From:	Abid, Joseph A
To:	Saric, James
Cc:	BUCHOLTZP@michigan.gov; Fortenberry, Chase; gtgriffi@gapac.com; Bondy, Garret E
Subject:	AMEC River-wide Health and Safety Plan - Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Date:	Thursday, July 11, 2013 8:24:47 PM
Attachments:	Signed HASP Transmittal - 071113.pdf 2013.07.11 Multi-Area HASP.pdf

Dear Mr. Saric,

In conjunction with Georgia-Pacific, AMEC is pleased to submit the attached Health and Safety Plan (HASP) which has been prepared by AMEC to facilitate continued river-wide SRI/FS activities on the Allied Paper, Inc/Portage Creek/Kalamazoo River Superfund Site. A hard copy will follow next week.

Should you have questions regarding this submittal, please feel free to contact AMEC or Georgia-Pacific.

Sincerely,

Joe Abid
Environmental Scientist

AMEC
Environment & Infrastructure
46850 Magellan Drive, Suite 190
Novi, Michigan 48377
(248) 926-4008
(248) 313-3692 (direct)
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joseph.abid@amec.com

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Georgia-Pacific LLC

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(404) 654-4701 fax
www.gp.com

July 11, 2013

Mr. James Saric
Remedial Project Manager
USEPA Region 5
77 West Jackson Boulevard (SR-6J)
Chicago, Illinois 60604-3511

Subject: Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Health and Safety Plan, July 2013

Dear Mr. Saric:

In order to facilitate continued Supplemental Remedial Investigation/Feasibility Study (SRI/FS) activities at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Site), AMEC Environment & Infrastructure, Inc. (AMEC) has prepared a new, river-wide Health and Safety Plan (HASP). The HASP has been prepared in accordance with the February 2007 Administrative Settlement Agreement and Order on Consent (AOC), Docket No. V-W-07-C-864, and the associated Statement of Work (SOW). An electronic copy of the HASP has been enclosed with this transmittal letter. A hard copy will be submitted the week of July 15, 2013.

If you have any questions, please do not hesitate to contact me.

Sincerely,

L. Chase Fortenberry, PG
Manager – Environmental Engineering, Environmental Affairs
Georgia-Pacific LLC

Enclosure via e-mail

cc: Paul Bucholtz, MDEQ
Garry Griffith, P.E., Georgia-Pacific LLC
Garret E. Bondy, P.E., AMEC E&I, Inc.

SITE-SPECIFIC HEALTH & SAFETY PLAN

SUPPLEMENTAL REMEDIAL INVESTIGATIONS
AND
FEASIBILITY STUDIES
KALAMAZOO RIVER – ALL AREAS
KALAMAZOO, MICHIGAN

Project Numbers
3293131539, 3293131541, 3293131542, 3293131543, 3293131544, 3293131545, 3293131546, & 3293131547

Prepared by:

AMEC E&I.
46850 Magellan Drive, Suite 190
Novi, Michigan 48377

July 2013

BEYOND ZERO

SITE-SPECIFIC HEALTH & SAFETY PLAN (HASP)

Project Name: **Kalamazoo River – All Area**
Project Location: Kalamazoo, MI
Project No.: Varies Task No: Varies

This HASP, which must be kept on site, addresses the health and safety hazards of each task conducted by AMEC employees for this project, including the requirements and procedures for worker protection (per 29 CFR 1910.120, the AMEC Hazardous Waste Operations and Emergency Response Program, and the Integrated Health, Safety and Environment (HSE) Manual). The HASP was developed based on the hazards known or suspected to be present at the site, specifically as they relate to the work to be conducted by AMEC employees. The hazards and controls within this HASP do not necessarily address all the hazards associated with subcontractor personnel. Subcontractors may adopt this HASP; however they will be responsible for reviewing and revising/amending the HASP to ensure that it addresses hazards unique to their operations.

The Site Health and Safety Officer (SHSO) can change or amend this document only with agreement from the Group Health, Safety and Environment Manager (GHSEM). The SHSO must initial any change made to the HASP at the relevant section and document the amendment date below.

Prepared by: Kenneth McRowe AMEC Managing Office: Novi, MI

Approved by:

Kenneth McRowe	7/11/2013
SHSO/Field Lead	Date
Joe Abid	7/11/2013
Assistant Project Manager	Date
Garret Bondy	7/11/2013
Project Manager	Date
Kendra Bavor, CSP	7/11/2013
Health & Safety Coordinator	Date

Amendment(s): _____

All site workers shall read this HASP. A pre-entry briefing conducted by the SHSO shall be held prior to initiating this project. Items to be covered during the briefing can be found on the Site Safety Orientation form (Appendix E). All applicable sections of this HASP shall be reviewed during this briefing. The SHSO shall review the information covered in the pre-entry briefing meeting with any worker not in attendance at the initial meeting prior to commencing work. Brief meetings will be held at the beginning of each work day to discuss important safety and health issues concerning tasks performed on that day and documented on the Daily Safety Meeting checklist (Appendix F). After reading the HASP and attending a pre-entry briefing, workers shall sign the following acknowledgment statement:

AMEC Field Team Review: I acknowledge that I have read the requirements of this HASP, and agree to abide by the procedures and limitations specified herein. I also acknowledge that I have been given an opportunity to have my questions regarding the HASP and its requirements answered prior to performing field activities. Health and safety training and medical surveillance requirements applicable to my field activities at this site are current and will not expire during on-site activities.

NAME	DATE	NAME	DATE

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APPENDIX F DAILY TAILGATE SAFETY MEETING CHECKLIST
APPENDIX G WEEKLY SITE SAFETY AND HEALTH CHECKLIST
APPENDIX H SPILL CONTAINMENT PLAN
APPENDIX I BOATING SAFETY

1.0 SITE DESCRIPTION

The Site is 76.6 miles of the Kalamazoo River from the Morrow Lake Dam in Kalamazoo, Michigan, through Allegan County, to Lake Michigan at Saugatuck, Michigan. The site is contaminated with residual polychlorinated biphenyls (PCBs) in soils and sediment from historical paper mill waste.

In support of the completion of Supplemental Remedial Investigations/Feasibility Studies (SRI/FS), the following tasks are to be performed at the site. Check the box to show if a task is to be conducted by either AMEC or our Subcontractor and that an Activity Hazard Analysis (AHA) has been developed and included with this HASP.

The following tasks are to be performed at the site.

AMEC	Sub	Tasks	AHA Developed	Initial Level of PPE
☒	☐	▪ Soil, groundwater, pore water, and surface water sampling on shore	☒	Mod level D
☒	☐	▪ Sediment, pore water, and surface water sampling from a boat	☒	Mod level D
☒	☒	▪ Electrofishing and fish/animal surveys	☒	Mod level D
☒	☒	▪ Construction/remediation oversight	☒	Mod level D
☒	☒	▪ Utility clearance	☒	Mod level D
☒	☒	▪ General Field and survey activities	☒	Mod level D

The tasks listed above may include the hazardous activities as listed in section 6.2

Expected start date: July 2013

Expected duration of project: Long term (2-3 years)

Expected average number of workers on site per day: varies

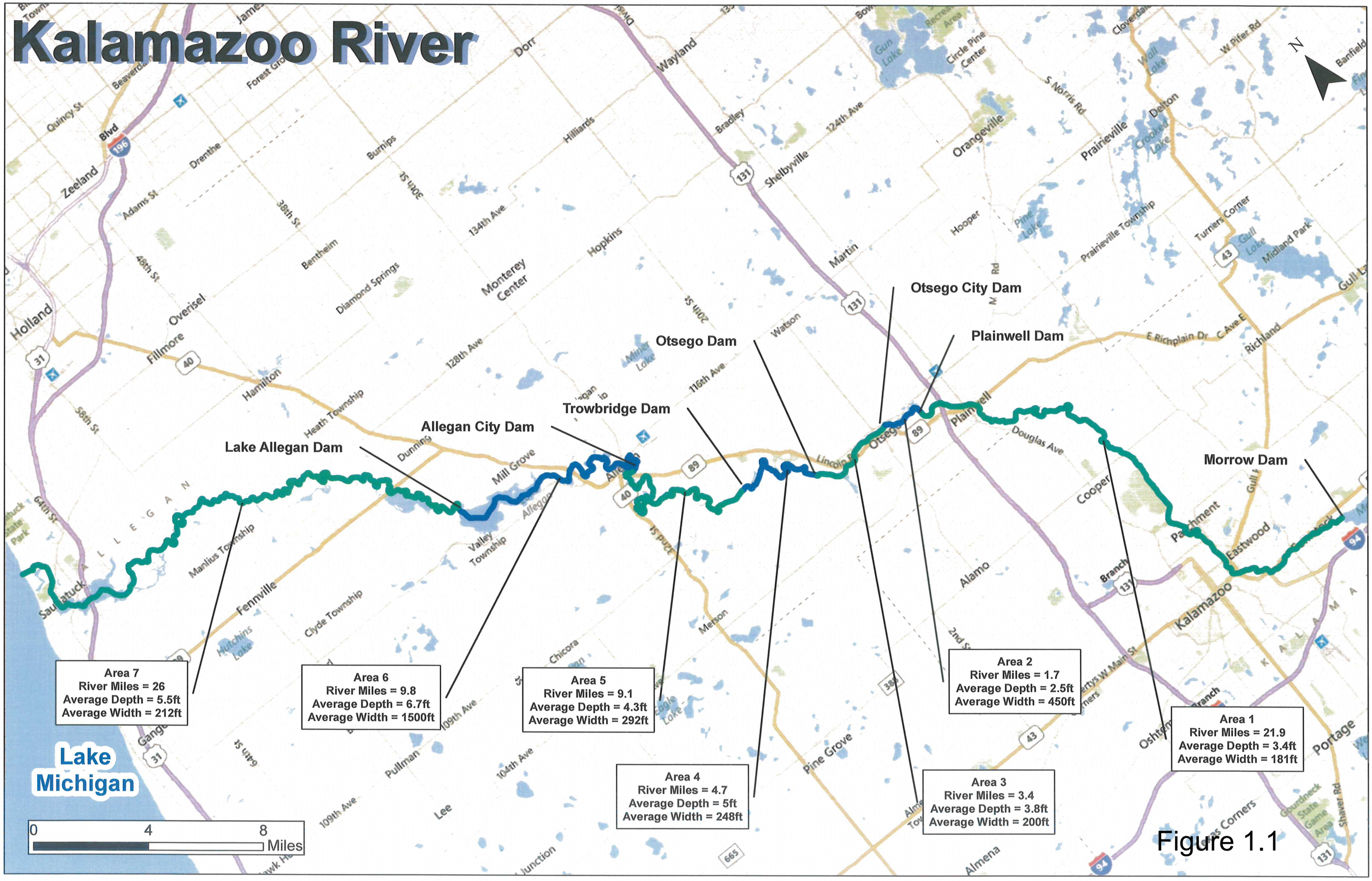
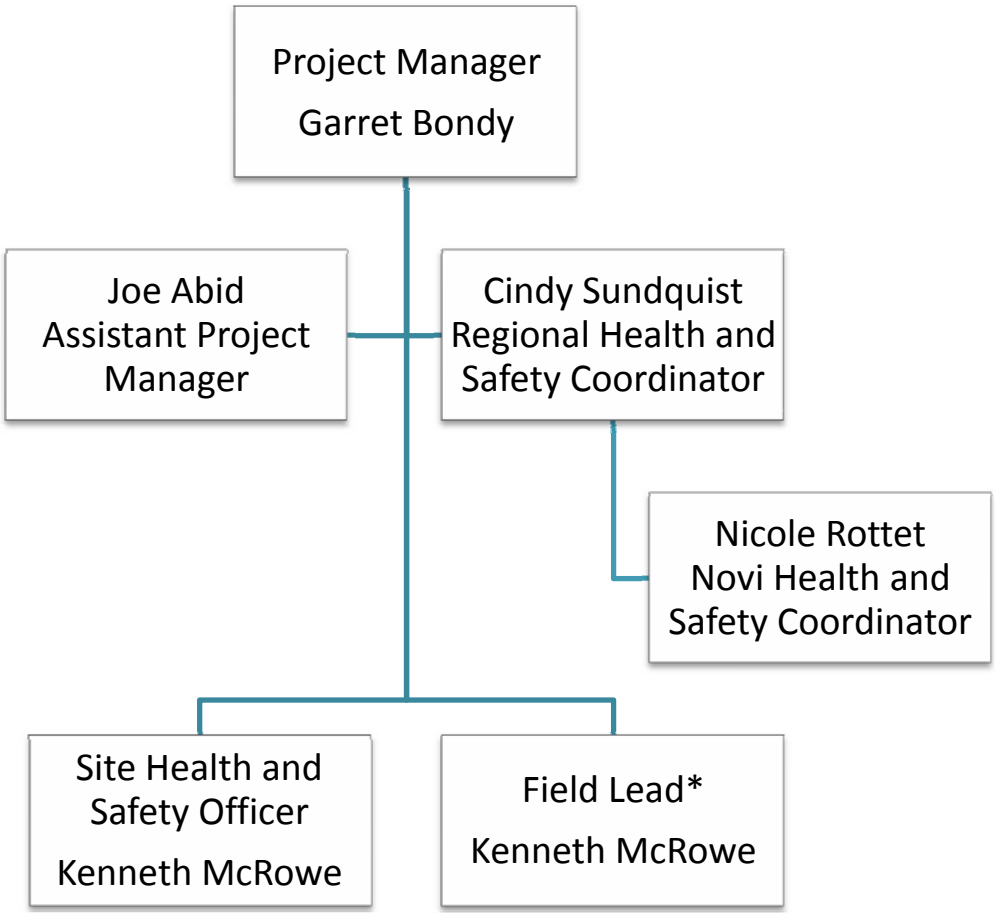

Kalamazoo River
Otsego City Dam
Plainwell Dam
Otsego Dam
Trowbridge Dam
Allegan City Dam
Lake Allegan Dam
Morrow Dam
Area 7
River Miles = 26
Average Depth = 5.5ft
Average Width = 212ft
Area 6
River Miles = 9.8
Average Depth = 6.7ft
Average Width = 1500ft
Area 5
River Miles = 9.1
Average Depth = 4.3ft
Average Width = 292ft
Area 4
River Miles = 4.7
Average Depth = 5ft
Average Width = 248ft
Area 3
River Miles = 3.4
Average Depth = 3.8ft
Average Width = 200ft
Area 2
River Miles = 1.7
Average Depth = 2.5ft
Average Width = 450ft
Area 1
River Miles = 21.9
Average Depth = 3.4ft
Average Width = 181ft
Lake Michigan
0
4
8
Miles
N

Figure 1.1

2.0 KEY PERSONNEL AND HEALTH AND SAFETY RESPONSIBILITIES

Figure 2.1 shows the project organizational chart. Table 2.1 describes health and safety responsibilities for key project personnel.

