-sparking tools to open.
- Picks, chisels, and firearms may not be used to open drums.
- Reseal bung holes or plugs whenever possible.
- Avoid mixing incompatible drum contents.
- Sample drums without leaning over the drum opening.
- Transfer the content of drums using a method that minimizes contact with material.
- PPE and air monitoring requirements specified in Sections 4 and 5 must address IDW drum sampling.
- Spill-containment procedures specified in Section 7 must be appropriate for the material to be handled.

2.1.5 Storm Sewer Video Taping

- Request from the CH2M HILL- Milwaukee, WI warehouse a "T-Lift" manhole remover.
- **No entry into the sewer is allowed under this HASP.**
 - Additional Levels of Planning are required if either CH2M HILL staff or subcontractor employees must enter the sewer for any reason.
 - Notify the Health and Safety Manager immediately.
- If working in a roadway, all employees shall don ANSI Class III reflective vests.
- If working in a roadway, Traffic Control must be erected in accordance with the U.S. Department of Transportation publication "Manual on Uniform Traffic Control Devices for Streets and Highways."
- Refer to Attachment 8 of this Site Specific HASP.

2.1.6 Inclement Weather

- Work may proceed in light rain- wear rain gear.
- Exposure to slips, trips and falls is increased during rainy and snowing conditions.
- Take cover in field vehicle during adverse weather conditions (High winds, heavy rain).
 - Work shall cease and cover sought in the event of lightning or tornado warnings.
 - Identify "Take Shelter" areas before starting project.
 - Work may proceed in light rain- wear rain gear.
- Notify the Project Manager and Client Representative after shelter has been sought

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2.1.7 Ordnance and Explosives (OE)

(Reference CH2M HILL SOP HSE-610, *Ordnance Explosives* (OE))

Due to the site history, the potential for exposure to Ordnance and Explosives (OE) exist, the chance for encountering ordnance items during sampling activities is very small. However, an MEC Avoidance Plan has been provided as part of this Site Specific HASP. The MEC Avoidance Plan should be read by all team members prior to commencing fieldwork. CH2M HILL SOP for HSE-610 *Ordnance Explosives* (OE) outlines the appropriate procedure for dealing with any OE discovered during the project. An OE hazards awareness safety brief should be included as part of the site-specific briefing and discussed at daily tailgate briefings.

- **Any OE encountered should be immediately reported to OE qualified staff according to the** Procedures for Communicating Potentially Live Munitions and Explosives of Concern (MEC) to Navy (Attachment B to the Work Plan) and the **MEC Avoidance Plan- Attachment 5**
- Prior to any action being performed on an ordnance item, all fuzing shall be positively identified. This identification will consist of fuze type by function, condition (armed or unarmed), and physical state/condition of the fuze (burned, broken, parts exposed or sheared, etc.).
- A projectile containing a base-detonating (BD) fuze is to be considered armed if the round has been fired.
- Arming wires and pop-out pins on unarmed fuzes should be secured prior to any movement.
- Do not depress plungers, turn vanes, rotate spindles, or move levers, setting rings, or other external fittings on OE items. Such actions may arm or activate the OE.
- Do not attempt to remove any fuzes from the OE. Do not dismantle or strip components from any OE item unless the item is included in the SOW.
- UXO personnel are not authorized to inert any OE item found on site unless it is a part of the SOW.
- OE/UXO items shall not be taken from the site as souvenirs or training aids.
- Civil War ordnance shall be treated like any other OE.
- Before entering U.S. Army-controlled areas or ranges contaminated with improved conventional munitions (ICM), an approved Department of the Army (DA) waiver must be obtained.
- Whenever suspect Chemical Weapons Material (CWM) is encountered during conventional OE site activities, all work shall immediately cease. Project personnel shall withdraw along cleared paths upwind from the discovery. A team consisting of two personnel shall secure the area to prevent unauthorized access. Personnel should position themselves as far upwind as possible while still maintaining security of the area. The local point of contact designated in the work plan shall be immediately notified.
- Avoid inhalation and skin contact with smoke, fumes, and vapors of explosives and other related materials.
- Consider OE items that have been exposed to fire and detonation as extremely hazardous. Chemical and physical changes may have occurred to the contents, which might render them more sensitive than in their original state.
- Do not rely on the color coding of OE for positive identification. Munitions having incomplete or improper color codes have been encountered.

2.2 General Hazards

- Refer To Master HSP

2.3 Biological Hazards and Controls

- Refer To Master HSP

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2.4 Contaminants of Concern

(Refer to Project Files for more detailed contaminant information)

Contaminant	Maximum ^a Concentration (ppm)	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	GW: 0.015 ppm SJS21-TW115-05D	1000 ppm	2000 ppm	Irritated throat, drowsiness	11.99
1,1-Dichloroethane	GW: 0.00047 ppm SJS21-MW09S-04D	100 ppm	3000 ppm	Skin irritation, drowsiness	11.10
1,1-Dichloroethene	GW: 0.011 ppm SJS21-MW13S-05D-P	Ca	Ca [N.D.]	Irritation to the eyes, skin throat; Headache, nausea; Liver and Kidney damage. Pneumonia. Carcinogen	10.0
1,2-Dichloroethane	GW: 0.0046 ppm SJS21-TW121-05D	Ca NIOSH TWA 1 ppm ST 2 ppm	50 ppm [Ca]	Irritation to the eyes, Central nervous system depression, nausea, vomit, dermatitis, liver and kidney damage. Carcinogen	11.05
1,3-Dinitrobenzene	GW: 0.0011 ppm SJS21-MW12S-05D	0.15 ppm	50 mg/m ³	Cyanosis, bad taste, visual disturbance	10.71
Acetone	GW: 0.02 ppm SJS21-MW03S-05D SB: 0.068 ppm SJS21-SB06-02-05D	500 ppm	2,500 ppm	Irritated eyes, headache, dizziness	9.69
Aluminum	GW: 0.324 ppm SJS21-MW10S-04D	2 mg/m ³	NE	Coughing, spitting, pulmonary fibrosis	Dust
Antimony (dissolved)	GW: 0.0055 SJS21-MW02S-03C	500 µg/ m ³	50 mg/m ³	Irritated nose, cough, headache, diarrhea	Dust
Arsenic	GW: 0.0728 ppm SJS21-MW01D-03C	10 µg/ m ³	5 mg/m ³	Nasal ulcers, fever, bronchitis, melanosis, peripheral neuropathy	Dust
Arsenic (dissolved)	GW: 0.072 ppm SJS21-MW01D-03C	10 µg/ m ³	5 mg/m ³	Nasal ulcers, fever, bronchitis, melanosis, peripheral neuropathy	Dust

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2.4 Contaminants of Concern

(Refer to Project Files for more detailed contaminant information)

Contaminant	Maximum ^a Concentration (ppm)	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Barium	GW: 0.051 ppm SJS21-MW11S-04D	500 µg/ m ³	50 mg/m ³	Muscle spasms, slow pulse, bronchial irritation	NA
Barium (dissolved)	GW: 0.049 ppm SJS21-MW11S-04D	500 µg/ m ³	50 mg/m ³	Muscle spasms, slow pulse, bronchial irritation	NA
Benzene	GW: 0.089 ppm SJS21-MW09S-04D	0.5 ppm	500 ppm	Eye and nose irritation, headache, giddiness, nausea, fatigue	9.25
Boron	GW: 0.252 ppm SJS21-MW11S-04D	1 mg/m ³	2000 mg/m ³	Nausea, conjunctivitis, diarrhea, skin rash	Dust
Boron (dissolved)	GW: 0.243 ppm SJS21-MW11S-04D	1 mg/m ³	2000 mg/m ³	Nausea, conjunctivitis, diarrhea, skin rash	Dust
Bromoform	GW: 0.00013 ppm SJS21-TW118-05D	0.5 ppm	850 ppm	Irritated eyes, CNS depression	10.51
Calcium (carbonate)	GW: 53.3 ppm SJS21-MW01D-04D	5 mg/m ³	NL	Considered harmless	Dust
Calcium (dissolved)	GW: 52.3 ppm SJS21-MW01D-04D	5 mg/m ³	NL	Considered harmless	Dust
Caprolactum (vapor)	GW: 1 ug/L SJS21-MW02S & SJS21-MW04S	5 ppm	NL	Convulsions, salivation, large pupils	NA
Carbon disulfide (skin)	GW: 0.00059 ppm SJS21-MW02S-04D-P	4 ppm	500 ppm	Nervousness, anorexia, psychosis, fatigue, sleep disturbance	UK
Carbon tetrachloride	GW: 0.00016 ppm SJS21-MW01S-05D	2 ppm	200 ppm	Central nervous system depression, nausea, liver damage	11.5
Chlorobenzene	GW: 0.014 ppm SJS21-TW113-05D	10 ppm	1000 ppm	Skin and eye irritation, incoordination, drowsiness	9.10
Chloroform	GW: 0.003 ppm SJS21-MW01D-03C	2 ppm	500 Ca	Dizziness, mental dullness, nausea, confusion, disorientation, headache, fatigue, eye and skin irritation, anesthesia, enlarged liver	11.40

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2.4 Contaminants of Concern

(Refer to Project Files for more detailed contaminant information)

Contaminant	Maximum ^a Concentration (ppm)	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Chloromethane	GW: 0.00077 ppm SJS21-MW11S-04D	Ca	Ca 2000	Dizziness, nausea, vomit, stagger, slurred speech, convulsions, coma; liver and kidney damage. Carcinogen	11.28
Chromium(as Cr(II) & Cr(III))	GW: 0.0472 ppm SJS21-MW01D-03C	0.5 mg/m ³	25	Irritated eyes, sensitization dermatitis, histologic fibrosis of lungs	
cis-1,2-Dichloroethene	GW: 1.8 ppm SJS21-MW13S-05D	UK	UK	The substance irritates severely the eyes, the skin and the respiratory tract. Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the kidneys.	NA
Cobalt	GW: 0.0359 ppm SJS21-MW11S-04D	20 µg/ m ³	20 mg/m ³	Coughing, difficulty breathing, wheezing, decreased pulmonary function, diffuse nodule fibrosous, dermatitis, respiratory hypersensitivity, asthma	UK
Cobalt (dissolved)	GW: 0.037 ppm SJS21-MW11S-04D	20 µg/ m ³	20 mg/m ³	Coughing, difficulty breathing, wheezing, decreased pulmonary function, diffuse nodule fibrosous, dermatitis, respiratory hypersensitivity, asthma	Dust
Cumene	GW: 0.002 ppm SJS21-MW01S	50 ppm	900 ppm	Irritated eyes, headache, narcosis	NA
Cyanide	GW: 0.0018 ppm SJS21-MW01D-03C	5 mg/m ³	25 mg/m ³	Weakness, headache, nausea, gasping breath	Dust
Cyclohexane	GW: 0.0081 ppm SJS21-MW09S-04D-P	300 ppm	1300 ppm	Irritated eyes, drowsiness, narcosis	9.90
Dichlorodifluoromethane (Freon-12)	GW: 0.0021 ppm SJS21-TW115-05D	1000 ppm	15000 ppm	Tremors, cardiac arrhythmias	11.80
Di-n-butylphthalate	GW: 0.0008 ppm SJS21-MW06S	5 mg/m ³	4000 mg/m ³	Irritated eyes, upper respiratory system and stomach	
Ethylbenzene	GW: 0.0003 ppm SJS21-TW126-05D	100 ppm	800 ppm	Eye and nose irritation, headache, narcosis	8.76
Heptachlor	GW: 0.000059 ppm SJS21-MW12S-05D	50 µg/ m ³	35 mg/m ³	Tremors, convulsions	NA
Iron	GW: 26.1 ppm SJS21-MW09S-04D	5 mg/m ³	2500 mg/m ³	Benign pneumoconiosis, cough	Dust

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2.4 Contaminants of Concern

(Refer to Project Files for more detailed contaminant information)

Contaminant	Maximum ^a Concentration (ppm)	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Iron (dissolved)	GW: 25.4 ppm SJS21-MW09S-04D	5 mg/m ³	2500 mg/m ³	Benign pneumoconiosis, cough	Dust
Magnesium	GW: 12.7 ppm SJS21-MW11S-04D	10 mg/m ³	750 mg/m ³	Flu-like fever, cough	Dust
Magnesium (dissolved)	GW: 12.6 ppm SJS21-MW11S-04D	10 mg/m ³	750 mg/m ³	Flu-like fever, cough	Dust
Manganese	GW: 3.04 ppm SJS21-MW11S-04D	0.2 mg/m ³	500 mg/m ³	Dead face", dry throat, cough metal fume fever, pneumonia	Dust
Manganese (dissolved)	GW: 3.05 ppm SJS21-MW11S-04D	0.2 mg/m ³	500 mg/m ³	Dead face", dry throat, cough metal fume fever, pneumonia	Dust
Methyl acetate	GW: 0.019 ppm SJS21-MW11S-04D	200 ppm	3100 ppm	Excitability, tremors, numbness	10.36
Methyl-tert-butyl ether (MTBE)	GW: 0.011 ppm SJS21-TW118-05D	40 ppm	NE	Drowsiness, eye irritation, incoordination, rapid breathing	9.40
Methylcyclohexane	GW: 0.0037 ppm SJS21-MW01S-04D	400 ppm	1200 ppm	Lightheadedness, drowsiness, nose and throat irritation	9.85
Methylene chloride	GW: 0.0018 ppm SJS21-MW11S-04D	25 ppm	2300 ppm	Weakness, tingling and numbness, vertigo, nausea	11.35
Molybdenum	GW: 0.0189 ppm SJS21-MW09S-04D	5 mg/m ³	1000 mg/m ³	Loss of appetite, incoordination, eye, nose and throat irritation	Dust
Molybdenum (dissolved)	GW: 0.0176 ppm SJS21-MW09S-04D	5 mg/m ³	1000 mg/m ³	Loss of appetite, incoordination, eye, nose and throat irritation	Dust
Nickel	GW: 0.0058 ppm SJS21-MW12S-05D	1 mg/m ³	10 mg/m ³	Skin sensitivity, chest pain, "asthma"	Dust
Nickel (dissolved)	GW: 0.0061 ppm SJS21-MW12S-05D	1 mg/m ³	10 mg/m ³	Skin sensitivity, chest pain, "asthma"	Dust
Phenol	GW: 0.0041 ppm SJS21-MW09S-04D	5 ppm	250 ppm	Skin corrosive, eye irritant, muscle aches, dark urine	8.50

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2.4 Contaminants of Concern

(Refer to Project Files for more detailed contaminant information)

Contaminant	Maximum ^a Concentration (ppm)	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Potassium	GW: 50.8 ppm SJS21-MW01D-03C	2 mg/m ³	NL	Eye, nose & throat irritation, nasal ulcers, lung damage	Dust
Potassium (dissolved)	GW: 48.6 ppm SJS21-MW01D-03C	2 mg/m ³	NL	Eye, nose & throat irritation, nasal ulcers, lung damage	Dust
RDX	GW: 0.0053 ppm SJS21-MW04S	1.5 mg/m ³	NL	Irritation to eyes and skin; headache; irritability; fatigue; weakness; tremors; nausea; dizziness; vomiting; insomnia; convulsions	NA
Selenium	GW: 0.0038 ppm SJS21-MW01D-03C	200 µg/ m ³	1 mg/m ³	Headache, chill, fever, garlic breath, disturbed vision	Dust
Sodium (hydroxide)	GW: 64.3 ppm SJS21-MW01D-03C	2 mg/m ³	10 mg/m ³	Irritated nose, burns eyes & skin, pneumonia	9.00
Sodium (dissolved)	GW: 64.0 ppm SJS21-MW01D-03C	2 mg/m ³	10 mg/m ³	Irritated nose, burns eyes & skin, pneumonia	9.00
trans-1,2-Dichloroethene	GW: 0.009 ppm SJS21-MW02S	200 ppm	1000 ppm	Irritated eyes and respiratory system; CNS depression	Dust
Trichloroethene	GW: 4.8 ppm SJS21-MW13S-05D SB: 45 ppm SJS21-SB05-02-05D	50 ppm	1000 ppm	Vertigo, visual disturbance, headache, drowsiness	Dust
Toluene	GW: 0.011 ppm SJS21-TW126-05D	50 ppm	500 ppm	Fatigue, confusion, euphoria, dizziness, headache, tears	8.82
Vanadium	GW: 0.0359 ppm SJS21-MW01D-03C	0.05 mg/m ³	35 mg/m ³	Green tongue, metal taste, coughing, throat irritation	Dust
Vanadium (dissolved)	GW: 0.0363 ppm SJS21-MW01D-03C	0.05 mg/m ³	35 mg/m ³	Green tongue, metal taste, coughing, throat irritation	Dust
Vinyl chloride	GW: 0.390 ppm SJS21-TW115-05D	1 ppm	NL Ca	Weakness, abdominal pain, gastrointestinal bleeding, enlarged liver, pallor or cyanosis of extremities	10.00
Xylene	GW: 0.00069 ppm SJS21-TW126-05D	100 ppm	900 ppm	Eye, nose, and throat irritation, drowsiness, nausea, incoordination	8.44

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2.4 Contaminants of Concern

(Refer to Project Files for more detailed contaminant information)

Contaminant	Maximum ^a Concentration (ppm)	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Zinc	GW: 0.0265 ppm SJS21-MW11S-04D	5 mg/m ³	NL	Sweet metal taste, dry throat, cough, tight chest, chills	
Zinc (dissolved)	GW: 0.0259 ppm SJS21-MW11S-04D	5 mg/m ³	NL	Sweet metal taste, dry throat, cough, tight chest, chills	

Footnotes:

J = value is estimated because detected below the method detection limit.

^a Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), SS (Surface Soil), SL (Sludge), SW (Surface Water), SD (Sediment).

^b Appropriate value of PEL, REL, or TLV listed.

^c IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.

^d PIP = photoionization potential; NA = Not applicable; UK = Unknown.

NA

2.5 Potential Routes of Exposure

Dermal: Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 4.	Inhalation: Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in Sections 4 and 5, respectively.	Other: Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).	
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3 Project Organization and Personnel

3.1 CH2M HILL Employee Medical Surveillance and Training

(Reference CH2M HILL SOPs HSE-113, *Medical Monitoring*, and HSE-110, *HS&E Training*)

The employees listed below are enrolled in the CH2M HILL Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SSC" have completed a 12-hour site safety coordinator course, and have documented requisite field experience. An SSC with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones. The employees listed below are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

3.1.1 Program Elements

The CH2M HILL medical surveillance program provides medical examinations, medical testing, biological monitoring, and vaccinations for workers based on their worker category and potential exposures from work activities.

3.1.2 Medical Examinations for Hazardous Waste Workers

Medical examinations are provided for employees who conduct work at hazardous waste operations or work with potentially contaminated equipment from hazardous waste sites. This category includes both hazardous waste site workers and Safety Coordinator- Hazardous Waste (SC-HW) staff.

Hazardous waste site workers receive initial (baseline), periodic (annual or biennial), and exit examinations as described below. The examination protocol can range from completing a questionnaire (e.g., periodic respirator clearance) to a medical examination with a medical history, physical examination, and biologic monitoring (e.g., baseline hazardous waste examination). The specific testing requirements are determined by the CCOP based on the information provided by the employee and the RHSPM. See Attachment 3 for the medical examination protocols for hazardous waste workers.

All medical approvals expire at the end of 1 year from the date of the last examination unless an extension to defer medical examination is obtained.

3.1.3 Medical Examinations for OE Site Workers

All CH2M HILL employees who work on OE sites must participate in a medical surveillance program consisting of a baseline health assessment, including a medical and occupational history review, blood and urine tests for contaminants of interest, electrocardiogram, slit-lamp corneal examination, pulmonary function tests, chest x-ray, respiratory fitness test, and a general physical examination that includes hearing and vision. Employees who terminate employment and who have worked at OE project sites may be required to undergo an exit examination equivalent to the baseline health assessment.

Subcontractors are responsible for ensuring that their employees receive medical surveillance as required.

3.1.3.1 Initial Examination

The purpose of the initial examination is to identify conditions that could place employees at increased risk of health impairment as a result of the performance of their job, to identify work restrictions, and to establish a baseline for future comparisons. An employee should receive his or her initial examination prior to conducting the activity that requires medical surveillance. If training is associated with the activity (e.g., 40-hour initial hazardous waste training), the medical clearance should be received before attending the training course. This process is the same for new CH2M HILL employees and for existing employees who are

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changing job assignments to hazardous waste work activities. This precludes employees who have a condition that would prevent them from doing a certain job function (such as inability to wear a respirator) from taking training they will not be able to use. If the employee has a condition that precludes them from performing a certain job function, the SPA or RHSPM will contact the employee's WGL and the HRM. See SOP HSE -110, HS&E Training, for additional information on training requirements.

If an employee joins CH2M HILL and has received a medical examination through their previous employer within the past 6 months, he or she should inform the SPA. The CCOP will determine if the previous examination meets CH2M HILL's requirements for initial or baseline examinations. The SPA shall request that the CCOP coordinate with the employee to have his or her previous medical provider send a copy of the results of his or her last previous examination to the CCOP. This may be accomplished if the employee has complete copies or by completing a medical release form for the previous provider to release medical records to the CCOP.

3.1.3.2 Periodic Examination

The purpose of the periodic examination is the same as for the initial examination and is used to detect potential occupational exposures or illnesses that may have developed. Regulatory requirements, potential exposures, risk factors as identified by the employee, client requirements, and risk-based decisions by the RHSPM are used by the CCOP to determine the frequency and type of testing for the periodic examination.

The employee medical examination may be deferred for more than 1 year depending on:

- The employee's frequency of performing fieldwork
- Exposure risk to regulated chemicals
- Exposure to occupational noise
- Frequency of respirator use

This information is captured on the Request for Extension of Medical Surveillance Form (Attachment 4) completed by the employee prior to the anniversary date of his or her more recent medical examination. All questions the CCOP has regarding employee exposures to hazardous chemicals or occupational noise shall be discussed with the RHSPM prior to making the determination to schedule the employee for periodic medical examination, biological monitoring, or audiometric testing.