Figure 2.1 - Project Organization Chart – Field Activities



*May vary per field mobilization.

TABLE 2.1
KEY PERSONNEL HEALTH AND SAFETY RESPONSIBILITIES

GROUP HEALTH, SAFETY, ENVIRONMENT MANAGER Cindy Sundquist, CIH, CSP	FIELD LEAD (FL) Name: Varies per mobilization	SITE HEALTH & SAFETY OFFICER (SHSO) Name: Kenneth McRowe	PROJECT PERSONNEL
• Implement appropriate corporate health and safety policies, or environmental projects • Approve HASP and Amendments • Maintain exposure monitoring records • Notify Corporate VP of HSE in the event of an emergency situation • Verify that corrective actions recommended on Incident Analysis Forms have been implemented	• See that personnel receive this plan, are aware of its provisions, and are aware of the potential hazards associated with site operations, are instructed in safe work practices, and are familiar with emergency procedures, and these actions are documented • Determine that appropriate monitoring and personnel protective equipment are available • Monitor the Field Logbooks to ensure the health and safety work practices are employed • Coordinate with SHSO so that emergency response procedures are implemented • Ensure corrective actions recommended on Incident Analysis Forms are implemented	• Implement project HASP; report to the Project Manager for action if any deviations from the anticipated conditions exist; and authorize the cessation of work at site investigations if necessary • Confirm that prior to a hazardous waste site visit, site personnel meet the proper medical requirements and have the health and safety training to qualify them to perform their assigned tasks. Identify all site personnel with special medical conditions. • Conduct pre-entry briefing and tailgate safety meetings. Document meetings on Daily Tailgate Safety Meeting Checklist (See Appendix F) • Verify that all monitoring equipment and personal protective equipment is operating correctly according to manufacturer's instructions and such equipment is utilized by on-site personnel. Calibrate or verify calibration of all monitoring equipment and record results. • Conduct weekly inspections of jobsite using the Weekly Site Safety And Health Checklist (See Appendix G) • Implement site emergency and follow-up procedures	• Be familiar with and abide by the HASP • Notify the SHSO of any special medical conditions (e.g., allergies) • Immediately report any accidents and/or unsafe conditions to the SHSO • No individual shall go on site where he/she does not have the required safety training

3.0 WORKER TRAINING

All workers onsite shall have the appropriate training experience with respect to 29 Code of Federal Regulations (CFR) 1910.120(e), 29 CFR 1910.38, and 29 CFR 1910.1200 and AMEC Integrated HSE Manual. Copies of training certificates shall be current and available by phone for both AMEC employees and subcontractors:

- 40-hour initial
- 8-hour refresher
- 8-hour supervisory
- First Aid/CPR
- Hazard Communication
- Medical Clearance
- Respiratory Clearance (if Level C or B PPE is to be used)
- Documentation of Annual Respirator Fit Test (if Level C or B PPE is to be used)
- Documentation of Annual Fire Extinguisher Training (if fire extinguishers are present at the site).
- Documentation of Fall Protection training (if working at elevations)
- Documentation of Confined Space Entry training (if working in confined spaces)
- Documentation of training on OSHA substance specific standards (e.g., Hexavalent Chromium, Lead, etc.) if applicable

Prior to site activities a list of key personnel shall be developed documenting required training and dates of training for all field staff for each event.

4.0 MEDICAL SURVEILLANCE

All workers who could potentially be exposed to concentrations of contaminants above the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) for 30 days per year or more must be included in the Medical Surveillance Program. Any site specific medical surveillance conducted for site workers will also be listed on the table.

5.0 SITE CONTROL

Site control procedures, as required by 29 CFR 1910.120(d) and the AMEC Hazardous Waste Operations and Emergency Response Program, will be implemented before the start of site tasks to control worker exposures to contaminants.

5.1 WORK ZONES

Work zones are to be determined at the site by the SHSO. At this time it is anticipated that the work zones will be defined relative to the location of the work activity. The Exclusion Zone is considered the area within a 10-foot diameter of the sampling or remediation location. The Contamination Reduction Zone is considered to be the area within a 20-foot diameter of the sampling or remediation location. The decontamination zone will be located upwind of the work area. Work zones will be maintained through the use of:

☐ Warning Tape

☐ Cones and/or Barricades

☒ Visual Observations

5.2 BUDDY SYSTEM

When required by contract or when conditions exist that could be dangerous to life and health, a buddy system shall be implemented.

Yes	No	
☒	☐	Buddy System required?

5.3 SITE ACCESS

Access to areas of the site where remedial activities are occurring will be controlled using the following method(s):

☒	Sign in/sign out log	☐	Guard
☐	Identification badges	☐	Other: _____

5.4 GENERAL SAFE WORK PRACTICES

General safe work practices to be implemented during work activities at this site are included in Table 5.1.

TABLE 5.1

GENERAL SAFE WORK PRACTICES

- Workers have the right and responsibility to refuse work that he/she has reason to believe may cause injury or illness to himself/herself or any other person. If work is deemed unsafe, immediately notify the FOL and SHSO.
- Minimize contact with excavated or contaminated materials. Plan work areas, decontamination areas, and procedures accordingly. Do not place equipment or drums on the ground. Do not sit on drums or other materials. Do not sit or kneel on the ground in the Exclusion Zone or CRZ. Avoid standing in or walking through puddles or stained soil.
- Smoking, eating, or drinking after entering the work zone and before decontamination will not be allowed. Use of illegal drugs and alcohol are prohibited.
- Practice good housekeeping. Keep everything orderly and out of potentially harmful situations.
- In an unknown situation, always assume the worst conditions.
- Be observant of your immediate surroundings and the surroundings of others. It is a team effort to notice and warn of impending dangerous situations. Withdrawal from a hazardous situation to reassess procedures is the preferred course of action.
- Conflicting situations may arise concerning safety requirements and working conditions and must be addressed and resolved rapidly by the SHSO, Field Lead and Project Manager to relieve any motivations or pressures to circumvent established safety policies.
- Unauthorized breaches of specified safety protocol will not be allowed. Workers unwilling or unable to comply with the established procedures will be discharged.

6.0 HAZARD ANALYSIS

6.1 CONTAMINANTS OF CONCERN

Pertinent site information (e.g. records of chemicals used, records of disposal) and previous sampling data (e.g. groundwater, soil, sediment) have been reviewed to determine the contaminants of concern for this project. The known or suspected contaminants for the site are:

Contaminants of Concern (Attach Fact Sheets)	Maximum Concentrations			PEL/TLV
	Sediment (mg/kg)	Soil (mg/kg)	Water/Groundwater (µg/l)	
Area 1 Polychlorinated Biphenyls	150	230	NA	0.5 mg/m^3 (dermal)
Area 2 Polychlorinated Biphenyls	130	110	NA	0.5 mg/m^3 (dermal)
Area 3 Polychlorinated Biphenyls	120	160	NA	0.5 mg/m^3 (dermal)
Area 4 Polychlorinated Biphenyls	130	120	NA	0.5 mg/m^3 (dermal)
Area 5 Polychlorinated Biphenyls	81	91	NA	0.5 mg/m^3 (dermal)
Area 6 Polychlorinated Biphenyls	No Data	7.2	NA	0.5 mg/m^3 (dermal)
Area 7 Polychlorinated Biphenyls	2.8	1.4	NA	0.5 mg/m^3 (dermal)

Where milligram per kilogram (mg/kg) is used in measuring concentrations in soil or sediment; microgram per liter (µg/l) is used to measure concentrations in water; and milligram per cubic meter (mg/m^3) is used to measure concentrations in air. Appendix A contains Contaminant Fact Sheets for PCBs.

Where appropriate, health hazards shall be evaluated using air monitoring equipment (Section 7.0) and controlled by implementing personal protective equipment (Section 8.0).

6.2 ACTIVITY HAZARD ANALYSIS

AHAs have been conducted for each task associated with this project. The following AHAs can be found in Appendix B.

AHAs:

☒	Clearing Brush and Trees
☒	Surface water/sediment sampling from boat
☒	Boating
☒	Canoeing Safety
☒	Decontamination
☒	Dog and Wildlife Safety
☒	Drilling Operations
☒	Electrofishing
☒	Field Work - General
☒	Field Work - Oversight
☒	Groundwater Sampling
☒	Insect Stings and Bites

AHAs:

☒	Poisonous Plants
☒	Pore Water Sampling from Shore
☒	Sediment and Surface Water sampling from shore
☒	Sediment sampling from a Canoe or Kayak
☒	Soil Sampling
☒	Stream-wetlands & Fish survey
☒	Surface Water Sampling
☒	Utility Clearance
☒	Vehicle Travel
☒	Working in a Muddy Area
☒	Working near Water
☒	Working with Gasoline

☒	Mobilization/Demobilization and Site Preparation	☒	Working with Preservatives

7.0 AIR MONITORING

Section 6.1 lists PCBs as the only known or suspected contaminant of concern at the site. Air monitoring, with respect to PCBs, is only considered of concern during tasks involving large quantities of soil or sediment where dust is a concern. No air monitoring is necessary during sampling activities. Table 7-1 lists the monitoring instruments to be used during these activities:

Table 7-1
Action Levels per Monitoring Instrument

			Upgrade/Action Levels			
	Meter		**Level D**	**Level C**	**Level B**	**Action**
☒	Dust Meter					
	☒	Total	< 0.25 mg/m^3	≥ 0.25 mg/m^3	≥ 15 mg/m^3	

Readings for particulates are for 15 consecutive minutes at breathing zone height, measured with a calibrated air monitoring device. Dust sampling instruments provide "total dust" levels and do not differentiate between contaminated and non-contaminated dust particulates. Dust action levels are based on total dust and not respirable dust levels. Dust action levels are in excess of background levels, as measured either prior to on-site or off-site activities.

Table 7-2
Air Monitoring Action Level Summary

Dust Meter[1]	**Action**	**Level of PPE**
< 0.25 mg/m^3	Continue to monitor with air monitoring device	Level D / Modified Level D
≥0.25 mg/m^3	Continue to monitor, wet soils to prevent dust	Level C
≥ 15 mg/m^3	Stop work and evacuate area, Notify SSHO	Level B

[1] Monitor breathing zone

All monitoring equipment will be calibrated before each day of use. Results will be documented in the Field Logbook.

Areas of airborne dust and odor should be avoided. Skin contact with soil, sediment, surface water and ground water should be avoided.

8.0 DUST CONTROL

A mini-ram air monitoring device will be continuously utilized during construction activities to monitor for dusty conditions. Dust control methods will be utilized, such as the continuous use of a water truck to maintain access roads, excavation areas, and loose soils, to create a "crust" and/or to minimize the dust potential of the soils. Should use of a water truck prove inadequate, a dust palliative will be utilized in designated areas to provide additional dust control.

9.0 PERSONAL PROTECTIVE EQUIPMENT

The initial level of protection required for each task is provided in Section 1.. The individual PPE required for each task is listed in the AHAs. The level of protection may be upgraded or downgraded according to the action guidelines provided in Section 7.0. Level of PPE used each day shall be indicated in the Field Logbook. When using PPE, workers must adhere to the company's Personal Protective Equipment Program and OSHA regulations (29 CFR 1910.120[g] and 29 CFR 1910 Subpart I).

If respirators are worn, workers must adhere to the company's Respiratory Protection Program and OSHA regulations (29 CFR 1910.134). Beards (e.g., facial hair interfering with the respirator seal) are not allowed when respirators are worn.

PPE shall be decontaminated as per 29 CFR 1910.120(k). The decontamination procedures, equipment, and decontamination solution required for each task are provided in the AHA – Decontamination.

Re-usable safety gear will be washed with soap and water prior to re-use or removing from the work zone. Sampling tools, etc. will be decontaminated as described in the W*ork Plan*, or as directed by the SHSO. All drilling fluids and cuttings will be handled in accordance with the *Work Plan*. The disposition of this material and disposable safety gear will be the responsibility of the site owner. Safety gear that cannot be decontaminated will be disposed of as an investigative derived waste (IDW) in accordance with the applicable Work Plan.

10.0 EMERGENCY RESPONSE

The following emergency response information is provided as per 29 CFR 1910.120(j) and the AMEC Hazardous Waste Operations an Emergency Response Program.

10.1 HOSPITALS/CLINICS

Nearby hospitals (for emergency injuries needing immediate treatment) and a clinics (for non-emergency injuries) have been identified. Due to the large area of the work site, multiple medical facilities have been identified and locations provided, but routes are not provided due to possible variability in docking locations. Field staff will have access to global position system (GPS) or a map of the area to navigate to the closest hospital during the field activities.

The hospital to be used for emergency treatment is (See Figure 11.1 for Hospital locations):
Borgess Medical Center
1521 Gull Road
Kalamazoo, MI
269-226-4816

Bronson Hospital
601 John St.
Kalamazoo, MI 49007
269-341-7654

Borgess-Pipp Hospital
411 Naomi St.
Plainwell, MI 49080

Allegan Community Hospital
555 Linn St.

Allegan, MI
269-686-4321

Holland Community hospital
602 Michigan Ave
Holland, MI 49423
616-392-5141

The clinic to be used for non-emergency treatment is (See Figure 11.2 for Route Map to Clinic):

Borgess Medical Center
1521 Gull Road
Kalamazoo, MI 49048
269-226-7000

10.2 EMERGENCY CONTACTS

A list of contacts and telephone numbers for the applicable local off-site emergency responders is provided in Table 11.1. The nature of the site work and contaminants of concern should be reviewed and the ability of off-site responders to respond to reasonably anticipated emergencies should be confirmed. If there are any concerns with off-site responsibilities they should be contacted directly.

10.3 EMERGENCY RESPONSE EQUIPMENT

The following emergency response equipment is required for this project and shall be readily available.