Employees will receive medical examinations and biological monitoring following an incident involving a potential exposure. The RHSPM provides the following information to the physician and CCOP:

- Identity of the hazardous chemical(s) to which the employee may have been exposed
- A description of the conditions under which the exposure or potential exposure occurred, including quantitative exposure data, if available
- A description of any signs and symptoms that the employee is experiencing
- A copy of the Material Safety Data Sheet (MSDS) for the chemical(s) involved

The CCOP will then determine the medical protocols required for the examination.

3.1.3.3 Exit Medical Examination

The exit examination will be provided for employees who have worked at sites with potential health and safety hazards since their last medical examination and who subsequently terminate employment or are reassigned to work activities that do not require medical surveillance. The purpose of an exit examination is to document health status at the time of termination or reassignment. The elements of the examination are similar to the annual examination and are determined by the CCOP. The CCOP may determine that an exit examination is not necessary.

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3.1.3.4 Respiratory Protection Medical Evaluation

All hazardous waste workers will be evaluated for their ability to wear respiratory protection. Medical evaluation is also required when employees voluntarily use a negative pressure air-purifying respirator (APR). A medical evaluation is not required when an employee voluntarily uses a filtering facepiece respirator (dust mask). The CCOP shall perform a medical evaluation that includes:

- Reviewing a respirator medical questionnaire completed by the employee as part of the initial or periodic medical examination for hazardous waste workers
- Requiring a follow-up examination, if warranted, based on evaluation of the answers to the questionnaire
- Providing a written recommendation regarding an employee’s ability to use respiratory protection, including any limitations

If, after using respiratory protection, an employee experiences any medical signs or symptoms related to use of a respirator or substantial increase in the physiological burden placed on the employee due to changes in the workplace, the employee shall inform his or her RHSPM to discuss this information. The RHSPM shall inform the CCOP of this information so the CCOP can re-evaluate the employee’s ability to wear a respirator. More information on respiratory protection is found in SOP [HSE-121 Respiratory Protection](#).

Pregnant employees are to obtain a physician’s statement of the employee’s ability to perform hazardous activities before being assigned fieldwork.

Employee Name	Office	Responsibility	SSC/FA-CPR
Cecilia White	VBO	Field Team Leader/SSC-HW	Level C SSC-HW; FA-CPR
Kim Henderson	VBO	Activity Manager/SSC-HW	Level C SSC-HW; FA-CPR
Adrienne Jones	VBO	Field Team Member	Level C SSC-HW; FA-CPR

*** All other workers, besides those listed above must have their training verified through the HandS database by their respective Operations Leader prior to mobilizing!**

3.2 Drug-Free Workplace & Screening Program

(SOP HSE-105, *Drug-Free Workplace*)

CH2M HILL does not tolerate illegal drugs, or any use of drugs, controlled substances, or alcohol that impairs an employees work performance or behavior. CH2M HILL employees and subcontractors shall not be involved in any manner with the unlawful manufacture, distribution, dispensation, possession, sale, or use of illegal drugs in the workplace. The use or possession of alcohol in the workplace is also prohibited. Any violation of these prohibitions may result in discipline or immediate discharge. All subcontractors and employees (CH2M HILL, CH2M HILL Constructors, Inc. [CCI]) are required to submit to a pre-employment and/or pre-assignment test for drug. Pre-assignment drug tests must be taken within 30 days of the employee’s arrival date at the project. The SC or PSC must verify that each subcontractor employee has completed drug testing by obtaining written verification from the employer (e.g., certificate of successful participation in testing for each person). A subcontractor employee’s participation in a random testing program, that meets CH2M HILL program requirements, since the beginning of their employment can be used in lieu of the pre-assignment requirement. Being subject to only post-incident testing will not be adequate to meet the random or pre-assignment requirements.

This page contains no comments

3.2.1 Preemployment or Preassignment Testing

Each employee is required to complete the Policy Acknowledgement and Consent Form. This form is not only important because it is the method for initiating preemployment or preassignment testing, but if there is a problem with an employee, you will need to have this form signed before you can take action. You are responsible for verifying that all employees have completed the form (or equivalent). For CH2M HILL employees, these records are part of the employee's HR record, and for subcontractor employees, they are part of the subcontractor's files. You may need to contact the HRM or contract administrator (KA), respectively, to help you verify that the appropriate records are in place. If during the course of the project you receive a completed form from an employee, you need to give it to the Drug Free Workplace Program Administrator (DFWPA).

When drug or alcohol testing is required, employees cannot work onsite prior to successfully passing the test. The Health & Safety Manager (HSM) will verify with the DFWPA or the Project Manager (PM) or Construction Manager (CM) that the people listed in the site-specific written safety plan have successfully passed the test before approving the plan. If personnel other than those listed in the site-specific written safety plan come onsite, the PM or CM is responsible for verifying with the DFWPA that they have successfully passed their drug and alcohol tests.

3.3 Field Team Chain of Command and Communication Procedures

3.3.1 Client

Contact Name:	Ms. Agnes Sullivan NAVFAC Atlantic
Phone:	757/444-4120
Facility Contact Name:	ENS Kimberly Mazur APWO St. Juliens Creek Annex
Phone:	W: 757-396-7475 C: 757-636-6800

3.3.2 CH2M HILL

Activity Manager:	Kimberly Henderson/VBO
Project Manager:	Janna Staszak/VBO
Health and Safety Manager:	Steve Beck/MKE
Field Team Leader:	Cecilia White/VBO
Site Safety Coordinator:	Cecilia White/VBO

The SSC is responsible for contacting the Field Team Leader and Project Manager. In general, the Project Manager will contact the client. The Health and Safety Manager should be contacted as appropriate.

This page contains no comments

3.3.3 CH2M HILL Subcontractors

(Reference CH2M HILL SOP HSE-215, *Contracts, Subcontracts, HS&E Management Practices*)

<p>MEC Support</p> <p>Subcontractor: NA Contact Name: Telephone:</p>	<p>Utilities Location</p> <p>Subcontractor: The Spectra Group Contact Name: John Fowler Telephone: 757-497-5862</p>
<p>Drilling</p> <p>Subcontractor: Parratt-Wolff Contact Name: Butch Stevens Telephone: 1-800-627-7920</p> <p>Safety Procedures Required: Subcontractor must have their company's safe drilling procedures onsite when field activities commence</p>	<p>Surveying</p> <p>Subcontractor: To be determined Contact Name: Telephone:</p>
<p>Sewer Video Surveying</p> <p>Subcontractor: To be determined Contact Name: Telephone:</p>	<p>IDW Waste Hauling</p> <p>Subcontractor: To be determined Contact Name: Telephone:</p>

The subcontractors listed above are covered by this HSP and must be provided a copy of this plan. However, this plan does not address hazards associated with the tasks and equipment that the subcontractor has expertise in (e.g., drilling, excavation work, electrical). Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit these procedures to CH2M HILL for review before the start of field work. Subcontractors must comply with the established health and safety plan(s). The CH2M HILL SSC should verify that subcontractor employee training, medical clearance, and fit test records are current and must monitor and enforce compliance with the established plan(s). CH2M HILL's oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

CH2M HILL should continuously endeavor to observe subcontractors' safety performance. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. In addition to this level of observation, the SSC is responsible for confirming CH2M HILL subcontractor performance against both the subcontractor's safety plan and applicable self-assessment checklists. Self-assessment checklists contained in **Attachment 6** are to be used by the SSC to review subcontractor performance.

Health and safety related communications with CH2M HILL subcontractors should be conducted as follows:

- Brief subcontractors on the provisions of this plan, and require them to sign the Employee Signoff Form included in **Attachment 1**.
- Request subcontractor(s) to brief the project team on the hazards and precautions related to their work.
- When apparent non-compliance/unsafe conditions or practices are observed, notify the subcontractor safety representative and require corrective action – the subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When repeat non-compliance/unsafe conditions are observed, notify the subcontractor safety representative and stop affected work until adequate corrective measures are implemented.
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, and stop affected work until adequate corrective measures are implemented. Notify the Project Manager and HSM as appropriate.
- Document all oral health and safety related communications in project field logbook, daily reports, or other records.

This page contains no comments

4 Personal Protective Equipment (PPE)

(Reference CH2M HILL SOP HSE-117, *Personal Protective Equipment*, HSE-121, *Respiratory Protection*)

PPE Specifications ^a

Task	Level	Body	Head	Respirator ^b
<ul style="list-style-type: none"> General site entry Surveying Video Surveying Sewer Observation of material loading for offsite disposal 	D	Work clothes; steel-toe, leather work boots; work glove.	Hardhat ^c Safety glasses Ear protection ^d	None required
<ul style="list-style-type: none"> Soil boring Soil Sampling Well Installation Groundwater sampling Soil boring Investigation-derived waste (drum) sampling and disposal 	Modified D	Coveralls: Uncoated Tyvek® Boots: Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Splash shield ^c Safety glasses Ear protection ^d	None required.
<ul style="list-style-type: none"> Tasks requiring upgrade 	C	Coveralls: Polycoated Tyvek® Boots: Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Splash shield ^c Ear protection ^d Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; with GME-H cartridges or equivalent ^e .
<ul style="list-style-type: none"> Tasks requiring upgrade 	B	Coveralls: Polycoated Tyvek® Boots: Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Splash shield ^c Ear protection ^d Spectacle inserts	Positive-pressure demand self-contained breathing apparatus (SCBA); MSA Ultralite, or equivalent.

Reasons for Upgrading or Downgrading Level of Protection

Upgrade ^f	Downgrade
<ul style="list-style-type: none"> Request from individual performing tasks. Change in work tasks that will increase contact or potential contact with hazardous materials. Occurrence or likely occurrence of gas or vapor emission. Known or suspected presence of dermal hazards. Instrument action levels (Section 5) exceeded. 	<ul style="list-style-type: none"> New information indicating that situation is less hazardous than originally thought. Change in site conditions that decreases the hazard. Change in work task that will reduce contact with hazardous materials.

^a Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

^b No facial hair that would interfere with respirator fit is permitted.

^c Hardhat and splash-shield areas are to be determined by the SSC.

^d Ear protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting.

^e Cartridge change-out schedule is at least every 8 hours (or one work day), except if relative humidity is > 85%, or if organic vapor measurements are > midpoint of Level C range (refer to Section 5)--then at least every 4 hours. If encountered conditions are different than those anticipated in this HSP, contact the HSM.

^f Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the HSM, and an SSC qualified at that level is present.

This page contains no comments

5 Air Monitoring/Sampling

(Reference CH2M HILL SOP HSE-401, *Air Pollution Sources*)

5.1 Air Monitoring Specifications

PID: OVM with 10.6eV lamp or equivalent	All intrusive activities	1 to - 5 ppm above b.g. →	Level D	Initially and periodically during task	Daily
		5 to 100ppm above b.g. →	Level C		
		100 to 300ppm above b.g. → (Sustained for 1 minute)	Level B (Not Anticipated or authorized)		
CGI: MSA model 260 or 261 or equivalent	Drilling Direct Push Technology	0-10% : →	No explosion hazard	Continuous during advancement of boring	Daily
		10-25% LEL: →	Potential explosion hazard		
		>25% LEL: →	Explosion hazard; evacuate or vent		
Dust Monitor: Visual	Drilling Direct Push Technology	No visual dust →	Level D.	Initially and periodically during tasks	N/A
		Visual dust →	Level D. Practice dust suppression		
Nose-Level Monitor: Voice	Drilling Direct Push Technology	Conversations can be held at distances of 3 feet without shouting →	No action required	Initially and periodically during task	N/A
		Conversations cannot be held at a distances of 3 feet without shouting →	Hearing protection required Stop; re-evaluate		

^a Action levels apply to sustained breathing-zone measurements above background.

^b The exact frequency of monitoring depends on field conditions and is to be determined by the SSC; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time, measurement results, personnel monitored, and place/location where measurement is taken (e.g., "Breathing Zone/MW-3", "at surface/SB-2", etc.).

5.2 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
PID: OVM, 10.6 or 11.8 eV bulb	100 ppm isobutylene	RF = 1.0	100 ppm	1.5 lpm reg T- tubing
PID: MiniRAE, 10.6 eV bulb	100 ppm isobutylene	CF = 100	100 ppm	1.5 lpm reg T-tubing
PID: TVA 1000	100 ppm isobutylene	CF = 1.0	100 ppm	1.5 lpm reg T-tubing
CGI: MSA 260, 261, 360, or 361	0.75% pentane	N/A	50% LEL <u>+ 5% LEL</u>	1.5 lpm reg direct tubing

5.3 Air Sampling

- No personal air sampling is required based on analytical data supplied in work plan.

This page contains no comments

6 Decontamination

(Reference CH2M HILL SOP HSE-506, *Decontamination*)

- Refer to the Master HASP

6.1 General Decontamination Specifications

- Refer to the Master HASP

6.2 Diagram of Personnel-Decontamination Line

- Refer to the Master HASP

7 Spill-Containment Procedures

- Refer to the Master HASP

8 Site-Control Plan

8.1 Site-Control Procedures

(Reference CH2M HILL SOP HSE-502, *Site Control*)

- Refer to the Master HASP

8.2 Hazwoper Compliance Plan

(Reference CH2M HILL SOP HSE-220, *Written Plans*)

- Refer to the Master HASP

9 Emergency Response Plan

(Reference CH2M HILL, SOP HSE-106, *Emergency Planning*)

9.1 Pre-Emergency Planning

- Refer to the Master HASP

9.2 Emergency Equipment and Supplies

- Refer to the Master HASP

9.3 Incident Response

- Refer to the Master HASP

9.4 Emergency Medical Treatment

- Refer to the Master HASP

9.5 Evacuation

- Refer to the Master HASP

9.6 Evacuation Signals

- Refer to the Master HASP

9.7 Incident Notification and Reporting

- Refer to the Master HASP

This page contains no comments

10 Approval

This site-specific Health and Safety Plan has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

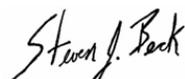
10.1 Original Plan

Written By: Bill Friedman/VBO

Date: 07/03/2004

Approved By: Steve Beck/MKE

Date: 08/02/2004



10.2 Revisions

Revisions Made By: Cecilia White

Date: 06/15/2006

Revisions to Plan: Updated Contaminants of Concern to reflect most recent round of sampling at Site 21. Updated SSC information. All field activities are the same.

Revisions Approved By: Steve Beck/MKE

Date: 06/26/2006



11 Attachments

- Attachment 1: Employee Signoff Form - Field Safety Instructions
- Attachment 2: Project-Specific Chemical Product Hazard Communication Form
- Attachment 3: Chemical-Specific Training Form
- Attachment 4: Emergency Contacts
- Attachment 5: MEC Avoidance Plan
- Attachment 6: Project Activity Self-Assessment Checklists
- Attachment 7: Applicable Material Safety Data Sheets
- Attachment 8: Metal Facts Sheet

This page contains no comments

Employee Signoff Form

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Project-Specific Chemical Product
Hazard Communication Form

This page contains no comments

This page contains no comments

CHEMICAL-SPECIFIC TRAINING FORM

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CHEMICAL-SPECIFIC TRAINING FORM

Location:	Project # :
HCC:	Trainer:

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

- Physical and health hazards
- Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)
- Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL’s written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

This page contains no comments

Emergency Contacts Page

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Emergency Contacts

24-hour CH2M HILL Emergency Beeper – 888/444-1226

Medical Emergency – 911

Facility Medical Response #: 757-396-3333

Local Ambulance #: 757-396-3333

CH2M HILL Medical Consultant

Health Resources

Dr. Jerry H. Berke, M.D.,M.P.H.

600 West Cummings Park, Suite 3400

Woburn, MA 01801

1-781-938-4653 or 1-800-350-4511

(After hours calls will be returned within 20 minutes)

Fire/Spill Emergency – 911

Facility Fire Response #: 757-396-3335

Local Fire Dept #: 757-382-6297

Corporate Director Health and Safety

Name: Mollie Netherland/SEA

Phone: 206/453-5005

24-hour emergency beeper: 888-444-1226

Security & Police – 911

Facility Security #: 757-396-5111

Local Police #: 757-382-6161

Regional Health, Safety & Environmental Manager

Name: Steve Beck/MKE

Phone: 414-272-2426 ex.277

Cell: 414-526-4517

Utilities Emergency

Water: 757-382-3550

Gas: 1-877-572-3342

Electric: 1-888-667-3000

Health and Safety Manager (HSM)

Name: Carl Woods/DAY

Phone: 937-2283180

Designated Safety Coordinator (DSC)

Name: Cecilia White

Phone: 757-671-8311 ex. 426

Regional Human Resources Department

Name: Cindy Bauder/WDC

Phone: 703-471-6405 ext. 4243

Project Manager

Name: Janna Staszak

Phone: 757-671-8311 ex. 433

Corporate Human Resources Department

Name: Pete Hannon/DEN

Phone: 303/771-0900

Federal Express Dangerous Goods Shipping

Phone: 800/238-5355

Worker's Compensation

Contact either the Regional Human Resources Dept. to have an Incident Report Form (IRF) completed.

After hours contact Julie Zimmerman 303-664-3304

CH2M HILL Emergency Number for Shipping Dangerous Goods

Phone: 800/255-3924

Auto Claims

Rental: Carol Dietz/DEN

1-303-713-2757

CH2M Hill owned: Zurich Insurance Company

1-800-987-3373

Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.

Facility Alarms: Sound Field Vehicle Horn (3x) **Evacuation Assembly Area(s):** Field Vehicle

Facility/Site Evacuation Route(s): See Site Map

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Hospital

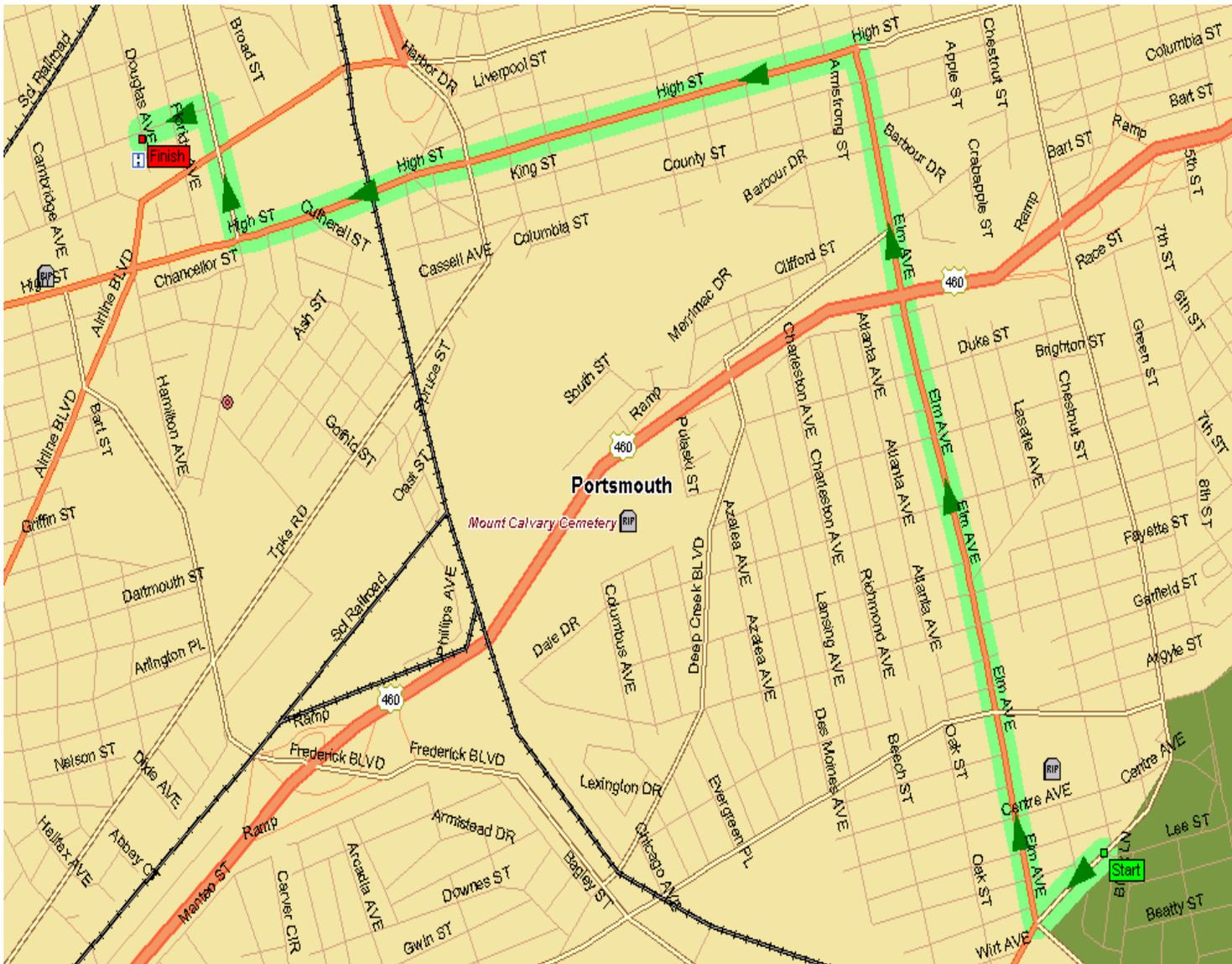
Hospital Name/Address:

Maryview Medical Center
3636 High Street
Portsmouth, VA 23707

Hospital Phone #: 757-398-2200

Directions to Hospital

- 1) Leave main gate of Annex and take left onto Victory Blvd.
- 2) At route 17 (George Washington Highway) take a right and go north.
- 3) Make left onto Fredrick Blvd, and continue on Fredrick until it dead ends.
- 4) Make left onto High Street, the Maryview Medical Center is on the right at the first light.



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MEC Avoidance Plan

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MEC Avoidance Plan

This MEC Avoidance plan has been developed as an attachment to the Health and Safety Plan for CH2M HILL personnel.

1.1 Plan Objective

This plan is designed to inform CH2MHILL employees of the specific hazards and procedures when performing operations in or around areas where Munitions & Explosives of Concern (MEC) may be encountered. All CH2M HILL employees who are not UXO qualified must become familiar with the sections of this plan, and all requirements of any subcontractors specific Safety & Health Plan while on site. Any discrepancies in the directives of this plan, and that of the subcontractor should be brought to the immediate attention of the CH2M HILL RHSM or Munitions Response (MR) Safety Staff for resolution.