- ☒ Field First Aid Kit (including Bloodborne Pathogen kit/supplies)
- ☒ Fire Extinguisher (during construction activities only)
  - ☐ Type A (Combustible materials)
  - ☐ Type B (Flammable liquids and gases)
  - ☐ Type C (Doesn't conduct electricity – to be used on electrical equipment)
  - ☒ Type ABC
- ☐ Eyewash (Note: 15 minutes of free-flowing fresh water
- ☐ SCBA
- ☐ Shower
- ☐ Other: Respirator

TABLE 11.1
EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department:	911		
Hospital:	269-226-4816		7/3/2013
Police Department:	911		
WorkCare (early injury case management)	1-888-449-7787		
	Office	**Cell**	
Site Health And Safety Officer: Ken McRowe	248-313-3698	517-204-5582	
Client Contact: Chase Fortenberry	404-652-6166	404-539-3509	
Project Manager: Garret Bondy	248-313-3660	248-514-1260	
Assistant Project Manager: Joe Abid	248-313-3692	517-290-7629	
Novi HS Coordinator: Nicole Rottet (See also Figure 10.3 – Incident Flow Chart)	248-313-3696	734-904-1562	
EPA: Project Manager: James Saric	313-886-0992		
OTHER: Ambulance	911		

10.4 COMMUNICATIONS

On-site communications will be conducted through the use of:

- ☒ Verbal
- ☐ Two-way radio
- ☒ Cellular telephone
- ☐ Hand signals
  - Hand gripping throat ..... Out of air, can't breathe
  - Grip partner's wrist or both hands around waist ..... Leave area immediately
  - Hands on top of head ..... Need assistance
  - Thumbs up ..... OK, I am all right, I understand
  - Thumbs down ..... No, negative
- ☐ Horn/Siren

☐ Other: _____

Off-site communications will be conducted through the use of:

☒ Cellular telephone
☐ Landline/Pay phone - location: _____
☐ Other: _____

10.5 EMERGENCY RESPONSE PROCEDURES

In the event that an on-site emergency develops, the procedures delineated in Table 11.2 are to be immediately followed.

TABLE 11.2
EMERGENCY PROCEDURES

- The SHSO (or alternate) should be immediately notified via the on-site communication system. The SHSO assumes control of the emergency response.
- The SHSO notifies the Project Manager and client contact of the emergency. The SHSO shall then contact the Eastern Group Health, Safety and Environment (HSE) Manager who will then contact the VP of HSE.
- If applicable, the SHSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the SHSO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs, should be donned.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and/or shower.
- If a worker is injured, first aid shall be administered by certified first aid provider.
- Before continuing site operations after an emergency involving toxic gases, the SHSO shall don a Self Contained Breathing Apparatus (SCBA) and utilize appropriate air monitoring equipment to verify that the site is safe.
- An injured worker shall be decontaminated appropriately.
- After the response, the SHSO shall follow-up with the required company reporting procedures, including the Incident Analysis Forms (Appendix C).

Injuries requiring medical treatment beyond first aid (as well as work-related vehicle incidents) will require the employee to submit a post incident drug test. It is the responsibility of the Supervisor/PM to ensure that the employee who has had an on-the-job incident as defined in AMEC Human Resource Policy HR 3-04 - Drug and Alcohol-Free Workplace, submits to this required testing. Contact Cindy Sundquist, Eastern Group HSE

Manager, at (207) 828-3309, or Collette Myers at 770-360-0607, if you have any questions on incident-related drug testing. The policy is located at http://amv2.amecnet.com/fn/HR/25445.aspx

10.5.1 AMEC Early Injury Case Management Program

If the emergency involves an injury to an AMEC employee, the HSE Coordinator or Field Lead are to implement the AMEC Early Injury Case Management program. See procedures below:

<table>
<tr><th>NON-EMERGENCY INCIDENT</th><th>EMERGENCY INCIDENT</th></tr>
<tr><td>Steps 1 & 2 must be completed before seeking medical attention other then local first aid.
1. Provide first-aid as necessary. Report the situation to your immediate supervisor AND HSE coordinator (all incidents with the apparent starting event should be reported within 1 hour of occurrence).
2. Injured employee:</td><td>1. Provide emergency first aid. Supervisor on duty must immediately call 911 or local emergency number; no employee may respond to outside queries without prior authorization. Any outside media calls concerning this incident must be referred immediately to Lauren Gallagher at 602-757-3211.
2. Once medical attention is sought and provided, the supervisor must:</td></tr>
<tr><td colspan="2">Call WorkCare 24/7 Hotline*
(888) II-XPRTS or (888) 449-7787</td></tr>
<tr><td>WorkCare will assess the situation and determine whether the incident requires further medical attention. During this process, WorkCare will perform the following:
• Explain the process to the caller.
• Determine the nature of the concern.
• Provide appropriate medical advice to the caller.
• Determine appropriate path forward with the caller.
• Maintain appropriate medical confidentiality.
• Help caller to execute path forward, including referral to the appropriate local medical facility.
• Send an email notification to the Corporate HSE Department.</td><td>WorkCare will be responsible for performing the following:
• Contact the treating physician.
• Request copies of all medical records from clinic.
• Send an email update to the Corporate HSE Department.</td></tr>
<tr><td colspan="2">3. IMMEDIATELY after contacting WorkCare send a brief email notification AND inform verbally (direct contact is required) ONE of HSE corporate representatives See Figure 11.3.
4. Make all other local notifications and client notifications.
5. Local Supervisor, HSE Coordinator, SSHO and any applicable safety committees to complete preliminary investigation, along with the initial Incident Report within 24 hours.
6. Corporate Loss Prevention Manager to complete Worker’s Compensation Insurance notifications as needed.
7. Corporate HSE to conduct further incident notifications, investigation, include in statistics, classify, and develop lessons learned materials.
* - NOTE: Step 2 is only applicable to the North-American operations and to incidents involving AMEC personnel. High potential near misses, subcontractors’ incidents, regulatory inspections, spills and property damages above $1,000 should be reported immediately, following directions from Step 3.</td></tr>
</table>

10.6 BLOODBORNE PATHOGENS

In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, a person who has a valid certificate in first-aid training shall be available at the worksite to render first aid or CPR. Provisions shall be made, prior to commencement of the project, for prompt medical attention in case of serious injury. All employees who work on a site where bloodborne pathogens are known to be present or who have been designated, as a part of their work duties at the site, to respond to all first aid injuries, will have received bloodborne pathogen training at the time of initial assignment and annually thereafter.

10.6.1 Universal Precautions

Universal precautions is a method of infection control, which operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be infectious for Human immunodeficiency Virus, Hepatitis B virus, Hepatitis C virus, or other bloodborne pathogens. Universal Precautions will be observed to prevent contact with blood or other potentially infectious materials. All body fluids are to be considered potentially infectious materials.

Universal precautions consist of the following practices:

- All workers will protect their skin and mucous membranes against contact with blood or other bodily fluids. At a minimum, gloves and safety glasses shall be donned prior to administering first aid or otherwise touching blood and body fluids, mucous membranes, or non-intact skin and for handling items or surfaces contaminated with blood or bodily fluids. Note: the gloves used selected to be used at this site to protect against chemical exposure will also protect against bloodborne pathogens.
- All first aid procedures involving blood or other potentially infectious materials will be performed in such a manner as to minimize splashing, spraying, spattering, and generation of droplets and aerosols of these substances.
- When there is a risk of exposure to the eyes, nose and mucous membranes from the generation of droplets of blood or other body fluids, masks and face shields shall be worn.
- Uncoated or polycoated Tyveks (or the suits provided in some bloodborne pathogen kits, shall be worn during procedures that are likely to generate splashes of blood or other body fluids.
- Hands and other skin surfaces shall be washed immediately and thoroughly if contaminated with blood or other bodily fluids. Flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.
- Hands must be washed with soap and water immediately or as soon as feasible after removal of gloves or other PPE used to perform first aid. When provision of hand washing facilities is not feasible, use appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible.
- CPR masks or other ventilation devices will be available for use in areas in which the need for resuscitation is foreseeable.

All site first aid kits shall include bloodborne pathogen kits or supplies. These kits typically include, at a minimum, the CPR mask, gloves, safety glasses, and a red bag.

10.6.2 Decontamination/Laundering

If a garment(s) is penetrated by blood or other potentially infectious materials, the garment(s) shall be removed immediately or as soon as feasible. All PPE shall be removed prior to leaving the work area. When PPE is removed it shall be placed in an appropriately designated area or container for storage, washing, decontamination or disposal. In many States where waste is incinerated, if the blood doesn't drip from a material when compressed or if there is no risk of it flaking off during handling, the materials can be disposed of in the regular trash and does not need to be handled as bio-hazardous materials.

If personal clothing should become contaminated with blood or other body fluids, it shall be collected, bagged or containerized and appropriately labeled. Contaminated laundry shall be handled as little as possible with a minimum of agitation.

All equipment and environmental/working surfaces shall be cleaned and decontaminated with an appropriate disinfectant immediately after contact with blood or other potentially infectious materials or as soon as feasibly possible. A solution of one part bleach to nine parts water can be mixed and used as a disinfectant to clean/wipe down equipment and other surfaces.

Broken glassware or other sharps which may be contaminated shall not be picked up directly with the hands. It shall be cleaned up using mechanical means, such as a brush and dust pan, tongs, or forceps and disposed of in a sturdy container.

10.6.3 Vaccines, Evaluation, Follow-Up

Hepatitis B vaccines will be available to all AMEC employees who may have an occupational exposure. Post-exposure evaluation and follow-up will be conducted on all employees who have had an exposure incident.