1.2 General Safety Requirements

Based on the Site 21 history and findings during investigations conducted to-date, there is a low probability of encounter of munitions and explosives of concern (MEC). However, MEC may be present and may be encountered during site activities. All CH2MHILL non-UXO qualified personnel will follow the safe work practices listed below:

- Non-UXO qualified personnel will receive site-specific UXO recognition briefing prior to participation in site activities.
- Non-UXO qualified personnel will not touch or disturb any object which could potentially be MEC-related, and will immediately notify the nearest UXO qualified person of the presence of the object.
- Immediately notify the UXO qualified escort of any suspicious items or possible MEC in the area of operation.
- If the UXO qualified escort finds an item of MEC and must uncover it for identification or marking, all CH2MHILL employees will depart the area in the same direction they entered to a distance of 200 feet, and remain there until notified by the UXO qualified escort that it is safe to return.

INFORMATION ON THE EXACT TYPES AND DENSITY OF MEC IS VAGUE. PROJECTILE CARTRIDGE CASINGS, PROPELLANT, AND PRIMERS ARE THE MOST LIKELY ITEMS TO BE ENCOUNTERED. SHOULD ANYTHING MORE HAZARDOUS BE ENCOUNTERED, PLANS AND PROCEDURES WILL BE UPDATED TO ACCOMMODATE SAFETY REQUIREMENTS FOR MORE HAZARDOUS MEC.

1.3 MEC Recognition and Safety

As part of the site-specific training, project Non-UXO personnel will receive MEC Recognition and Safety training. Training will include a review of the MEC Removal Action Explosive Safety Submission Addendum, MEC terms and definitions, MEC identification, and reporting and specific safety procedures.

2.0 HAZARD/RISK ANALYSIS

MEC is a safety hazard that may constitute an imminent and substantial danger to the personnel performing environmental investigation and removal action activities and the public in general. MEC contamination must be considered a possibility on all formerly used defense sites (FUDS) and active military installations. The surface danger zone of a range (active or inactive), the target area, impact area, ricochet area and the secondary danger zones may be contaminated with MEC (both surface and/or subsurface contamination). The varying types of ammunition, angle of fire, and soil types preclude the accurate estimation of the depth of any subsurface MEC.

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Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Surveying and establishing boundaries and grids.	Accidental detonation of explosives	Personnel involved will attend a site-specific munitions and explosives of concern (MEC) recognition class prior to the commencement of site activities.
		Observe the Basic Safety Concepts and Considerations for UXO Operations.
		UXO personnel will escort non-UXO personnel at all times.
		Mark and avoid MEC. Only UXO personnel will handle MEC.
Clearing and grubbing	Accidental detonation of explosives.	Check location with magnetometer prior to driving stakes.
		Observe the Basic Safety Concepts and Considerations for UXO Operations.
		Personnel involved will attend a site-specific MEC recognition class prior to the commencement of any site activities.
		Be alert and mark all MEC located.
MPPEH Related Scrap Demilitarization	Accidental detonation of explosives	Only clear and grub to within four inches of the ground surface.
		UXO trained personnel will escort non-UXO personnel at all times.
	Shredder Operations	Surface sweeps will be conducted with magnetometers or other suitable geophysical instrumentation to identify potential MEC.
		Observe the Basic Safety Concepts and Considerations for UXO Operations.
Inspection/Certification of MPPEH Related Scrap	Accidental detonation of explosives	Only UXO technicians will perform explosive demilitarization of MPPEH related scrap.
		Stay clear of moving mechanical parts.
		Insure only inspected scrap is fed into shredder.
		Only UXO technicians will inspect MPPEH related scrap.
		Personnel in the immediate vicinity of MPPEH related scrap inspections will be kept to the minimum necessary for safe operations but no less than two UXO technicians.
		Observe requirements of DOD 4160.21-M-1.

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Project Activity Self-Assessment Checklists

This page contains no comments

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to hazards associated with drilling operations (complete Sections 1 and 3), and/or 2) CH2M HILL oversight of a drilling subcontractor is required (complete entire checklist).

SSC may consult with drilling subcontractors when completing this checklist, but shall not direct the means and methods of drilling operations nor direct the details of corrective actions. Drilling subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Completed checklists shall be sent to the health and safety manager for review.

Project Name: _____ Project No.: _____
 Location: _____ PM: _____
 Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- Evaluate CH2M HILL employee exposures to drilling hazards
 - Evaluate a CH2M HILL subcontractor's compliance with drilling H&S requirements
- Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the drilling subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-204.

<u>SECTION 1</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
PERSONNEL SAFE WORK PRACTICES (3.1)				
1. Only authorized personnel operating drill rig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Personnel cleared during rig startup	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Personnel clear of rotating parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Personnel not positioned under hoisted loads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Loose clothing and jewelry removed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Personnel instructed not to approach equipment that has become electrically energized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Smoking is prohibited around drilling operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Personnel wearing appropriate PPE, per HSP/FSI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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<u>SECTION 2</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
GENERAL (3.2.1)				
9. Daily safety briefing/ meeting conducted with crew	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Daily inspection of drill rig and equipment conducted before use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILL RIG PLACEMENT (3.2.2)				
11. Location of underground utilities identified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Safe clearance distance maintained from overhead powerlines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Drilling pad established, when necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Drill rig leveled and stabilized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILL RIG TRAVEL (3.2.3)				
15. Rig shut down and mast lowered and secured prior to rig movement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Tools and equipment secured prior to rig movement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Only personnel seated in cab are riding on rig during movement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Safe clearance distance maintained while traveling under overhead powerlines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Backup alarm or spotter used when backing rig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILL RIG OPERATION (3.2.4)				
20. Kill switch clearly identified and operational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. All machine guards are in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Rig ropes not wrapped around body parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Pressurized lines and hoses secured from whipping hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Drill operation stopped during inclement weather	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Air monitoring conducted per HSP/FSI for hazardous atmospheres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Rig placed in neutral when operator not at controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILL RIG MAINTENANCE (3.2.5)				
27. Defective components repaired immediately	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Lockout/ tagout procedures used prior to maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Cathead in clean, sound condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Drill rig ropes in clean, sound condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Fall protection used for fall exposures of 6 feet or greater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Rig in neutral and augers stopped rotating before cleaning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Good housekeeping maintained on and around rig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILLING AT HAZARDOUS WASTE SITES (3.2.6)				
34. Waste disposed of according to HSP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Appropriate decontamination procedures being followed, per HSP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Rev.0

This page contains no comments

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Material Safety Data Sheets

This page contains no comments

Section 1 - Product and Company Identification
ISOBUTYLENE

Product Identification: ISOBUTYLENE
Date of MSDS: 09/14/1989 **Technical Review Date:** 09/13/1995
FSC: 6830 **NIIN:** LIIN: 00N042744
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: SCOTT SPECIALTY GASES
Manufacturer's Address1: ROUTE 611
Manufacturer's Address2: PLUMSTEADVILLE, PA 18949
Manufacturer's Country: US
General Information Telephone: 215-766-8861
Emergency Telephone: 215-766-8861
Emergency Telephone: 215-766-8861
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 51847
Special Project Code: N

Contractor Information

Contractor's Name: SCOTT SPECIALTY GASES
Post Office Box: 310
Contractor's Address1: 6141 EASTON RD
Contractor's Address2: PLUMSTEADVILLE, PA 18949-0310
Contractor's Telephone: 215-766-8861
Contractor's CAGE: 51847

Section 2 - Composition /Information on Ingredients
ISOBUTYLENE

Ingredient Name: PROPENE, 2-METHYL-; (ISOBUTYLENE)
Ingredient CAS Number: 115-11-7 **Ingredient CAS Code:** M
RTECS Number: UD0890000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100
% Environmental Weight:
Other REC Limits: N/K
OSHA PEL: N/K (FP N) **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: N/K (FP N) **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:

This page contains no comments

Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
ISOBUTYLENE

Health Hazards Acute & Chronic: ACUTE:ASPHYXIANT. SYMPTOMS INCLUDE RAPID RESPIRATION, MUSCULAR INCOORDINATION, FATIGUE, NAUSEA & VOMITING. LOSS OF CONSCIOUSNESS & DEATH MAY OCCUR. CONTACT W/LIQUID MAY RESULT IN SYMPTOMS OF FROSTBITE . CHRONIC:NONE.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:

Inhalation: YES

Skin: NO

Ingestion: NO

Carcinogenicity Indicators

NTP: NO

IARC: NO

OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures
ISOBUTYLENE

First Aid:

INGEST:CALL MD IMMEDIATE (FP N). INHAL:IMMEDIATE REMOVE VICTIM TO FRESH AIR. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. SKIN:IMMEDIATE FLUSH W/ COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAM CLTHG. IF FROSTBITE OCCURS, WARM AFFECTED AREA W/WATER OR TOWEL. EYE:IMMEDIATE FLUSH W/COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES.

Section 5 - Fire Fighting Measures
ISOBUTYLENE

Fire Fighting Procedures:

USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). FLAMMABLE HIGH PRESSURE LIQUID OR GAS.

Unusual Fire or Explosion Hazard:

DANGEROUS. VAP MAY TRAVEL CONSIDERABLE DIST TO SOURCE OF IGNIT & FLASH BACK. MAY FORM EXPLO MIXTS W/AIR. CAN REACT VIGOROUSLY W/OXIDIZING MATLS.

Extinguishing Media:

DO NOT EXTING BURNING GAS IF FLOW CANNOT BE SHUT OFF. USE WATER SPRAY TO KEEP FIRE EXPOS CYLS COOL. MOVE CYL (SUPDAT)

Flash Point: Flash Point Text: -105F,-76C

This page contains no comments

Autoignition Temperature:

Autoignition Temperature Text: N/A
Lower Limit(s): 1.8%
Upper Limit(s): 9.6%

Section 6 - Accidental Release Measures
ISOBUTYLENE

Spill Release Procedures:

EVACUATE & VENTILATE AREA. REMOVE LEAKING CYLINDER TO EXHAUST HOOD OR SAFE OUTDOORS AREA IF THIS CAN BE DONE SAFELY.

Section 7 - Handling and Storage
ISOBUTYLENE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
ISOBUTYLENE

Respiratory Protection:

USE NIOSH/MSHA APPROVED SCBA IN CASE OF EMERGENCY OR NON-ROUTINE USE.

Ventilation:

PROVIDE ADEQUATE & LOCAL EXHAUST VENTILATION TO MAINTAIN CONCENTRATION BELOW EXPOSURE LIMITS.

Protective Gloves:

IMPERVIOUS GLOVES (FP N).

Eye Protection: SAFETY GOGGLES.

Other Protective Equipment: SAFETY SHOES WHEN HANDLING CYLINDERS.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information: EXTING MEDIA:AWAY FROM FIRE IF THERE IS NO RISK. OTHER PREC:HAS NOT BEEN FILLED BY THE OWNER OR W/HIS WRITTEN CONSENT IS A VIOLATION OF FEDERAL LAW (49 CFR).

Section 9 - Physical & Chemical Properties
ISOBUTYLENE

HCC: G2

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 19.6F,-6.9C

Melting/Freezing Point: Melting/Freezing Text: N/K

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: 2.65@21.1C Vapor Density: 1.947

Percent Volatile Organic Content:

Specific Gravity: 0.588 (H2O=1)

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: NOT APPLICABLE

Solubility in Water: SLIGHT

Appearance and Odor: COLORLESS, ETHEREAL ODOR.

Percent Volatiles by Volume: 100

Corrosion Rate: N/K

This page contains no comments

Section 10 - Stability & Reactivity Data
ISOBUTYLENE

Stability Indicator: YES
Materials to Avoid:
OXIDIZING MATERIALS.
Stability Condition to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
CARBON MONOXIDE, CARBON DIOXIDE.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
ISOBUTYLENE

Toxicological Information:
N/P

Section 12 - Ecological Information
ISOBUTYLENE

Ecological Information:
N/P

Section 13 - Disposal Considerations
ISOBUTYLENE

Waste Disposal Methods:
DISP MUST BE I/A/W FED, STATE & LOC REGS (FP N). RETURN CYLS TO SUPPLIER FOR PROPER DISP W/ANY VALVE OUTLET PLUGS/CAPS SECURED & VALVE PROT CAP IN PLACE. DO NOT REUSE CYL. EMPTY CYL WILL CONTAIN HAZ R ESIDUE.

Section 14 - MSDS Transport Information
ISOBUTYLENE

Transport Information:
N/P

Section 15 - Regulatory Information
ISOBUTYLENE

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
ISOBUTYLENE

Other Information:
N/P

This page contains no comments

HAZCOM Label Information

Product Identification: ISOBUTYLENE
CAGE: 51847
Assigned Individual: N
Company Name: SCOTT SPECIALTY GASES
Company PO Box: 310
Company Street Address1: 6141 EASTON RD
Company Street Address2: PLUMSTEADVILLE, PA 18949-0310 US
Health Emergency Telephone: 215-766-8861
Label Required Indicator: Y
Date Label Reviewed: 09/08/1993
Status Code: C
Manufacturer's Label Number:
Date of Label: 09/08/1993
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: DANGER
Health Hazard: Moderate
Contact Hazard: Slight
Fire Hazard: Severe
Reactivity Hazard: None

8/9/2002

This page contains no comments

MSDS Name: **Nitric Acid**, Reagent ACS

Synonyms: Azotic Acid, Engravers Nitrate, Hydrogen Nitrate.

Company Identification: Acros Organics N.V.

One Reagent Lane

Fairlawn, NJ 07410

For information in North America, call: 800-ACROS-01

For emergencies in the US, call CHEMTREC: 800-424-9300

2. Composition/Information on Ingredients

CAS#	Chemical Name	%	EINECS#
7697-37-2	Nitric acid	69-71%	231-714-2
7732-18-5	Water	Balance	231-791-2

Hazard Symbols: O C

Risk Phrases: 35 8

3. Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear colorless to pale yellow.

Danger! Strong oxidizer. Contact with other material may cause a fire. Corrosive. Causes eye and skin burns. Causes digestive and respiratory tract burns. May be fatal if inhaled. 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.

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:

Get medical aid immediately. 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. Destroy contaminated shoes.

Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. 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. DO NOT use mouth-to-mouth respiration.

Notes to Physician:

Treat symptomatically and supportively.

This page contains no comments

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. Containers may explode in the heat of a fire.

Extinguishing Media:

Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Do NOT get water inside containers. For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water. For small fires, use dry chemical, carbon dioxide, sand, earth, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

Autoignition Temperature: Not available.

Flash Point: Not available.

NFPA Rating: Not published.

Explosion Limits, Lower: Not available.

Upper: Not available.

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). Neutralize spill with sodium bicarbonate. Use water spray to disperse the gas/vapor. Remove all sources of ignition. Use a spark-proof tool.

7. Handling and Storage

Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Ground and bond containers when transferring material. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale.

Storage:

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

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/m ³ ; 4 ppm STEL; 10 mg/m ³ STEL	2 ppm TWA; 5 mg/m ³ TWA 25 ppm IDLH	2 ppm TWA; 5 mg/m ³ TWA

OSHA Vacated PELs:

Nitric acid: 2 ppm TWA; 5 mg/m³ TWA

Personal Protective Equipment

Eyes:

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

Skin:

Wear appropriate protective gloves and clothing to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

This page contains no comments

9. Physical and Chemical Properties (Nitric Acid)

Appearance:	clear colorless to pale yellow liquid
Odor:	strong odor, acrid odor
Solubility:	Soluble in water
Density/Spec. Grav:	1.50
pH:	1.0
% Volatiles by volume @ 21C (70F):	Not available
Boiling Point:	72 deg C
Melting Point:	-42 deg C
Vapor Density (Air=1):	Not available
Vapor Pressure (mm Hg):	6.8 mm Hg
Evaporation Rate (Butyl Acetate=1):	Not available
Viscosity:	Not available

Molecular Formula: HNO₃
Molecular Weight: 63.0119

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 specifics. Reacts explosively with organic materials and combustibles.

Hazardous Decomposition Products: Nitrogen oxides.

Hazardous Polymerization: Has not been reported.

11. Toxicological Information

RTECS#:

CAS# 7697-37-2: QU5775000 QU5900000

CAS# 7732-18-5: ZC0110000

LD50/LC50:

CAS# 7697-37-2: Inhalation, rat: LC50 =67 ppm(NO₂)/4H.

CAS# 7732-18-5: Oral, rat: LD50 = >90 mL/kg.

Carcinogenicity:

Nitric acid -

Not 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:

This page contains no comments

No information available.

Neurotoxicity:

No information available.

Mutagenicity:

No information available.

Other Studies:

None.

12. Ecological Information

Ecotoxicity:

Mosquito fish: TLm=72 ppm/96H (fresh water) Cockle: LC50=330-1000 ppm/48H (salt water)

Environmental Fate:

No information reported.

Physical/Chemical:

No information available.

Other:

None.

13. Disposal Considerations

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

RCRA D-Series Maximum Concentration of Contaminants: None listed.

RCRA D-Series Chronic Toxicity Reference Levels: None listed.

RCRA F-Series: None listed.

RCRA P-Series: None listed.

RCRA U-Series: None listed.

16. Other Information

MSDS Creation Date: 2/01/1996 Revision #4 Date: 12/16/1997

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

This page contains no comments

MSDS Name: **Hydrochloric Acid, Reagent ACS**

Chlorohydric acid, hydrogen chloride, muriatic acid, spirits of salt.

Company Identification: Acros Organics N.V.

One Reagent Lane

Fairlawn, NJ 07410

For information in North America, call: 800-ACROS-01

For emergencies in the US, call CHEMTREC: 800-424-9300

2. Composition/Information on Ingredients

CAS#	Chemical Name	%	EINECS#
7647-01-0	Hydrochloric acid, reagent ACS	37%	231-595-7
7732-18-5	Water	Balance	231-791-2

Hazard Symbols: C

Risk Phrases: 34 37

3. Hazards Identification

Emergency Overview

EMERGENCY OVERVIEW

Appearance: Clear, colorless to faintly yellow.

Danger! Corrosive. Sensitizer. Causes eye and skin burns. May cause severe respiratory and digestive tract irritation with possible burns.

Target Organs: None.

Potential Health Effects

Eye:

May cause irreversible eye injury. Vapor or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns. May cause painful sensitization to light. May cause conjunctivitis.

Skin:

May be absorbed through the skin in harmful amounts. Contact with liquid is corrosive and causes severe burns and ulceration. May cause photosensitization in certain individuals.

Ingestion:

May cause circulatory system failure. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract.

Inhalation:

Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma. May cause pulmonary edema and severe respiratory disturbances.

Chronic:

Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. May cause conjunctivitis and photosensitization.

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:

Get medical aid. Rinse area with large amounts of water for at least 15 minutes. Remove contaminated clothing and shoes.

This page contains no comments

Ingestion:

Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately.

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.

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. Not flammable, but reacts with most metals to form flammable hydrogen gas. Use water spray to keep fire-exposed containers cool.

Extinguishing Media:

Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

Autoignition Temperature: Not available.

Flash Point: Not available.

NFPA Rating: Not published.

Explosion Limits, Lower: Not available.

Upper: Not available.

6. Accidental Release Measures

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

Spills/Leaks:

Large spills may be neutralized with dilute alkaline solutions of soda ash, or lime. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite.

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:

Keep away from heat and flame. Do not store in direct sunlight. Store in a cool, dry, well-ventilated area away from incompatible substances.

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

Hydrochloric acid, reagent ACS C 5 ppm; C 7.5 mg/m³ 50 ppm IDLH C 5 ppm; C 7 mg/m³

OSHA Vacated PELs:

Hydrochloric acid, reagent ACS:

No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:

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

Skin:

Wear appropriate protective gloves to prevent skin exposure.

This page contains no comments

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

9. Physical and Chemical Properties (Hydrochloric Acid)

Appearance:	Clear, colorless to faintly yellow liquid
Odor:	Strong, pungent
Solubility:	823g/L water at 32F
Density:	1.16-1.19
pH:	1.1 (0.1N sol)
% Volatiles by volume @ 21C (70F):	Not available
Boiling Point:	230 deg F
Melting Point:	-101 deg F
Vapor Density (Air=1):	1.257
Vapor Pressure:	160 mm Hg
Evaporation Rate (Butyl acetate =1):	2.0

Molecular Formula: HCl

Molecular Weight: 36.46

10. Stability and Reactivity

Chemical Stability:

Stable under normal temperatures and pressures.

Conditions to Avoid:

Incompatible materials, light.

Incompatibilities with Other Materials:

Acetate, acetic anhydride, alcohols + hydrogen cyanide, 2-aminoethanol, ammonium hydroxide, calcium carbide, calcium phosphide, cesium acetylene carbide, cesium carbide, chlorosulfonic acid, 1,1-difluoroethylene, ethylene diamine, ethyleneimine, fluorine, lithium silicide, magnesium boride, mercuric sulfate, oleum, perchloric acid, potassium permanganate, b-propiolactone, propylene oxide, rubidium acetylene carbide, rubidium carbide, silver perchlorate + carbon tetrachloride, sodium, sodium hydroxide, sulfuric acid, uranium phosphide, vinyl acetate. Substance polymerizes on contact with aldehydes or epoxides.

Hazardous Decomposition Products:

Hydrogen chloride, chlorine, carbon monoxide, carbon dioxide, hydrogen gas.

Hazardous Polymerization: May occur.

11. Toxicological Information

RTECS#:

CAS# 7647-01-0: MW4025000

CAS# 7732-18-5: ZC0110000

LD50/LC50:

CAS# 7647-01-0: Inhalation, mouse: LC50 =1108 ppm/1H; Inhalation, rat: LC50 =3124 ppm/1H; Oral, rabbit: LD50 = 900 mg/kg.

CAS# 7732-18-5: Oral, rat: LD50 = >90 mL/kg.

Carcinogenicity:

Hydrochloric acid, reagent ACS -

IARC: Group 3 carcinogen

Epidemiology:

No information available.

Teratogenicity:

This page contains no comments

Embryo or Fetus: Stunted fetus, ihl-rat TCLo=450 mg/m3/1H Specific
Developmental Abnormalities: homeostasis, ihl-rat TCLo=450 mg/m3/1H.

Reproductive Effects:

No information available.

Neurotoxicity:

No information available.