Figure 11.1a

Address **1521 Gull Rd**
Kalamazoo Township, MI 49048

Borgess Medical Center
269-226-4816

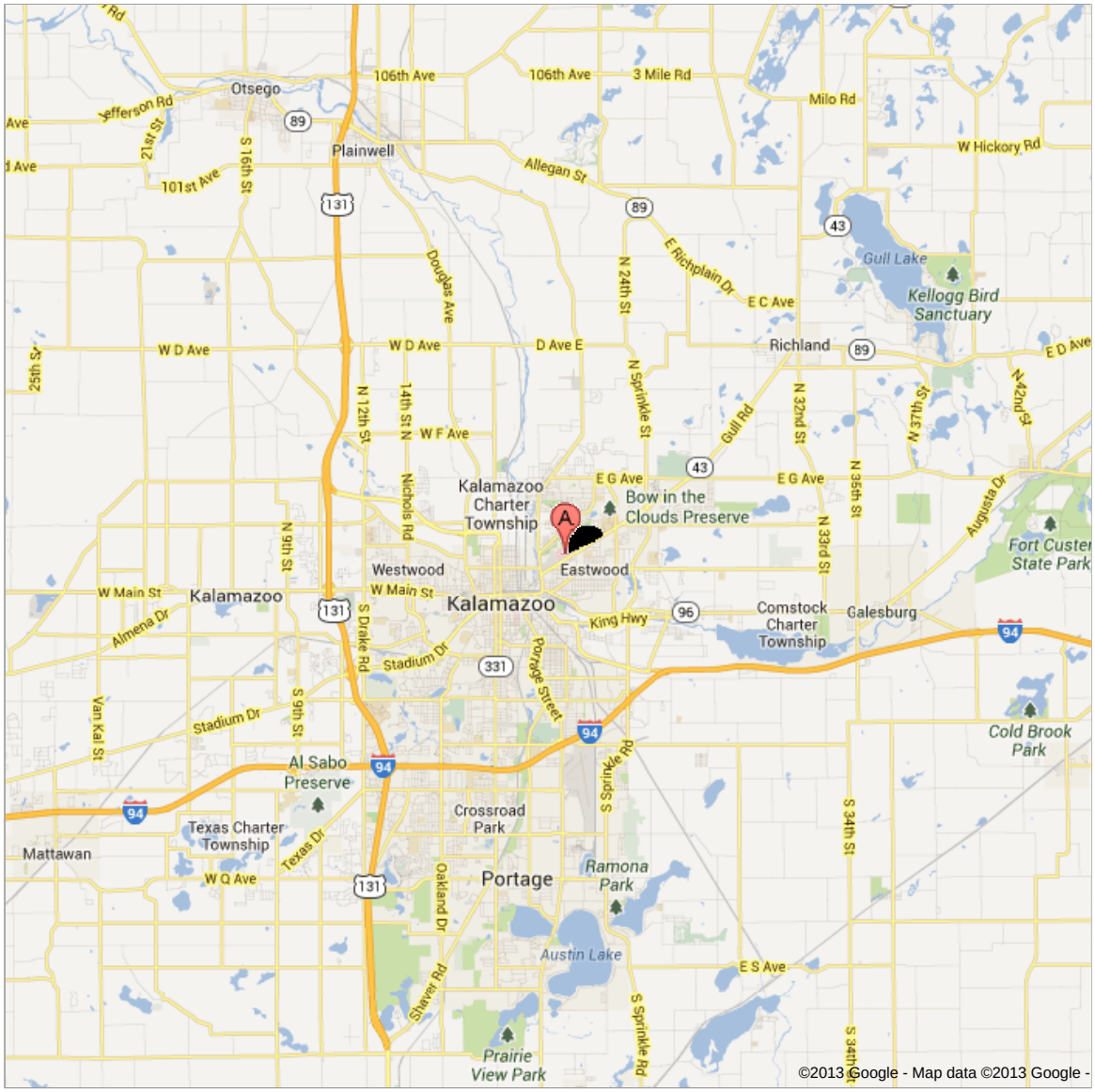


Figure 11.1b

Google

Address **601 John St**
Kalamazoo, MI 49007

Bronson Hospital - Downtown Kalamazoo
269-341-6387

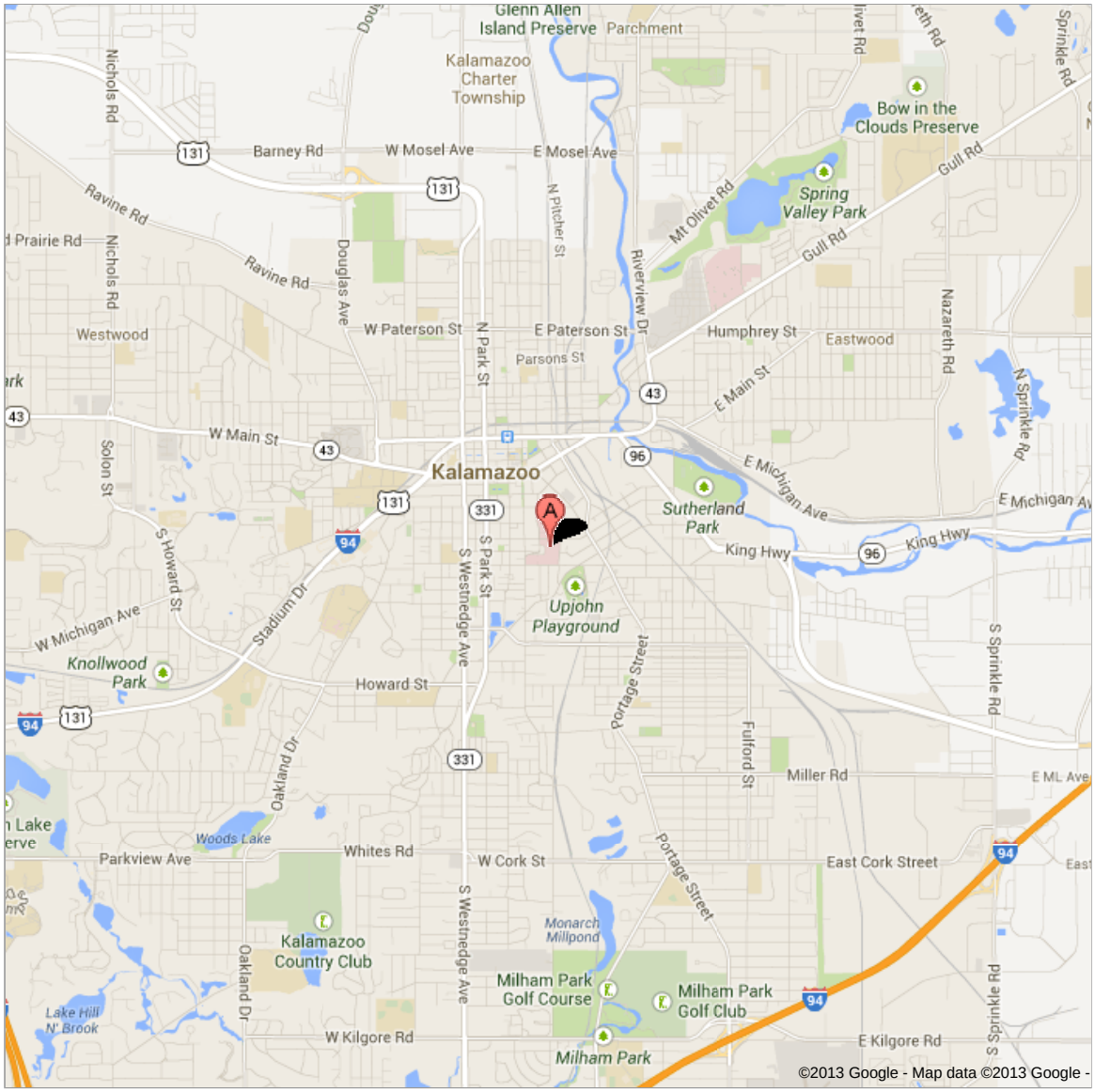


Figure 11.1c

Address **411 Naomi St**
Plainwell, MI 49080

Borgess-Pipp Hospital
411-685-0739

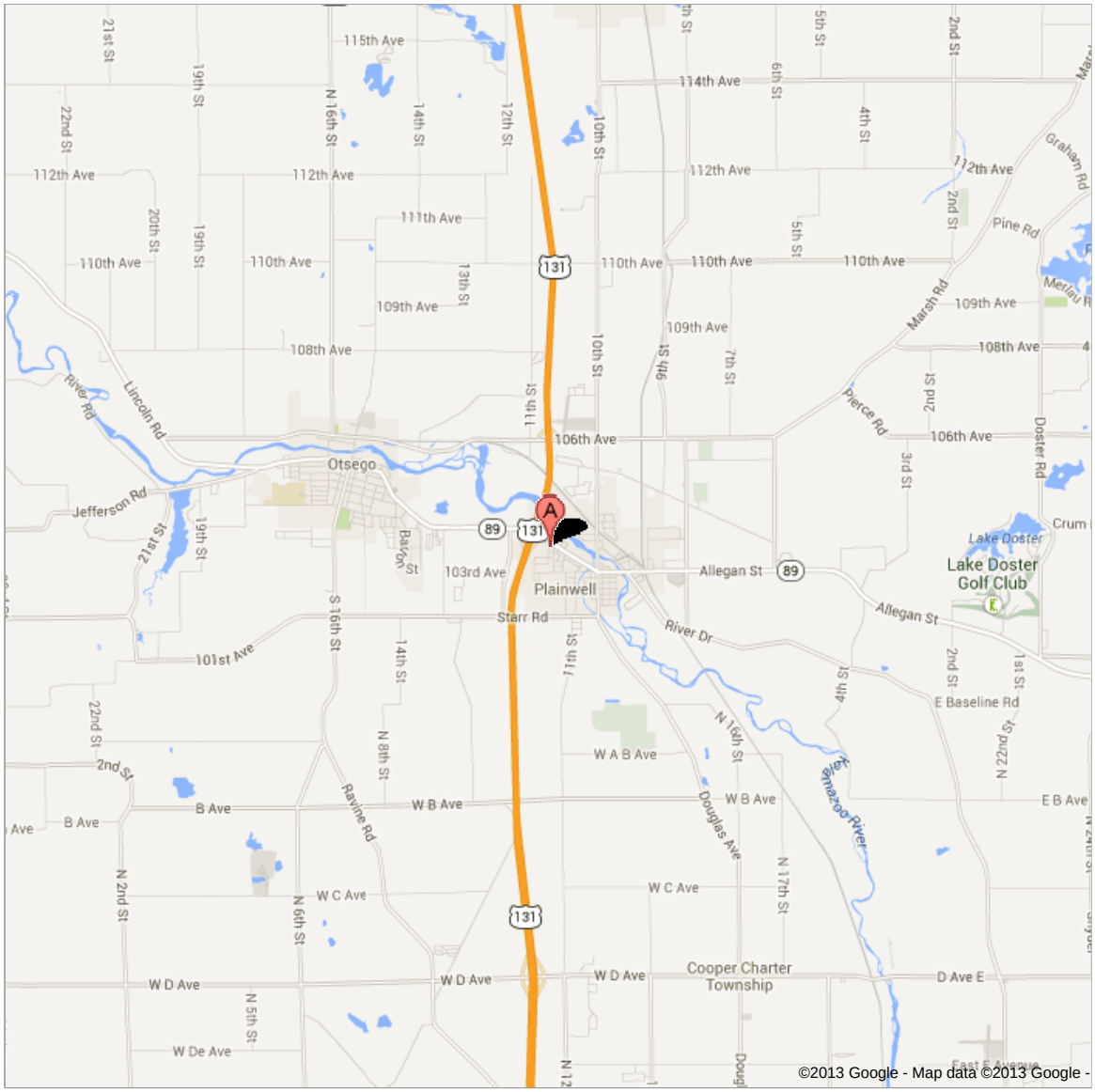


Figure 11.1d

Address **555 Linn St**
Allegan, MI 49010

Allegan General Hospital
269-686-4321

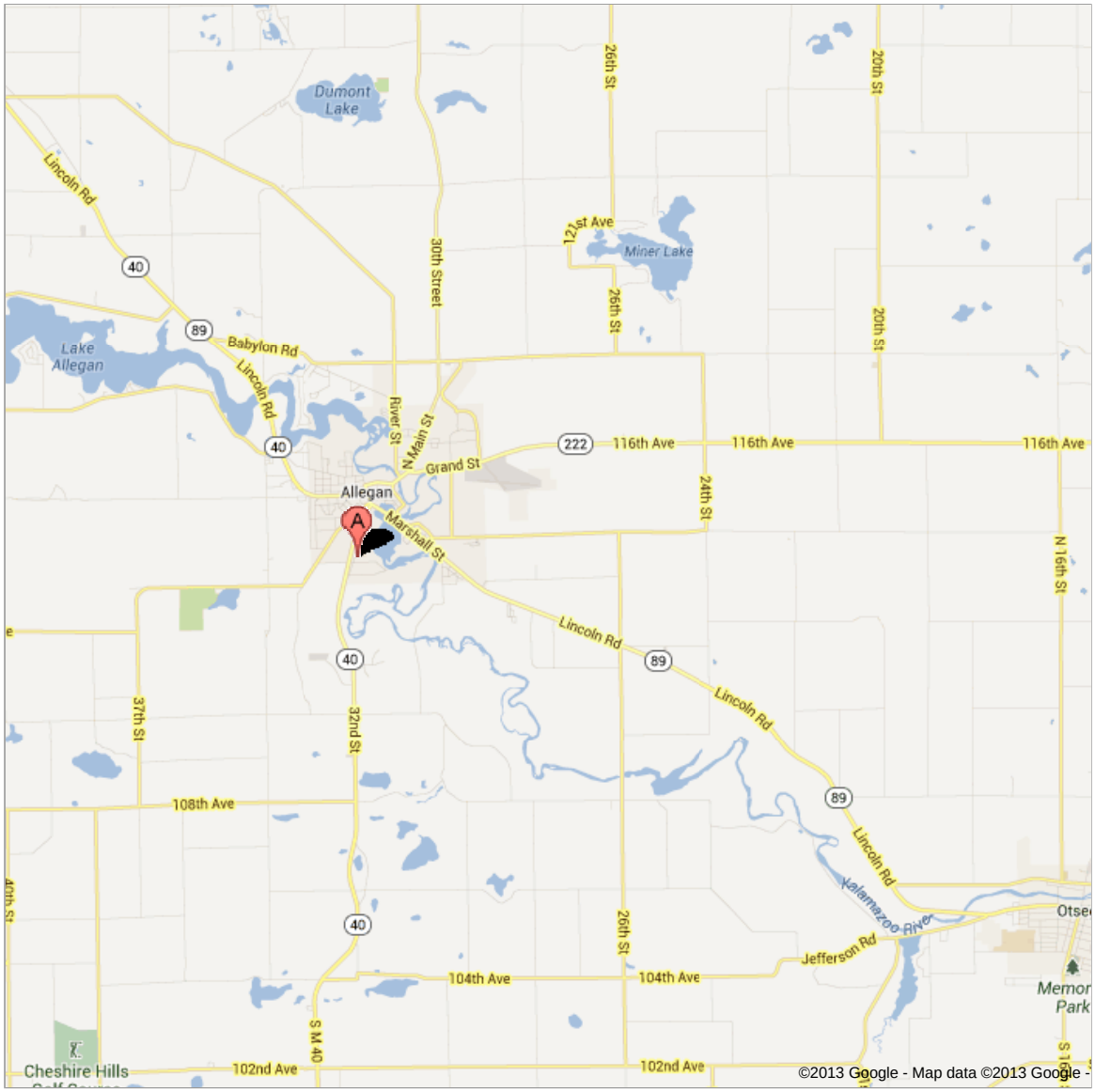


Figure 11.1e

Address **602 Michigan Ave**
Holland, MI 49423

Holland Community Hospital
616-392-5141

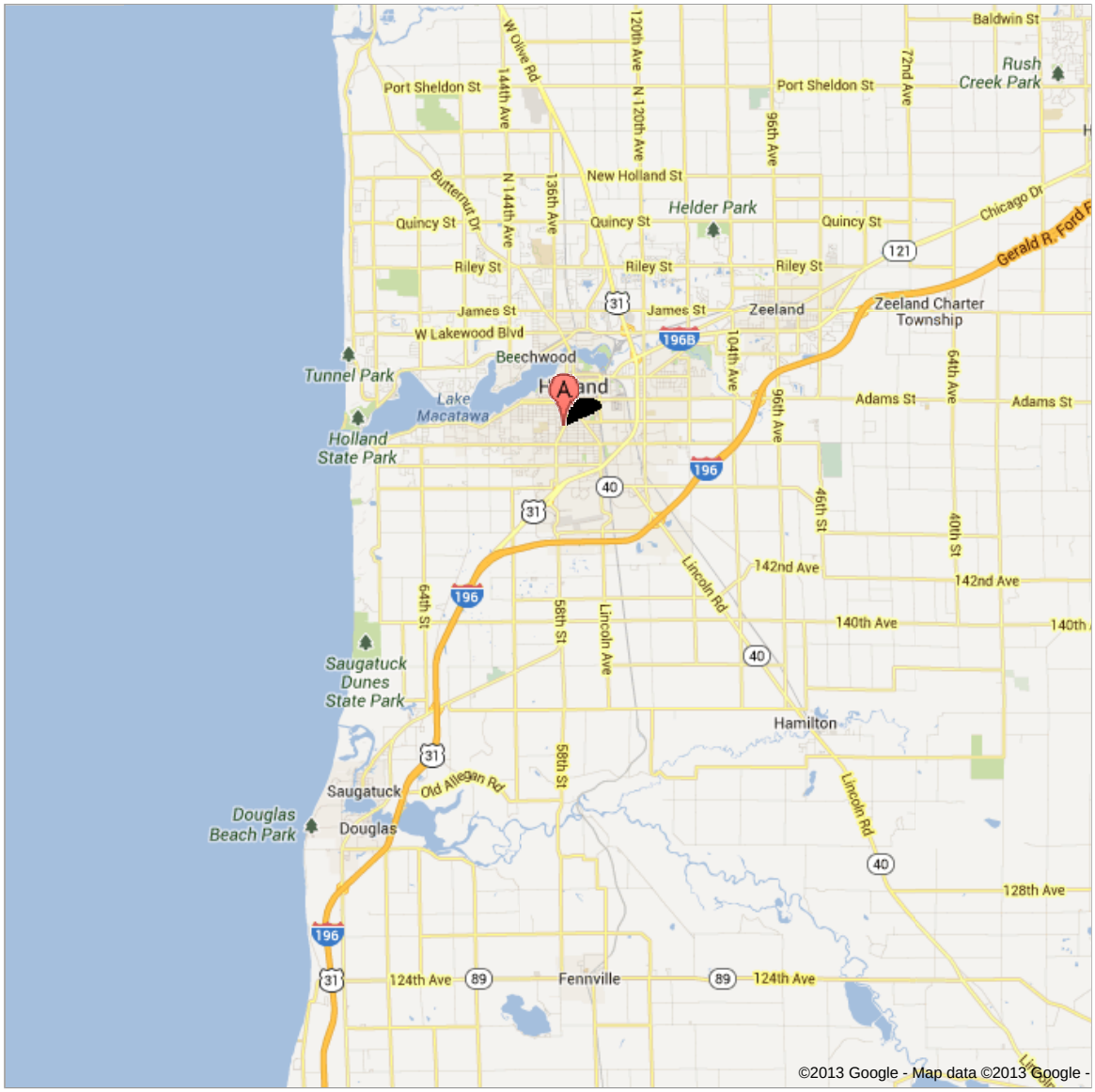


Figure 11.2

Address **1521 Gull Rd**
Kalamazoo Township, MI 49048

Borgess Medical Center -clinic
269-226-7000

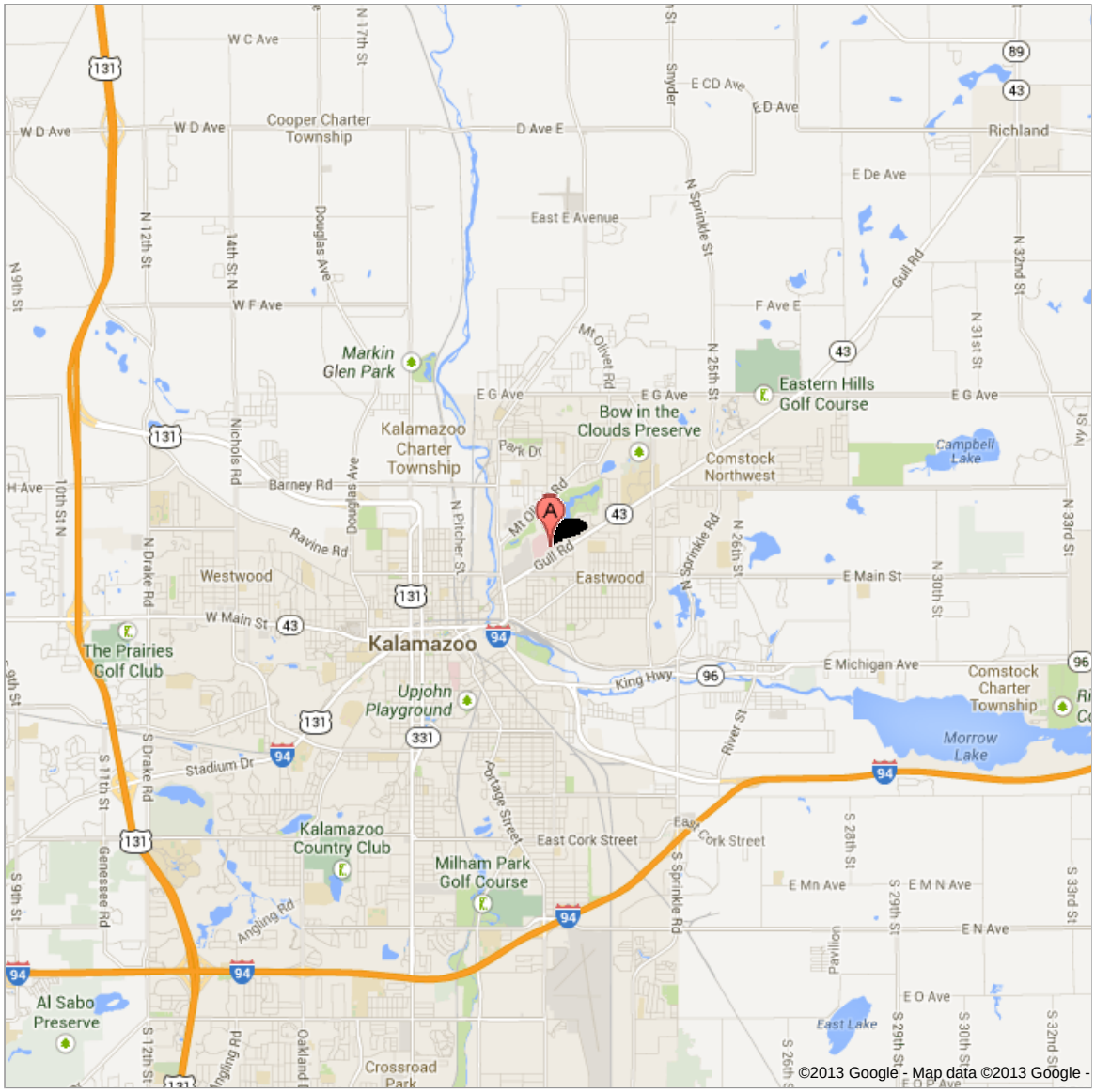
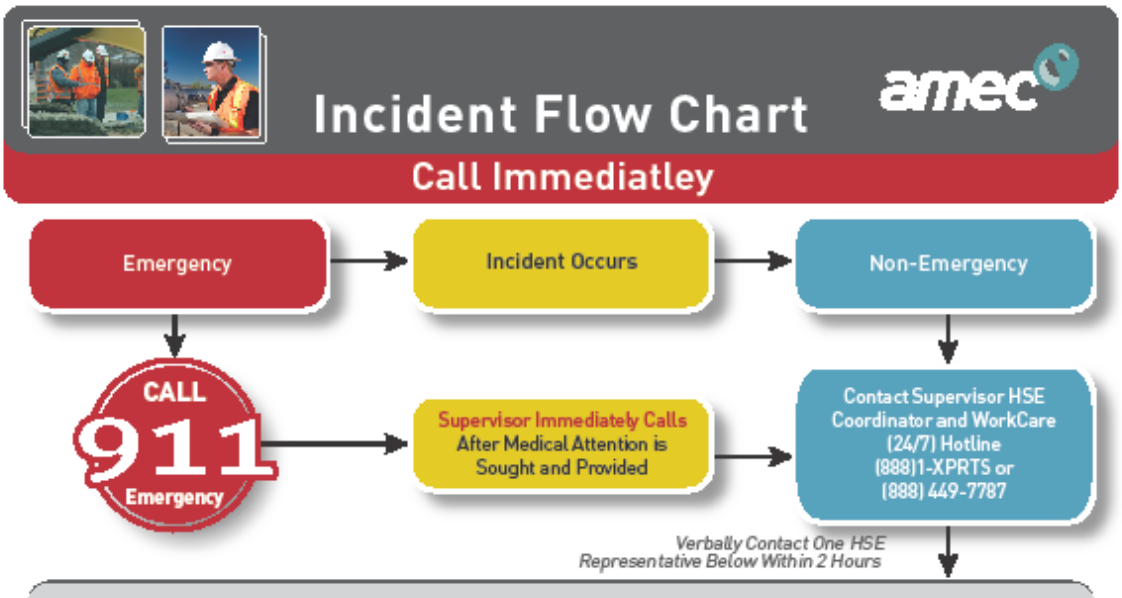


FIGURE 11.3
INCIDENT FLOW CHART



E&I Corporate HSE Department Contact List

Name/Email	Office Location	Contact Information
Bruce Voss bruce.voss@amec.com	Catherdral City, CA	760.202.3737 (office) 951.897.6381 (cell)
Chad Barnes chad.barnes@amec.com	Phoenix, AZ	602.733.6000 (office) 480.495.9846 (cell)
Cindy Sundquist cynthia.sundquist@amec.com	Portland, ME	207.828.3309 (office) 207.650.7593 (cell) 207.892.4402 (home)
Don Kubik don.kubik@amec.com	Oakland, CA	510.663.4100 (office) 510.368.6433 (cell)
Gabe Sandholm gabe.sandholm@amec.com	Minneapolis, MN	612.252.3785 (office) 206.683.9190 (cell)
John Mazur john.mazur@amec.com	Wilmington, NC	910.452.1185 (office) 910.431.230 (cell) 910.681.0538 (home)
Lori Dowling lori.dowling@amec.com	Prince George, BC	250.564.3243 (office)
Philip Neville philip.neville@amec.com	Thorold, ON	905.687.6616 (office) 905.380.4465 (cell)
Tim Kihn tim.kihn@amec.com	Edmonton, AB	780.944.6363 (office) 780.717.5058 (cell)
Vlad Ivensky (can call 24/7) vlad.ivesky@amec.com	Plymouth Meeting, PA	610.877.6144 (office) 484.919.5175 (cell) 215.947.0393 (home)

**High potential near misses, subcontractor incidents, regulatory inspections, spills, and property damage greater than $1000, should be reported within 60 minutes to one of the above HSE Representatives.*

Revised 17 July 2012-hb

11.0 CONFINED SPACE ENTRY

Yes	No	
☐	☒	The task(s) for this project involve confined space entry.

If yes, see applicable AHA in Appendix B.

12.0 SPILL CONTAINMENT

Yes	No	
☒	☐	The task(s) for this project involve drum/tank/container sampling, excavation, transportation, etc.

If yes, see Appendix H for spill containment procedures. Additional details should be provided in the event of the construction work or other activities that warrant it spill control measures.

13.0 HAZARD COMMUNICATION

The following procedures shall be followed for all chemicals brought on site (e.g., decontamination solution, sample preservatives, etc.)

- Chemical containers (primary and secondary) shall be correctly and clearly labeled with the name of the chemical and the hazard(s) associated with that chemical (e.g. flammable, corrosive, etc.).
- If chemicals are transferred to a secondary container, that container will be labeled with the name of the chemical and the hazard warnings.
- Workers will have received training on the hazards of these chemicals as indicated in Table 3.1.
- A Material Safety Data Sheet (MSDS)/Safety data sheet (SDS) for each chemical listed below is included in Appendix D.

Alconox	Nitric Acid
Bentonite	pH 4 calibrating buffer
Gasoline	pH 7 calibrating buffer
Hydrochloric acid	Portland Cement
Methyl alcohol	

When chemicals are used on site, workers must adhere to the AMEC Hazard Communications Program and the OSHA regulation (29 CFR 1910.1200).

14.0 RECORDKEEPING

At the end of the project, the following items shall be maintained in the project file:

- ☒ HASP
- ☒ Incident Analysis/Vehicle Incident Forms (if applicable)
- ☒ Ground Disturbance Incident Analysis (if applicable)
- ☒ Industrial Hygiene/Air Monitoring information (results and documentation - send copies to C. Sundquist)
- ☒ Log notebooks

APPENDIX A

CONTAMINANT FACT SHEETS

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Aroclors-General 1336-36-3
CAS Number: 11097-69-1, 53469-21-9
Synonyms:
Chlorodiphenyls
Polychlorinated biphenyls (PCBs)

HEALTH HAZARD DATA

Color: Colorless to pale yellow

Physical State: Solid X (below 50^0 F)
Liquid (Viscous)
Gas

Odor: Hydrocarbon-like

Odor Threshold: NA

Vapor Density: NA

Ionization Potential (IP): Unknown

IDLH: 5 mg/m^3

Carcinogen: OSHA
IARC X
NTP X
ACGIH X
NIOSH X

Skin absorbable: yes X no ___
Skin corrosive: yes X no ___

Signs/Symptoms of Acute Exposure:
Irritant to eyes, chloracne, liver damage

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.5 mg/m^3 (1254)		
ACGIH TLVs	0.5 mg/m^3 (1254)		
NIOSH RELs	0.001 mg/m^3 (1254)		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Not Applicable (NA)				

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Saranex, Butyl Rubber, Neoprene, Viton, Teflon, Barricade, Responder

Gloves: Viton, Butyl Rubber, Teflon, Neoprene

Boots: Butyl Rubber, Neoprene

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 2.5 mg/m^3

MUC Full-Face APR =TWA x 10 = 2.5 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA/NA

Fire Extinguishing Media:

Dry Chemical	X	Foam	X
Water Spray	X	CO_2	X

Incompatibilities:
Strong oxidizers

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

APPENDIX B

ACTIVITY HAZARD ANALYSIS PER TASK(S)

AHA - Surface Water and Sediment Sampling from a Boat
Activity Description

Activity/Work Task:	Boating- Surface water and sediment collection		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**9//20/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/ Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures
- Collecting samples from a boat
- The **Safe Boating Checklist** and a **Float Plan** must be filled out prior to use of a boat
- See Appendix F of the HASP for the Boating Safety and Personal Floatation Device Selection Guide

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (work gloves, PFDs, hard hat if A frame or other overhead objects, safety glasses, gloves, steel toe work boots) Boating first Aid kit Boating Safety Kit (flares, air horn, marine radio, cell phone, tool kit)	**Competent / Qualified Personnel:** See HASP (Name – Position/Employer) **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Full boat inspection prior to use. Inspect all PPE prior to use

AHA - Surface Water and Sediment Sampling from a Boat
Activity Description

Job Steps	Hazards	Controls	RAC
1. Prepare for site visit	1A) Slips, trips, falls	1A) Slips, trips, falls ▪ Familiarize self with site prior to visit. ▪ Complete appropriate training before going on site. ▪ Provide appropriate person in district office your itinerary. ▪ Prepare listing of emergency phone numbers, both on and offsite. ▪ Identify site/activity PPE needs ▪ Ensure that First Aid training is current, and that tetanus booster are current	**L**
2. Check and calibrate sampling equipment.	2A) Muscle Strain - lifting, twisting, tugging	2A) Muscle Strain - lifting, twisting, tugging ▪ Inspect all PPE and equipment and ensure that it is working properly. ▪ Get assistance from a coworker or use mechanical means to move equipment (dolly, cart, etc.)	**L**
	2B) Slips, trips and falls	2B) Slips, trips, and falls ▪ Wear proper footwear ▪ Pay attention to where walking	**L**
3. Load/carry equipment to the site.	3A) Slips, trips, falls	3A) Slips, trips, falls ▪ See AHA for Mobilization / Demobilization and Site Preparation	**L**
	3B) Muscle Strain - lifting, twisting, tugging	3B) Muscle Strain - lifting, twisting, tugging ▪ Proper lifting, posture, ergonomic practices and body mechanics. ▪ Share the load, move items in smaller shifts, or use cart. ▪ Loading the boat: ensure no twisting. ▪ Use a trailer if possible to launch boat. ▪ Empty boat of gear prior to loading or moving boat to/from vehicle. ▪ Ensure boat is properly secured in the vehicle prior to moving. ▪ Tie a red cloth to the furthest point of the boat if overhanging from the vehicle. ▪ Ensure enough able bodies to move and launch the boat to share the load.	**L**
	3C) Irate property owners, pets	3C) Irate property owners, pets ▪ Call property owners in advance. ▪ Check in to introduce yourself upon arrival. ▪ Be courteous and diplomatic	**L**
	3D) Crime	3D) Crime ▪ Do not enter areas where threats are present. ▪ Contract security where applicable. Use the buddy system. ▪ Maintain contact with support such as radio or cell phone.	**L**
	3E) Struck by traffic – launch boat.	3E) Struck by traffic – launch boat. ▪ Wear hi visibility safety vest, use buddy system. ▪ Use traffic cones and a lookout. Launch from public boat launch facilities.	**L**
	3F) Battery handling – acid exposure	3F) Battery handling – acid exposure ▪ Use care when handling batteries. ▪ Wear gloves and protective clothing when caring batteries. ▪ Check for leaks and damage prior to use of batteries.	**L**