Mutagenicity:

No information available.

Other Studies:

None.

12. Ecological Information

Ecotoxicity:

Trout LC100=10 mg/L/24H Shrimp LC50=100-330 ppm Starfish LC50=100-330mg/L/48H Shore crab LC50=240 mg/L/48H
Chronic plant toxicity=100 ppm

Environmental Fate:

Substance will neutralize soil carbonate-based components.

Physical/Chemical:

No information available.

Other:

None.

13. Disposal Considerations

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

RCRA D-Series Maximum Concentration of Contaminants: None listed.

RCRA D-Series Chronic Toxicity Reference Levels: None listed.

RCRA F-Series: None listed.

RCRA P-Series: None listed.

RCRA U-Series: None listed

16. Other Information

MSDS Creation Date: 11/09/1995 Revision #4 Date: 4/28/1998

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

This page contains no comments

MSDS Name: **Sulfuric acid**, reagent acs

Synonyms: Hydrogen Sulfate, Oil of Vitriol, Vitriol Brown Oil, Matting Acid, Battery Acid

Company Identification: Acros Organics N.V.

One Reagent Lane

Fairlawn, NJ 07410

For information in North America, call: 800-ACROS-01

For emergencies in the US, call CHEMTREC: 800-424-9300

2. Composition/Information on Ingredients

CAS#	Chemical Name	%	EINECS#
7664-93-9	Sulfuric acid	95-98.0%	231-639-5
7732-18-5	Water	Balance	231-791-2

Hazard Symbols: XI C

Risk Phrases: 35 36/38

3. Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless to brown.

Danger! Harmful if inhaled. Corrosive. Hygroscopic. Causes digestive and respiratory tract burns. Causes digestive and respiratory tract irritation. Causes severe eye and skin irritation and burns. Target Organs: None known.

Potential Health Effects

Eye:

May cause irreversible eye injury. Causes eye irritation and burns.

Skin:

Causes severe skin irritation and burns.

Ingestion:

Causes gastrointestinal tract burns.

Inhalation:

Harmful if inhaled. May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract.

Chronic:

Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis. Prolonged or repeated eye contact may cause conjunctivitis.

4. First Aid Measures

Eyes:

Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation is required (at least 30 minutes).

Skin:

Get medical aid immediately. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. **SPEEDY ACTION IS CRITICAL!**

Ingestion:

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

This page contains no comments

Inhalation:

Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen.

Notes to Physician:

Treat symptomatically and supportively.

5. Fire Fighting Measures

General Information:

Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Contact with water can cause violent liberation of heat and splattering of the material.

Extinguishing Media:

Do NOT use water directly on fire. Use water spray to cool fire-exposed containers. Use carbon dioxide or dry chemical.

Autoignition Temperature: Not available.

Flash Point: 340 deg C (644.00 deg F)

NFPA Rating: Not published.

Explosion Limits, Lower: Not available.

Upper: Not available.

6. Accidental Release Measures

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

Spills/Leaks:

Cover with sand, dry lime or soda ash and place in a closed container for disposal.

7. Handling and Storage

Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well ventilated area. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Do not allow contact with water. Discard contaminated shoes.

Storage:

Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area.

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
Sulfuric acid	1 mg/m3; 3 mg/m3 STEL	1 mg/m3 TWA; 15 mg/m3 IDLH	1 mg/m3 TWA

OSHA Vacated PELs:

Sulfuric acid:1 mg/m3 TWA

Personal Protective Equipment

Eyes:

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

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

This page contains no comments

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

9. Physical and Chemical Properties ()

Appearance:	colorless to brown liquid
Odor:	Odorless
Solubility:	
Density:	1.8400 g/cm ³
pH:	Not available
% Volatiles by volume @ 21C (70F):	
Boiling Point:	280 deg C @ 760.00mm Hg
Melting Point:	3 deg C
Vapor Density (Air=1):	1.2 kg/m ³
Vapor Pressure (mm Hg):	< 0.00120 mm Hg
Evaporation Rate:	Slower than ether
Viscosity:	Not available

Molecular Formula: H₂O₄S

Molecular Weight: 98.08

10. Stability and Reactivity

Chemical Stability:

Stable under normal temperatures and pressures.

Conditions to Avoid:

Contact with water, metals, excess heat, combustible materials, organic materials.

Incompatibilities with Other Materials:

Acids (mineral, oxidizing, e.g. chromic acid, hypochlorous acid, nitric acid, sulfuric acid), alcohols and glycols (e.g. butyl alcohol, ethanol, methanol, ethylene glycol), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, formaldehyde), amines (aliphatic and aromatic, e.g. dimethyl amine, propylamine, pyridine, triethylamine), azo, diazo, and hydrazines (e.g. dimethyl hydrazine, hydrazine, methyl hydrazine), caustics (e.g. ammonia, ammonium hydroxide, calcium hydroxide, potassium hydroxide, sodium hydroxide), cyanides (e.g. potassium cyanide, sodium cyanide), dithiocarbamates (e.g. ferbam, maneb, metham, thiram), fluorides (inorganic, e.g. ammonium fluoride, calcium fluoride, cesium fluoride), isocyanates (e.g. methyl isocyanate), metals (alkali and alkaline, e.g. cesium, potassium, sodium), metals as powders (e.g. hafnium, raney nickel), metals and metal compounds (toxic, e.g. beryllium, lead acetate, nickel carbonyl, tetraethyl lead), nitrides (e.g. potassium nitride, sodium n.

Hazardous Decomposition Products:

Oxides of sulfur.

Hazardous Polymerization: Has not been reported.

This page contains no comments

11. Toxicological Information

RTECS#:

CAS# 7664-93-9: WS5600000

LD50/LC50:

CAS# 7664-93-9: Inhalation, mouse: LC50 =320 mg/m³/2H; Inhalation, rat: LC50 =510 mg/m³/2H; Oral, rat: LD50 = 2140 mg/kg.

Carcinogenicity:

Sulfuric acid -

ACGIH: A2 - Suspected Human Carcinogen

OSHA: Select carcinogen

IARC: Group 1 carcinogen

Epidemiology:

Workers exposed to industrial sulfuric acid mist showed a statistical increase in laryngeal cancer. This data suggests a possible relationship between carcinogenesis and inhalation of sulfuric acid mist.

Teratogenicity:

No data available.

Reproductive Effects:

No data available.

Neurotoxicity:

No data available.

Mutagenicity:

No data available.

Other Studies:

No data available.

12. Ecological Information

Ecotoxicity:

Sulfuric acid is harmful to aquatic life in very low concentrations. It may be dangerous if it enters water intakes. The aquatic toxicity for bluegill in fresh water was 24.5 ppm/24 hr, which was lethal.

Environmental Fate:

Not available.

Physical/Chemical:

Not available.

Other:

Not available.

13. Disposal Considerations

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

RCRA D-Series Maximum Concentration of Contaminants: None listed.

RCRA D-Series Chronic Toxicity Reference Levels: None listed.

RCRA F-Series: None listed.

RCRA P-Series: None listed.

RCRA U-Series: None listed.

16. Other Information

MSDS Creation Date: 2/01/1996 Revision #3 Date: 10/01/1997

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

This page contains no comments

MSDS: Sodium Hydroxide

HAZARDOUS ACCORDING TO WORKSAFE CRITERIA

Supplied by: Chemical Co.

UN Number: 1823

Dangerous Goods Class: 8

Hazchem Code: 2X

Other Names: Caustic Soda

Soda Lye

White caustic

Properties: White deliquescent crystalline flakes or pearls

Health Hazard Information Acute Health Effects Swallowed:

Ingestion of the substance causes severe burns of the mouth and the oesophagus, nausea, vomiting and edema of the pharynx. In the worst cases perforation of the gastrointestinal tract and heart failure may occur.

Eyes: Contact of this substance with the eyes may cause severe lesions and possible loss of sight.

Skin: Skin contact with this substance causes severe burns and necrosis.

Inhaled: Inhalation of dusts may cause pulmonary congestion with subsequent compromise of respiratory functionality followed by loss of consciousness. Extremely irritative to respiratory tract (including mucous membranes, throat and lungs). Slightly toxic.

Chronic Health Effects

Prolonged and reiterated inhalations of the dusts may cause chronic disturbance of the respiratory routes. May cause dermatitis.

First Aid Swallowed:

Contact a Doctor or the Poisons Information Centre immediately. Give patient 1 - 3 cups of water. DO NOT induce vomiting. Immediately transport to a hospital or doctor.

Eyes: Flood eyes with clean water for 15 minutes - retract eyelids often. Immediately transport to a hospital or doctor **Skin:** Remove all contaminated clothing including footwear. Wash affected areas thoroughly with mild soap and water. Seek medical advice.

Inhaled: Remove from contaminated area immediately; avoid becoming a casualty. If NOT breathing apply artificial resuscitation. Experienced person may administer oxygen if breathing is difficult. Immediately transport to a hospital or doctor.

Safe Handling Information PPE:

Goggles, face screen, rubber or PVC gloves. Acid-proof overalls for operations in which there is a risk of splashes. Avoid contact with skin and eyes. Do not eat, drink or smoke in storage areas or during handling. Wash hands and face thoroughly after handling and before work breaks, eating, drinking, smoking and using toilet facilities.

Storage and Transport: Transport or store in a cool, dry place. Transport or store away from strong acids. The drums must be stored in suitable storage rooms equipped with impermeable floors, eye wash fountains and water inlets for rinsing the floor in case of spills.

Spills and Disposal:

Spills

Clean-up personnel should wear full protective clothing. Prevent product access to rivers and canals. Absorb with sand or soil, scoop up and place in suitable containers for later treatment/disposal.

Disposal

Use very dilute acid for neutralisation. Dispose of in accordance with Local, State and Federal regulations at an approved waste disposal facility. Neutralise aqueous solutions by diluting with very diluted hydrochloric acid. Drain effluent with plenty of water, keeping pH under control. Beware of heat and splashes caused by water reactions (dissolution heat) or neutralisation.

Fire/Explosion Hazard: Fire/Explosion

Generally all the reactions with acids and halogenated substances are strongly exothermic. It forms explosive products (Chloroacetylenic derivatives) by reacting with Trichloroethylene at warm temperatures. It can cause the decomposition of

This page contains no comments

maleic anhydride at explosive speed. It causes violent polymerisation of acrolein and acrylonitrile. It reacts exothermically with alcohol and chloroform mixtures. Incompatible with strong oxidising agents and strong acids, organic materials, aluminium, tin, zinc and nitro compounds. Absorbs CO₂ from air. Decomposition products: nature of decomposition products not known. Material itself is not flammable or explosive but reactions with metals can generate hydrogen gas, which is flammable in air (between 4% and 75% volume). May start fires in contact with fuels.

Extinguishing Media

Evacuate area - move upwind of fire. Summon Fire Brigade immediately, DIAL 000.

DO NOT USE WATER. Fire-fighters should wear full protective clothing including self-contained breathing apparatus.

Fire Fighting: Keep containers cool, Water spray/fog, Foam-alcohol type

This page contains no comments

MSDS: METHANOL

HAZARDOUS ACCORDING TO WORKSAFE CRITERIA

Supplied by Chemical Co. **Date:** 7/1/98 UN Number: 1230 Dangerous Goods Class: 3 3(6.1) Hazchem Code: 2WE Poisons Schedule S6

Other Names Methyl alcohol

Properties Liquid. Mixes with water.