AHA - Surface Water and Sediment Sampling from a Boat
Activity Description

Job Steps	Hazards	Controls	RAC
	3G) Launch and load boat: Capsize	3G) Launch and load boat: Capsize ▪ Be aware of the boat maximum weight, person capacity, and engine size limit. ▪ Balance the gear and people in the boat. ▪ Personnel must wear approved, properly sized and buckled PFD when on the water. ▪ Ensure lines and body parts are out of the water before operating engine. ▪ Avoid operation within swimming areas. ▪ Provide signal flags and communication to protect the public of your activities. ▪ Test motor prior to shoving away from the pier. ▪ Ensure all appropriate equipment is provided and accessible according to AMEC EH&S Manual – Boating Safety. ▪ Include bailer, anchor, second means of propulsion, line and throwable floatation.	**L**
	3H) Pinch points – attaching/mounting the motor	3H) Pinch points – attaching/mounting the motor ▪ Mind where hands and body parts are when moving and loading equipment.	**L**
	3I) Fueling – chemical exposure, fumes, environmental spills.	3I) Fueling – chemical exposure, fumes, environmental spills. ▪ See AHA Gasoline	**L**
	3J) Noise – engine (optional)	3J) Noise – engine (optional) ▪ Wear hearing protection. ▪ Provide shielding from noise such as bulkhead, or sound dampening. ▪ Operate with engine box in place to dampen noise	**L**
4. Field parameters	4A) Falling into water and capsize	4A) Falling into water and capsize ▪ Use equipment that facilitates reaching the location from a safe distance (extensions, etc.). ▪ Work using the buddy system. ▪ Wear PFD when working on the water. ▪ Balance equipment and people. ▪ Avoid leaning over the side of the boat. ▪ Anchor or secure the vessel to hold station. ▪ Steer boat to meet waves on the bow. ▪ Stay seated while in boat. ▪ If moving about, keep weight low.	**M**
	4B) Slips trips and falls	4B) Slips trips and falls ▪ Wear appropriate footwear. ▪ Survey and clear walking area. ▪ Do not walk on slippery surfaces. ▪ Maintain good housekeeping. ▪ Provide walkways, platforms or secure walking surface. ▪ Use the buddy system and maintain communications with support staff.	**L**

AHA - Surface Water and Sediment Sampling from a Boat
Activity Description

Job Steps	Hazards	Controls	RAC
	4C) Vermin, leaches, Insect/animal born disease	4C) Vermin, leaches, Insect/animal born disease ▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Be aware of your surroundings. ▪ Wear insect netting clothing or apply insect repellant on all exposed skin surfaces as appropriate – consider sample contamination ▪ Wear long sleeve shirt and full length pants ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Tuck pants leg into boot ▪ Do not put hand/arm into/under an area that you can not see into/under clearly ▪ Do not touch any suspected contaminant without appropriate hand PPE ▪ Wash hands as soon as possible upon completion of task. ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. ▪ Contract vermin relocation, if applicable. ▪ Remain vigilant and respectful of wildlife. (See AHA for Insects, Stings and Bites) ▪ Wear wind impervious outerwear ▪ During warm months – wear a long sleeve cotton/breathable fabric shirt and pants.	**L**
	4D) Weather – temperature extremes, hypothermia, sun stroke, heat exhaustion, dehydration, sun burn.	4D) Weather – temperature extremes, hypothermia, sun stroke, heat exhaustion, dehydration, sun burn. ▪ Train workers about weather and appropriate precautions. ▪ Heat: Familiarize self with signs of heat related illnesses: cramps, heat rash, dehydration, heat exhaustion, and heat stroke. ▪ Sun: o Keep body protected o Wear sunscreen, wide brimmed hat or hardhat. o Drink plenty of fluids to remain hydrated. (Follow AMEC guidelines, procedures and training for fluid intake, sunscreen use, proper clothing, work schedule, etc.) o Schedule work for cool part of day. o Take breaks in the shade. ▪ Wind: o Wear layered clothing, gloves, hard hat with winter liner, etc. ▪ Cold: o During cold weather - layer clothing	**L**
	4E) Weather – inclement and strong winds	4E) Weather – inclement and strong winds ▪ Watch for clouds and incoming weather. ▪ Monitor weather forecasts. ▪ Have a float plan and communications when on and off the water. ▪ Return to shore if weather threatens. ▪ Stay close to shore if possible and abandon work until winds subside. ▪ Schedule work when weather is calm (early morning or evening.) ▪ Provide proper lighting if working after dark.	**L**
	4F) Run aground – shifting or unbalanced vessel - equipment/personnel/slip/ fall/overboard	4F) Run aground – shifting or unbalanced vessel - equipment/personnel/slip/ fall/overboard ▪ Operate at safe speed. ▪ Post a look out for shallow or submerge obstacles. ▪ Remain seated when under way. ▪ Be wary of tides, flooding, flash floods and dam releases. ▪ Use anchor to kedge or pull back toward the way you came and deeper water. ▪ Use a pole or paddle, lighten the vessel to float off.	**L**

AHA - Surface Water and Sediment Sampling from a Boat
Activity Description

Job Steps	Hazards	Controls	RAC
5. Sample collection	5A) Same as Item #4 above.	5A) Same as Item #4 above.	L
	5B) Bending, pulling, twisting	5B) Bending, pulling, twisting ▪ Use a vibrating or wiggling motion on the sample device to break the soil suction. ▪ Proper lifting technique.	L
	5C) Splash	5C) Splash ▪ Wear appropriate safety glasses (tinted for sun). ▪ Be aware if sampling water through a filter, if it becomes plugged with sediment it may unexpectedly "blow off" the hose and splash. ▪ Change filter prior to sedimentation back pressure. ▪ Minimize pouring distance to limit the splash between containers.	L
	5D) Chemical exposure	5D) Chemical exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Work upwind of the sample location. Minimize exposure using a shovel/spoon or tool to collect the sample. ▪ Review and understand MSDS for all chemicals being handled. ▪ Be careful when handling acids and caustic substances. ▪ Wear adequate PPE and wash hands after completion of task.	L
	5E) Vegetation, sticks, reeds, - cuts and punctures.	5E) Vegetation, sticks, reeds, - cuts and punctures. ▪ Clear access to site. ▪ Be familiar with toxic plants such as poison ivy. ▪ Avoid such plants. ▪ Wash thoroughly after accidental contact with toxic materials and plants.	L
6. Vessel Operations	6A) Lack of boating skills, boating incident	6A) Lack of boating skills, boating incident ▪ Complete USCG/Power Squadron or other recognized boating course. ▪ All employees must wear PFDs while underway. ▪ Maintain vessel and proper safety equipment. ▪ Carry cell phone or radio. ▪ File a float plan and work in pairs.	M
7. Sample preparation	7A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain	7A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain ▪ Use proper ergonomics when lifting heavy objects ▪ Use appropriate mechanical assistance and tools when possible.	L
	7B) Chemical Exposure	7B) Chemical Exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Wash/wipe or decontaminate exterior of sample containers and equipment. ▪ Use care handling preservatives (acids/bases.)	L
	7C) Sharps and knives	7C) Sharps and knives ▪ Use care handling tape dispensers, knives and sharp objects. ▪ Use guarded dispensers	L
	7D) Extreme cold (ice preservation)	7D) Extreme cold (ice preservation) ▪ Minimize exposure to ice. ▪ Use a shovel/spoon or tool to fill bags for preserving samples in coolers.	L
8. Site exit and drive home or next site.	8A) Vehicle contamination	8A) Vehicle contamination ▪ Wash hands promptly. ▪ Contaminated PPE (Booties, tyvek, latex gloves) should be disposed on-site. ▪ Remove boots and soiled clothing for secure storage in trunk; decontaminate as soon as possible. ▪ Update exposure log.	L

AHA - Surface Water and Sediment Sampling from a Boat
Activity Description

Job Steps	Hazards	Controls	RAC
	8B) Traffic hazards.	8B) Traffic hazards. ▪ Follow AHA for Mobilization / Demobilization and Site Preparation	L
	8C). Equipment Malfunction	8C). Equipment Malfunction	L
		• Take a basic tool kit aboard the boat including boat plugs, fire extinguisher, and first aid kit.	
		• Carry extra engine parts and fluids in the event of engine problems.	
		• Be alert and rid the area of any spilled gas and gas fumes before doing any work on electrical parts that may cause a spark.	
	8D). Communications	8D) Communications	L
		• A cell phone shall be maintained on board the boat at all times.	
9. Collecting Samples	9A). Capsizing Boat/Falling Overboard	9A). Capsizing Boat/Falling Overboard	M
		• Make sure a proper anchor is in the boat to stabilize the boat at the sampling location.	
		• Ensure proper distribution of the load in the boat to avoid tipping and capsizing. Standing in the boat should be minimized.	
		• An appropriate Coast Guard approved personal floatation device shall be worn by each individual on board to protect against drowning.	

AHA - Boating
Activity Description

Activity/Work Task:	Boating / Working from a boat		
Project Location:	**Kalamazoo River**		
Contract Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/ Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures
- Collecting samples from a boat
- The **Safe Boating Checklist** and a **Float Plan** must be filled out prior to use of a boat
- See Appendix F of the HASP for the Boating Safety and Personal Floatation Device Selection Guide

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: PFDs if boating. Work gloves, PFDs, safety glasses, gloves, and steel toe work boots if working from boat Boating first Aid kit Boating Safety Kit (flares, air horn, cell phone, tool kit)	**Competent / Qualified Personnel:** See HASP (Name – Position/Employer) **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Full boat inspection prior to use. Inspect all PPE prior to use

Job Steps	Hazards	Controls	RAC
1) Prepare for Boat	1). NA	1) Prepare for Boat Operation	L

AHA - Boating
Activity Description

Job Steps	Hazards	Controls	RAC
Operation		• Any employee assigned to operate a boat on behalf of AMEC shall be thoroughly trained in the proper operation of the boat and outboard motor. This training maybe provided by the employee's Supervisor or a Coast Guard approved boating safety course. • A safe Boating checklist form shall be completed for the appropriate boat(s) prior to the field trip to ensure that all required equipment is present in the boat. • Prior to boat entering the water, a Float Plan must be filled out and filed with a reliable person who can be depended upon to notify the Coast Guard, or other rescue organization, should you not return or check-in as scheduled.	
2) Attaching/ Detaching Trailer to/from Vehicle	2) Vehicle/Trailer Accident/Hand injury	2) Vehicle/Trailer Accident • Be sure to wear work gloves when working with trailer hitches to reduce pinching fingers and hands. • Be sure trailer tires are checked for wear and proper pressure. • Use spotter when backing up to trailer. • When lowering trailer onto vehicle hitch, never put hands or fingers under the hitch. • Lock trailer hitch in place • Use safety chains • Attach trailer light hook-up. • Check to make sure all trailer lights are working.	**L**
3) Boat Transport to and from Jobsite	3). Vehicle/Boat Trailer Accident	3). Vehicle/Boat Trailer Accident • Prior to trip, make sure boat and trailer are compatible and that the boat is securely fastened to the trailer. • Once under way it is easy to lose a feel for the toe. Allow more room to stop and greater clear distance for overtaking and passing other vehicles. • Continually check and/or monitor that the trailer features (ie. wheel bearings, tie downs, lights) are in good shape and proper working condition during the trip. • Be alert for signs restricting trailers. • When loading and unloading, be sure that the bow/stern straps are fastened/unfastened and the plug is in. • Care should be exercised when loading and unloading the boat on the trailer. Everyone should stand away except for one designated spotter helping the truck driver load and unload.	**L**
4) Fueling Boat	4). Fueling Accident	4). Fueling Accident • Remove the tank from the boat before fueling • Fueling the boat shall be done with extreme caution to avoid static sparks and spills. Don't overfill the tanks, allow for fuel expansion.	**L**

AHA - Boating
Activity Description

Job Steps	Hazards	Controls	RAC
		• Be alert and rid the area of any spilled gas and gas fumes before doing any work on electrical parts that may cause a spark. • All electrical equipment should be shut off during fueling operations. • Make sure a fire extinguisher and first aid kit is in the boat.	
5) Operating Boat	5A). Excessive Speed/Boat Accident	5A). Excessive Speed/Boat Accident • Keep an alert lookout and go at a safe speed when traveling in the boat. On the Missouri River, watch for Barge traffic and other river traffic. • Watch your wake and the wake of other boats. Boat operators are responsible for their wake and any damage it may cause. • Avoid any large debris that maybe floating.	**L**
	5B). Falls Overboard	5B). Falls Overboard • Ensure proper distribution of the load in the boat to avoid tipping and capsizing • An appropriate Coast Guard approved personal floatation device shall be worn by each individual on board to protect against drowning. • A throwable floatation device (ring) shall also be onboard during boat operation.	**M**
	5C). Equipment Malfunction	5C). Equipment Malfunction • Take a basic tool kit aboard the boat including boat plugs, fire extinguisher, and first aid kit. • Carry extra engine parts and fluids in the event of engine problems. • Be alert and rid the area of any spilled gas and gas fumes before doing any work on electrical parts that may cause a spark.	**L**
	5D). Communications	5D) Communications • A cell phone shall be maintained on board the boat at all times.	**L**
6) Collecting Samples	6). Capsizing Boat/Falling Overboard	6). Capsizing Boat/Falling Overboard • Make sure a proper anchor is in the boat to stabilize the boat at the sampling location. • Ensure proper distribution of the load in the boat to avoid tipping and capsizing. Standing in the boat should be minimized. • An appropriate Coast Guard approved personal floatation device shall be worn by each individual on board to protect against drowning.	**M**

AHA – Canoeing Safety
Activity Description

Activity/Work Task:	Canoeing		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for Canoeing and working from a canoe

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: PFDs Cell phone	**Competent / Qualified Personnel:** See HASP (Name – Position/Employer) **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Full canoe and paddle inspection prior to use. Inspect all PPE prior to use.

AHA – Canoeing Safety
Activity Description

Job Steps	Hazards	Controls	RAC
1. Recruit 3 people to make up the "canoe lift team", establish spotter/lead person.	Encountering adverse weather	Inquire about conditions before leaving the office. Be aware of oncoming storms.	L
	Communication errors during canoe relocation resulting in injury	One person is to serve as the spotter/lead voice for potential slip/trip/fall hazards. If only 2 people are available, vocal communication is necessary at all times, establish a lead voice person. Each person is to serve as lookout for potential slip/trip/fall hazards throughout the move.	L
2. Safely remove canoe from vehicle	Slips, trips, falls	Each person on the lift team is to serve as lookout for potential slip/trip/fall hazards throughout the move.	L
	Head, neck, back or general body strain and injury from improper lifting	Train all involved personnel for proper lifting lifting procedures. Slowly transfer canoe from vehicle to overhead position as soon as team is ready and in place. Wait for the lead voice person to initiate the lift.	L
3. Moving to destination	Adverse road and/or terrain conditions creating hazards.	Communicate with team, listen to spotter/lead voice, slow down, stay alert, and never turn on a slope.	L
	Auto and pedestrian traffic	Assess the conditions before moving to a clear destination.	L
4. Set canoe down on level ground	Bad location	Evaluate area prior to lowering the canoe. Utilize a three step process for lowering the canoe - slowly lowering/rotating canoe to shoulder, waist, and then to ground level. Once canoe is safely on the ground, check the condition of the canoe. If any holes are observed, do not use it.	L
5. Place canoe in water, board canoe.	Slips, trips, falls resulting in bodily injury or drowning.	Drag canoe to edge of water and push into water. Don PFD prior to boarding canoe. PFDs are to be worn at all times while in canoes. Carefully board canoe one at a time while it is stabilized by other team members. Use caution to avoid tipping the canoe.	L
	Horseplay while canoeing leading to tipping.	No standing while in the canoe.	L

AHA – Canoeing Safety
Activity Description

Job Steps	Hazards	Controls	RAC
6. Upon returning to the shore, prior to removing the canoe from the water, identify level ground and plan a safe route of travel prior to attempting to relocate canoe.	Slips, trips, falls	To remove canoe from water, drag canoe out of water to the identified stable bank area.	**L**
7. Lift canoe to overhead position.	Body strain	Check condition of canoe Communicate with the entire lifting team. Lift canoe using a two step process, slowly raising the canoe to waist level prior to lifting to a full overhead position.	**L**
8. Moving to vehicle and loading canoe back onto vehicle.	Slips, trips, falls	Each person on the lift team is to serve as lookout for potential slip/trip/fall hazards throughout the move.	**L**
9.	Head, neck, back or general body strain and injury from improper lifting	Train all involved personnel for proper lifting lifting procedures. Slowly transfer canoe from vehicle to overhead position as soon as team is ready and in place. Wait for the lead voice person to initiate the lift.	**L**
10.	Improperly attaching the canoe to the vehicle leading to equipment damage and injury.	Ensure secure attachment of the canoe to the vehicle.	**L**

AHA – Clearing Brush and Trees
Activity Description

Activity/Work Task:	Clearing Brush and Trees		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **H**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for safety while clearing brush and trees
- Additional PPE than normal is required, including protective chaps and a face shield for appropriate work

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Hard Hat, safety glasses, face shield, gauntlets, protective chaps, steel toe leather work boots with slip resistant soles, high visibility safety vest, hearing protection). Chaps must overlap safety boots by at least 2 inches. Back support if necessary. Machete, axes, brush hook and/or chainsaw.	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Any chain saw that is used on the project must be equipped with appropriate guards, and all guards must be in place and functional as designed before tool is used. Inspect power cord sets prior to use. Inspect all PPE prior to use.

AHA – Clearing Brush and Trees
Activity Description

Job Steps	Hazards	Controls	RAC
1. Going to site, work preparation	1A) General	1A) See Mobilization/demobilization and Site Preparation AHA	L
2. Clearing light brush with Machete	2A) Cuts and Lacerations	2A) Cuts and Lacerations ▪ The machete should be used only to cut light brush. Do not use machetes for heavy cutting. Use long-handed lopping shears or brush hooks instead of machetes for cutting thorny bushes and briars. ▪ Don heavy leather work gloves, safety glasses and face shield, and long sleeve work clothing prior to using machete. ▪ Remove vines and low hanging limbs that might catch machete and cause it to fly out of your hand or strike your body. ▪ Never use a machete while in a tree. ▪ Always use sharp tools. Dull tools are likely to slip or rebound. Sharpen machete blades only from six (6) inches from the butt of the handle to within two (2) inches of the point. The end of the machete blade should not be sharpened. To reduce the possibility of injury, it can even be blunted. ▪ Station machete users at no closer than ten (10) feet intervals. Under no conditions should workers who are using sharp-edged tools simultaneously be within 10 feet of each other. Protect yourself by retaining this minimum safety zone. ▪ Always have a firm footing before swinging the machete. While chopping, if possible, lean forward. ▪ Strokes should be made away from the body. No cut should ever be directed downward toward the feet or toward any other part of the body. ▪ Swing with a full swing at an approximate 45º, but do not over-swing or swing too hard. ▪ Right-handed: Right foot forward - when swinging downward toward the left or when swinging upward to the right. Left foot forward - when swinging downward toward the right or when swinging upward to the left. ▪ Left-handed - reverse the right-handed procedure. ▪ When not in use, the machete should be placed in a stout scabbard to reduce the chance of injury and to protect its cutting edge and stored out of walking areas.	M
	2B) Eye Injury	2B) Eye Injury ▪ Maintain a distance of at least 10 feet between site workers when walking through dense vegetation or woods so that rebounding branches don't cause eye injuries. ▪ Wear eye protection.	L
	2C) Slips/Trips/Falls	2C) Slips/Trips/Falls ▪ Be particularly careful when walking along a cleared survey line that may have protruding sharp tree/brush stubs. They can cause serious injury if fallen upon. ▪ Wear sturdy work boots with over-the-ankle support and with good traction.	L

AHA – Clearing Brush and Trees
Activity Description

Job Steps	Hazards	Controls	RAC
	2D) Accidental Contact with Poisonous Plants	2D) Contact with Poisonous Plants ▪ Be particularly careful when cleaning areas that have the potential for poisonous plants (e.g., poison ivy) avoid these areas whenever possible. ▪ Instruct all site workers on how to recognize poisonous plants that may be present in the work area; especially workers who are highly sensitive (had positive reaction previously). ▪ When possible, do not assign workers who have experienced reaction to contact with poisonous plant to brush clearing activities. ▪ See Poisonous Plants AHA. ▪ Provide and apply a skin protectant or barrier cream. Fasten pant legs securely over boot tops (adhesive tape may be necessary). ▪ Wear gloves and keep them away from the face and other exposed parts of the body. Do not touch skin with hands, clothes, or equipment that may have contacted poisonous plants. ▪ Whenever the skin contacts a poisonous plant or noxious weed, wash the area with cold water and poisonous plant wash within 1 to 3 minutes or as soon as possible. Use liberal amounts of water to ensure that all poisonous oils are washed off. While working around poisonous plants, do not wash with soap and/or hot water because they can remove natural protective oils from your skin. ▪ Destroy poisonous plants around improved areas. ▪ Do not burn poisonous plants. Inhaling smoke from burning poisonous plants can cause fever, malaise, respiratory problems, and severe rash. ▪ As soon as possible upon returning from the field, use a poisonous plant wash (e.g., Technu) rubbing alcohol to cleanse skin that contacted poisonous plants. ▪ Clean tools with a citrus-based solvent before storing (use appropriate gloves and adequate ventilation). Provide verbal warning to field services personnel who will receive returned equipment that the equipment may have come in contact with poisonous plants. ▪ Avoid handling contaminated clothes. Wash contaminated clothing separately from other clothes in hot water and detergent.	**L**
	2E) Ticks and Stinging Insects	2E) Ticks and Stinging Insects ▪ See Insect Stings and Bites AHA.	**L**

AHA – Clearing Brush and Trees
Activity Description

Job Steps	Hazards	Controls	RAC
3. Clearing small trees or limbs with Axes	3A) Cuts/Lacerations	3A) Cuts/Lacerations ▪ Axes are for cutting trees with trunks or limbs greater than one inch in diameter. ▪ Remove vines and low hanging limbs that might catch the axe and cause it to fly out of your hand or strike your body. ▪ Inspect the axe to make sure it is in proper working order. Make sure that the head of the axe is tight on the handle. ▪ Always use sharp tools. Dull tools are likely to slip or rebound. ▪ Never use an axe while in a tree. ▪ Proper grip of the handle is important. Where working space is ample and full-force chopping is necessary, place one hand near the end of the handle and move the other toward the head as the axe is being lifted; on the down stroke, this hand should slide toward the end of the handle. In crowded locations, hold the handle near its center with both hands. Strokes with this grip are easily controlled but are not too powerful. ▪ Keep your eyes on the spot you're aiming for. ▪ Warm the blade of an axe slightly before using it in cold weather. This can be done by holding the axe in gloved hands for a short period of time. A tempered steel blade, when cold, can fracture and cause particles of metal to fly. ▪ Do not chop frozen wood or very hard knots. They can cause the blade to rebound. ▪ When cutting a dead, hardwood tree, be very careful because many of them are extremely hard. ▪ To trim limbs from a fallen tree trunk, stand to the side of the tree opposite the limb. ▪ Carry an axe by gripping the handle just behind the head and turning the sharp edge outward. The axe should be always be sheathed when not in use.	**M**
	3B) Eye Injury	3B) Eye Injury ▪ Maintain a distance of at least 10 feet between site workers when walking through dense vegetation or woods so that rebounding branches don't cause eye injuries. ▪ Wear eye protection.	**L**
	3C) Slips/Trips/Falls	3C) Slips/Trips/Falls ▪ Be particularly careful when walking along a cleared survey line having protruding sharp stubs. They can cause serious injury if fallen upon. ▪ Wear sturdy work boots with over-the-ankle support and with good traction.	**L**

AHA – Clearing Brush and Trees
Activity Description

Job Steps	Hazards	Controls	RAC
4. Clearing brush using a Brush Hook	4A) Cuts/Lacerations	4A) Cuts/Lacerations ▪ The brush hook functions like an axe that has its cutting head reversed. It is used for rough work in brush too thick for an axe and finds its best use in thick underbrush where a low cut, requiring a long cutting edge, is needed. ▪ Inspect the bush hook to make sure it is in proper working order. Make sure that the head of the brush hook is tight on the handle. ▪ Always use sharp tools. Dull tools are likely to slip or rebound. ▪ Remove vines and low hanging limbs that might catch brush hooks and cause them to fly out of your hand or strike your body. ▪ Never use a brush hook while in a tree. ▪ To keep the head solidly on the handle, workers should carry a tool to adjust the collar or clamp. ▪ When using, hold the brush hook like you would an axe, except keep your upper hand a little more toward the cutting edge to give better balance when making a low cut. ▪ When cutting, try not to fight the foliage but, rather, strike at the base of the plants. Aim carefully and keep your body balance. ▪ Make sure adequate clearance is maintained. The brush hook can be more easily deflected than the axe because of the shape of its blade. ▪ Carry a brush hook like you would carry an axe. Keep your hand close to the head. Because the beak easily catches on vines and wires when the brush hook is carried with its head pointing backward, always point the head to the front. Never carry a brush hook on your shoulder. ▪ Because of their shape, brush hooks are difficult to store in trucks or tool houses unless special provisions are made. Sheathes should be provided to protect workers and to keep the blades from being nicked.	**M**
	4B) Eye Injury	4B) Eye Injury ▪ Maintain a distance of at least 10 feet between site workers when walking through dense vegetation or woods so that rebounding branches don't cause eye injuries. ▪ Wear eye protection.	**L**
	4C) Slips/Trips/Falls	4C) Slips/Trips/Falls ▪ Be particularly careful when walking along a cleared survey line having protruding sharp stubs. They can cause serious injury if fallen upon. ▪ Wear sturdy work boots with over-the-ankle support and with good traction.	**L**

AHA – Clearing Brush and Trees
Activity Description

Job Steps	Hazards	Controls	RAC
5. Clearing brush /small trees with a chainsaw	5A) Cuts, Hearing Loss, Eye Injuries, Head injuries	5A) Cuts, Hearing Loss, Eye Injuries, Head injuries ▪ Anyone operating a chainsaw shall have had appropriate safety training in operation of chainsaws and tree clearing. Under no circumstances must AMEC personnel operate the subcontractor's chainsaw. ▪ AMEC personnel shall remain at a safe distance away from tree clearing activities. ▪ Obtain, read, and follow all of the chainsaw manufacturer's required safety precautions and instructions. ▪ Wear gloves, chaps, hard hat, safety glasses and face shield, hearing protection, and sturdy leather boots with slip resistant soles. Chaps must overlap safety boots by at least 2 inches. ▪ Do not wear loose-fitting clothing. ▪ Make sure that the chain is always sharp and the lubrication reservoir is full. ▪ Ensure fuel cap on saw is secure. ▪ Start the saw on the ground or on another firm support. Drop starting is never allowed. ▪ Start the saw at least 10 feet from the fueling area, with the chain's brake engaged. ▪ Do not operate or allow a chainsaw to run while walking. ▪ Point bar forward when going downhill and the saw is at the side. ▪ Point bar to the rear when going uphill and the saw at the side. ▪ Pack and guard bar and dogs when carrying saw on the shoulder. ▪ Maintain minimum 10 feet walking space between site workers. ▪ Leg protection (chaps) shall cover the full length of the thigh to the top of the boots.	**H**