Health Hazard Information Acute Health Effects:

Irritating to eyes.

Vapours may cause dizziness or suffocation.

Ingestion may produce health damage.

Chronic Health Effects: Cumulative effects may result following exposure (limited evidence).

First Aid Swallowed: Contact a Doctor or Poisons Centre. If more than 15 mins from a Doctor, induce vomiting (if conscious).

Eyes: Wash with running water (for 15 mins). Seek medical attention. Skin: Remove contaminated clothing. Wash with water and soap. Inhaled: Fresh air. Rest and keep warm. If breathing shallow, give oxygen. Seek medical attention.

Safe Handling Information PPE:

Gloves, rubber or plastic

Goggles or face-shield

Laboratory coat, plastic apron if large quantities are handled

Fume cupboard

Respirator as required when vapours/aerosols generated.

Storage and Transport:

Keep container in a well ventilated place.

Keep away from sources of ignition.

Avoid heating. No smoking.

Store in a cool, dry protected area.

Incompatible with acid halides, alkaline earth metals, oxidising agents.

Spills and Disposal:

Turn off all sources of flame.

Inform others to keep a safe distance.

Consider evacuation if it is a major spill.

Prevent from entering drains.

Contain spillage by any means.

Mop up with plenty of water.

Control vapour with water spray/fog.

Absorb with dry agent.

Fire/Explosion Hazard: Highly flammable. Vapour/air mixture explosive. Fire Fighting:

Keep containers cool.

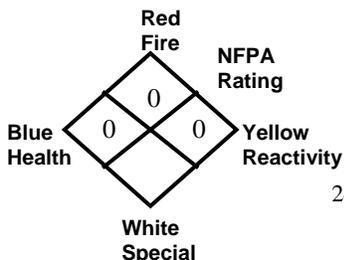
Water spray/fog. Full protective apparatus and contain.

Warning Signs F = Flammable; T=Toxic

This page contains no comments

Alconox®

MATERIAL SAFETY DATA SHEET



Alconox, Inc.
30 Glenn Street
White Plains, NY 10603

24 Hour Emergency Number – Chem-Tel (800) 255-3924

I. IDENTIFICATION

Product Name (as appears on label)	ALCONOX
CAS Registry Number:	Not Applicable
Effective Date:	January 1, 2001
Chemical Family:	Anionic Powdered Detergent
Manufacturer Catalog Numbers for sizes	1104, 1125, 1150, 1101, 1103 and 1112

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

There are no hazardous ingredients in ALCONOX as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

III. PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point (F):	Not Applicable
Vapor Pressure (mm Hg):	Not Applicable
Vapor Density (AIR=1):	Not Applicable
Specific Gravity (Water=1):	Not Applicable
Melting Point:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Not Applicable
Solubility in Water:	Appreciable-Soluble to 10% at ambient conditions
Appearance:	White powder interspersed with cream colored flakes.
pH:	9.5 (1%)

IV. FIRE AND EXPLOSION DATA

Flash Point (Method Used):	None
Flammable Limits:	LEL: No Data UEL: No Data
Extinguishing Media:	Water, dry chemical, CO ₂ , foam
Special Fire fighting Procedures:	Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None

V. REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Incompatibility (Materials to Avoid):	None
Hazardous Decomposition or Byproducts:	May release CO ₂ on burning

This page contains no comments

VI. HEALTH HAZARD DATA

Route(s) of Entry:	Inhalation? Yes Skin? No Ingestion? Yes
Health Hazards (Acute and Chronic):	Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Exposure may irritate mucous membranes. May cause sneezing.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggravated by powder.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs administer fluids. See a physician for discomfort.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	Material should be stored in a dry area to prevent caking.
Other Precautions:	No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

VIII. CONTROL MEASURES

Respiratory Protection (Specify Type):	Dust mask - Recommended
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are useful but not required.
Eye Protection:	Goggles are recommended when handling solutions.
Other Protective Clothing or Equipment:	None
Work/Hygienic Practices:	No special practices required

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Liqui-nox® Material Safety Data Sheet

Alconox, Inc.
30 Glenn Street, Suite 309
White Plains, NY 10603
24 Hour Emergency Number - Chem-Tel (800) 255-3924

I. Identification

Product Name (shown on label): LIQUI-NOX

CAS Registry Number: Not Applicable

Effective Date: January 1, 2001

Chemical Family: Anionic Liquid Detergent

Mfr. Catalog #s for Sizes: 1232, 1201, 1215, 1255

II. Hazardous Ingredients/Identity Information

There are no hazardous ingredients in LIQUI-NOX™ as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

National Fire Protection
Association 704 Labeling:

NJTSRN: 1200

III. Physical/Chemical Characteristics

Boiling Point (F): 214°F

Vapor Pressure (mm Hg): No Data

Vapor Density (AIR=1): No Data

Specific Gravity (Water=1): 1.075

Evaporation Rate (Butyl Acetate=1): Slower

Melting Point: No Data

Solubility in Water: Completely soluble in all proportions

Appearance: Yellow liquid, nearly odorless

pH: 8.5 (1%)

IV. Fire and Explosion Data

Flash Point (Method Used): None (Cleveland Open Cup)

Flammable Limits: LEL: No Data

UEL: No Data

Extinguishing Media: Water, dry chemical, CO₂, foam

Special Fire fighting Procedures: Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.

Unusual Fire and Explosion Hazards: None

V. Reactivity Data

Stability: Stable

Hazardous Polymerization: Will not occur.

Incompatibility (Materials to Avoid): Oxidizing agents.

Hazardous Decomposition or Byproducts: May release SO₂ on burning.

VI. Health Hazard Data

Route(s) of Entry: Inhalation? No

Skin? Yes

Ingestion? Yes

This page contains no comments

Health Hazards (Acute and Chronic): Skin contact may prove locally irritating, causing drying and/or chapping. Ingestion may cause discomfort and/or diarrhea.

Carcinogenicity: NTP? No

IARC Monographs? No

OSHA Regulated? No

Signs and Symptoms of Exposure: Prolonged skin contact may cause drying and/or chapping.

Medical Conditions Generally Aggravated by Exposure: Not established. Unnecessary exposure to this product or any industrial chemical should be avoided.

Emergency and First Aid Procedures: Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician.

Skin: Flush with plenty of water.

Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs administer fluids. See a physician for discomfort.

VII. Precautions for Safe Handling and Use

Steps to be Taken if Material is Released or Spilled: Material foams profusely. For small spills recover as much as possible with absorbent material and flush remainder to sewer. Material is biodegradable.

Waste Disposal Method: Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.

Precautions to be Taken in Storing and Handling: No special precautions in storing. Use protective equipment when handling undiluted material.

Other Precautions: No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

VII. Control Measures

Respiratory Protection (Specify Type): None Required

Ventilation: Local Exhaust-Normal

Special-Not Required

Mechanical-Not Required

Other-Not Required

Protective Gloves: Impervious gloves are recommended.

Eye Protection: Goggles and/or splash shields are recommended.

Other Protective Clothing or Equipment: Not required

Work/Hygienic Practices: No special practices required.

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Attachment B
ESS Waiver & MEC Communication Procedures

This page contains no comments



DEPARTMENT OF THE NAVY
NAVAL ORDNANCE SAFETY & SECURITY ACTIVITY
FARRAGUT HALL BLDG D-323
23 STRAUSS AVENUE
INDIAN HEAD MD 20640-5555

8020
Ser N539/1185
19 Jul 06

From: Commanding Officer, Naval Ordnance Safety and Security Activity
To: Commanding Officer, Naval Facilities Engineering Command Mid-Atlantic
Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION FOR IRP SITE 21, ST JULIEN'S CREEK ANNEX, CHESAPEAKE, VIRGINIA
Ref: (a) NAVFACMIDLANT (EV3AS) memo of 13 Jul 06 (w/encl)
(b) NOSSAINST 8020.15, Military Munitions Response Program Oversight, of 8 Mar 04
(c) NAVSEA OP 5, Revision 7

1. The Naval Ordnance Safety and Security Activity (NOSSA) reviewed the reference (a) e-mail and its enclosed NOSSA Explosives Safety Submission (ESS) determination request for a project that includes the installation of three permanent groundwater monitoring wells, as well as the collection of depth-specific groundwater samples utilizing direct push technology. Based on the information presented in reference (a), and on the ESS criteria in references (b) and (c), NOSSA determines that an ESS is not required for this project.

2. NOSSA understands that your operational risk/hazard assessment of the proposed actions concluded the probability of encountering Munitions and Explosives of Concern (MEC) is negligible, but that you will maintain a qualified MEC technician on call for the duration of the project.

3. In the event you or your contractor encounter MEC during the project, avoid intentional physical contact with it, note its type and location, and request the responsible EOD unit to respond. Then report the find to NOSSA using enclosure (1) of reference (b). NOSSA will evaluate the report and may direct you to submit an ESS at that time.

This page contains no comments

Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION FOR IRP SITE
21, ST JULIEN'S CREEK ANNEX, CHESAPEAKE, VIRGINIA

4. The NOSSA point of contact for this ESS determination is Mr. Douglas Murray, who can be contacted at DSN 354-4450 or commercial at 301-744-4450.


R. S. BARCUS

Copy to:
CNO (N411; N45C)
NAVFAC HQ (ENV)
NOSSA ESSOLANT (N5L)

This page contains no comments

Procedures for Communicating Potentially Live Munitions and Explosives of Concern (MEC) to Navy

The following are procedures designed to effectively communicate the finding of potentially live munitions and explosives of concern (MEC) that could be encountered during investigative, avoidance and / or remedial work at St. Juliens Creek Annex (SJCA). Communicating in a fast, accurate, and calm manner is critical in keeping the situation under control. During all intrusive investigations, a qualified MEC Technician with expertise and knowledge in dealing with MEC will be on-call. Only the MEC Technician will determine whether an item is considered live or inert. If the MEC Technician can not make a determination regarding the found item or if the item is determined to be live, the following steps should be taken:

1. Stop all work. Under no circumstances should work continue near the item (Norfolk Naval Shipyard [NNSY] security typically does not permit any work to occur at a site even if it is some distance away from the item).
2. Contact the NNSY Security dispatcher at (757) 396-5111. If the field team lead reports to the NNSY he / she should discuss the situation with the MEC Technician prior to making the call. It is imperative to communicate whether the situation is an emergency, that activities have stopped, and that people will not have access to the area.
3. Immediately following notification to NNSY Security, a phone call should be placed to the CH2M HILL activity manager/project manager. The CH2M HILL activity manager/project manager will be responsible for contacting the NAVFAC Mid-Atlantic project manager Ms. Agnes Sullivan @ 444-4120.
4. If the project is a construction project that includes the NNSY Resident Office In Charge Of Construction (ROICC), contact the ROICC office at (757) 396-5121.
5. From the moment that NNSY security arrives, they are in charge and there are no exceptions.
6. Naval Ordnance Safety & Security Activity (NOSSA) will be notified by in accordance with Navy policy.

The MEC Technician will review and as necessary, discuss this procedure with CH2M HILL, the Navy, and other contractors working on the site

This page contains no comments