	5B) Kickback	5B) Kickback
		▪ There are two recognized methods for safely starting a saw. In both methods, the trigger lock should not be used.
		  ▪ On Ground starting.
		  ▪ Stand starting.
		▪ Drop Starting is prohibited.
		▪ Gasoline-powered chain saws must be equipped with a protective device that minimizes chain saw kickback.
		▪ Be cautious of saw kick-back. To avoid kick-back, do not saw with the tip. If equipped, keep tip guard in place.
			H

	5D) Cuts, eye injury, hearing damage, back strain, falling debris	5D) Cuts, eye injury, hearing damage, back strain, falling debris ▪ Wear gloves, eye and hearing protection, steel-toed shoes, back support, hard hat. ▪ Be aware of surroundings (i.e. power lines, vehicles, other employees). Be alert and look up frequently. ▪ Use line or wedge to guide fall. ▪ Do not conduct tree/brush cutting activities at night. ▪ Do not leave a partially cut tree without marking it and warning others. Remove the partially cut tree pieces as soon as possible.	**M**

AHA – Clearing Brush and Trees
Activity Description

Job Steps	Hazards	Controls	RAC
	5E) Tree Felling	5E) Area Size up Surrounding ▪ Determine natural lean and condition of tree (rot, splits, loose bark etc.) and the best direction to be felled. ▪ Be aware of other trees leaning into the tree being felled. ▪ Be aware of snags in the area. ▪ Do not cut during shifting, high or gusty wind conditions. ▪ Clear away dirt, debris, small tree limbs and rocks from the saw's chain path. Look for nails, spikes or other metal in the tree before cutting. Clean materials away from the tree's base that may pose a hazard. ▪ Avoid cutting above your shoulders. ▪ Keep your hands on the saw's handles, and maintain secure footing while operating the saw. ▪ Be careful that the trunk or tree limbs will not bind against the saw. ▪ Watch for branches under tension, they may spring out when cut. ▪ Before cutting determine your primary and secondary escape routes to a predetermined safe area. ▪ Using the saw, prepare your escape route by cutting all tripping hazards. ▪ Keep proper spacing between site workers (at least two tree lengths). ▪ As the tree commits to the undercut, watch the top as you get away from the stump as quickly as possible. If the tree moves in a direction that compromises the primary escape route, use the secondary route ▪ Shut off the saw when carrying the saw on rough or uneven terrain.	**H**
	5F) Making undercuts; Falling Materials Saw Cuts and Flying Material	5F) Saw Cuts and Flying Material ▪ The cut depth must be a minimum of 1/3 the tree's diameter. ▪ The cut width must be a minimum of 1/5 of the diameter and at 45-degree angle. ▪ Do not leave a partially cut tree without marking it and warning others. When situations are deemed unsafe, use alternate methods or cancel the task.	**H**
	5G) Back cut Wedging and Falling Material	5G) Back cut Wedging and Falling Material ▪ Announce Felling ▪ Notify others in the area that the tree is about to fall. ▪ Make the back cut slightly above (approximately 2 inches under-cut), must be level and even. ▪ Remove loose bark before beginning back cut. ▪ Wedge tree as soon as possible after beginning back-cut continue with the back-cut and tamp in wedges periodical.	**H**
	5H) Being hit by Falling Trees/Branches/Pieces	5H) Being hit by Falling Trees/ Branches/ Pieces ▪ When the tree begins to fall, withdraw the saw from cut and shut off. ▪ Retreat to your safety area at an angle, not straight back. ▪ Do not turn your back on a falling tree. ▪ Continue to watch for falling limbs and/or other trees after the tree hits the ground. ▪ Try to avoid hanging tree up in standing timber. ▪ Do not attempt to fall trees without all the essential equipment. This equipment includes: PPE, chainsaw, small axe and swamper.	**H**

AHA – Clearing Brush and Trees
Activity Description

Job Steps	Hazards	Controls	RAC
	5I) Kickback, Puller/swamper, uneven terrain, Fatigue	5I) Kickback, Puller/swamper, uneven terrain, Fatigue ▪ Secure firm footing. ▪▪ Keep feet spread apart in a wide balanced stance. ▪▪ Feet should be placed so as to keep feet and legs away from saw chain. ▪▪ Keep a firm grip on saw with both hands. ▪ Look up for widow makers and other loose debris. ▪▪ Don't cut under a hazard. ▪▪ Remove the hazard or relocate the cutting location. ▪▪ Flush cut limbs and stems. ▪ Never cut with engine higher than your chest. ▪ Clear debris from cutting location so that the guide bar tip is not accidentally stubbed.	**H**
	15A) Bucking Felled Trees and Kickback	15A) Bucking Felled Trees and Kickback ▪ When bucking logs, be aware of the direction the logs may roll or move after bucking. ▪ Do not stand on the downhill side of logs.	**H**
	5J) Explosion, fire, hazardous vapors, splashing fuel in eyes, spills	5J) Explosion, fire, hazardous vapors, splashing fuel in eyes, spills ▪ Wear eye protection. ▪ Shut off engine and let cool before refueling. ▪ Refuel in well ventilated area on bare ground or other non-combustible surface. ▪ Wipe fuel off saw ▪ Keep fuel away from sparks or open flame, never start saw within 10 feet of fueling area. No smoking during fueling. ▪ Do not start the saw at the point of fueling. ▪ Transport fuel in approved containers ▪ Have spill kit ready in case of fuel spill. ▪ Use proper saw gas and oil fuel mixture. Never use motor oil or bar lubricant to mix with saw gas. ▪ Fix pinched bar guide rails, bent bars or damaged tips immediately. ▪ Keep chain sharp and with proper tension at all times. ▪ Use gloves whenever working with the chain. ▪ Beware of hot muffler. ▪ Ensure chain brake is working properly. ▪ Ensure the carburetor is adjusted properly so the chain doesn't run at an idle. ▪ Stop saw If the bar oil runs out before the saw gas does.	**M**
	5K) Lightning, Rain, Strong winds, Darkness	5K) Lightning, Rain, Strong winds, Darkness ▪ All work shall terminate and each employee shall move to a place of safety when environmental conditions create a hazard for the employee. ▪ See Field Work – General AHA.	**L**

AHA - Decontamination
Activity Description

Activity/Work Task:	Decontamination		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for decontaminating work equipment used on site

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Safety glasses, gloves (HASP), steel toe work boots, high visibility safety vest, hearing protection.)	**Competent / Qualified Personnel:** See HASP - Name – Position/Employer **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

Job Steps	Hazards	Controls	RAC
1. Establish Decontamination Station	1A) Materials Handling	1A) Materials Handling ▪ Use proper lifting techniques ▪ Use mechanical aids, if available, to move heavy items.	L

AHA - Decontamination
Activity Description

Job Steps	Hazards	Controls	RAC
2. Decontamination / Steam cleaning.	2A) Struck by steam/hot water/pressure washing	2A) Struck by steam/hot water ▪ Workers not directly engaged in steam cleaning operations must stay clear. ▪ Workers using steam cleaning equipment must be trained on operation and safety devices/procedures using the owners/operators manual. ▪ Use face shield **and** safety glasses or goggles, if steam cleaning. ▪ Stay out of the splash/steam radius. ▪ Pressure washer must have dead man switch. ▪ Do not direct steam at anyone. ▪ Do not hold objects with your feet or hands. ▪ Ensure that direction of spray minimizes spread of contaminants of concern. ▪ Use shielding as necessary.	**L**
	2B) Exposure to contaminants	2B) Exposure to contaminants ▪ Conduct air monitoring (see HASP). ▪ Wear proper PPE (see HASP). ▪ See MSDSs for hazards associated with the decon solutions used (if other than water alone us used).	**L**
	2C) Slips/Trips/Falls	2C) Slips/Trips/Falls ▪ Be cautious as ground/plastic can become slippery ▪ Use boots or boot covers with good traction	**L**
3. Vehicle Decontamination	3A) Vehicle traffic in and out of the CRZ	3A) Large Vehicle Traffic ▪ Always wear a hard hat, steel toe boots, and a high visibility vest (unless Tyveks are used and are high visibility). ▪ Vehicle drivers are not to exit the vehicle in the CRZ. ▪ Identify an individual to communicate with vehicle drivers and maintain order ▪ Trucks will be lined with plastic and kept out of direct contact with any contaminated materials during loading. Wear PPE when removing plastic lining from truck beds. ▪ If not in the vehicle, obtain eye contact with the driver, so he is aware of your presence and location in the CRZ. ▪ If you are driving the vehicle, be aware of personnel in the CRZ and maintain communication with the identified personnel.	**L**
	3B) Exposure to contaminants	3B) Exposure to contaminants ▪ Use safety glasses or goggles, Polycoated Tyvek (if level of contamination poses dermal hazard or to keep work clothes dry), high visibility vest (if high visibility Tyveks are not used) hard hats, steel toe boots, and gloves while cleaning contaminated materials. ▪ Do not doff PPE until decontamination of the vehicle is complete and a decontamination certificate has been issued by the HSO. ▪ Conduct air monitoring (see HASP). ▪ See MSDSs for hazards associated with the decon solutions (if other than water alone is used).	**L**

AHA - Decontamination
Activity Description

Job Steps	Hazards	Controls	RAC
	3C) Slips/Trips/Falls	3C) Slips/Trips/Falls ▪ Be cautious as ground/plastic can become slippery ▪ Use boots or boot covers with good traction	L
4. Equipment and Sample Decontamination	4A) Chemical exposure when handling contaminated sample jars and equipment	4A) Chemical exposure ▪ Wear PPE as outlined in the HASP. ▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for contaminants ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.) if appropriate (see HASP)	L
	4B) Materials Handling related injuries	4B) Materials Handling related injuries ▪ Use proper lifting techniques when lifting heavy equipment ▪ Use two person lift for heavy coolers	L

5. Personal Decontamination	4C) Exposure to contaminants	4C) Exposure to contaminants
		▪ Avoid bringing contaminated materials via shoes and clothing into the CRZ by examining such prior to exiting the EZ.
		▪ Removal of PPE will be performed by the following tasks in the listed order:
		  ▪ Gross boot wash and rinse and removal
		  ▪ Outer glove removal
		  ▪ Suit removal
		  ▪ Respirator removal (if worn).
		  ▪ Inner glove removal
		▪ Contaminated PPE is to be placed in the appropriate, provided receptacles.
		▪ Respirators will be removed and decontaminated at a specified location within the CRZ by a designated technician, then placed in storage bag.
		▪ Employees will wash hands, face, and any other exposed areas with soap and water.
		▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials.
		▪ See MSDSs for hazards associated with the decontamination solutions used.
		▪ Decon solutions will be disposed of according to the work plan.
			L

AHA – Dog and Wildlife Safety
Activity Description

Activity/Work Task:	Dog and Wildlife Safety		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing site specific measures for dealing with animals if accidently encountered onsite.
- This AHA assumes it is unlikely to encounter wild animals but gives information on what to do if it does occur, therefore PPE is described as what is relevant to what should be worn while inspecting the site

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: safety glasses, work gloves, steel toe work boots, high visibility vest	**Competent / Qualified Personnel:** All AMEC employees **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Inspect all PPE prior to use

AHA – Dog and Wildlife Safety
Activity Description

Job Steps	Hazards	Controls	RAC
1. Working in areas with potential wild animals or dogs exist, example outdoor wooded areas, fields or residential areas.	1A) Preparation for Site Visit	1A) Preparation for Site Visit ▪ Call land owner prior to site visit. ▪ Arrange for appointment time so animals can be restrained during the visit. ▪ Wear field clothes such as long pants, long sleeves, and boots to provide protection if attacked.	**L**
	1B) Preventing Bites or Attacks	1B) Preventing Bites or Attacks ▪ Be aware of surroundings. Locate and work at safe distance from dens, nests, warrens, cages, leashed animals, or "homes" of animals. ▪ Learn body language and warning signs of animals posturing to attack. ▪ See attached drawings and explainations of animal behavior ▪ Do not approach strange dogs especially one who's tied, tethered or confined behind a fence or in a car. They often feel vulnerable and will fight to protect their territory ▪ Never hang over fences or put your hands through fence openings to touch a dog, even one you know. ▪ Never approach a dog that is acting afraid, growling, showing teeth or who has puppies - even if the owner is there. ▪ Don't disturb a dog while sleeping, eating, chewing on a toy, or caring for puppies. ▪ Always let the dog sniff you first before petting. Pat on the back or side, reaching over a dog's head may scare him. ▪ Never run past a dog. Joggers and children on bicycles can trigger their instinct to chase and attack ▪ Never tease a dog by pulling ears, tail or feet or play too rough. Avoid games such as tug-of-war, jumping up for toys/food, wrestling and chase, all could lead to injury if the game gets out of hand ▪ Be careful around older dogs. They may be blind, sensitive to touch or hearing-impaired ▪ Never try to break up a dog fight with your hands. Use a water hose, stick or throw a blanket over the dogs to disorient them ▪ Alert animal control to stray or roaming dogs.	**L**

AHA – Dog and Wildlife Safety
Activity Description

Job Steps	Hazards	Controls	RAC
	1C) Attacking Animal	1C) Attacking Animal ▪ If an animal shows aggressive behavior, slowly walk away from it. ▪ If the animal approaches you, remain calm and quiet. Never turn your back, scream and run away. Avoid sudden movements. ▪ If you say anything, speak calmly and firmly ▪ If the animal still follows you, remain motionless with hands at your sides. Face the animal but turn your head away and avoid eye contact. If you are boring or not a threat, there is a good chance the animal will lose interest and move on. ▪ If the animal does attack, put anything that you can put between yourself and the animal like a tree or car. ▪ If lunged at, don't try to overpower the animal. ▪ If you're holding something, put it into his mouth. If you don't have anything in your hand, put your arm up to protect your face. ▪ If the animal jump son you or knocks you down, don't move or scream or roll around. Pretend that you are a turtle: curl into a ball, face down, cover your head with your arms and use your hands to protect the back of your neck. Stay in this position until the animal leaves.	**L**
2. If bitten or wounded.	2A) Allergic reactions, excessive bleeding, broken bones	2A) Allergic reactions, excessive bleeding, broken bones ▪ Field crews must maintain a stocked first aid kit. ▪ Work using the buddysystem or maintain communicaitons by radio or cell phone. ▪ If you or anyone you are working with is allergic. Make sure you carry emergency medication with you at all times. ▪ If the victim develops hives, asthmatic breathing, tissue swelling, or a drop in blood pressure, seek medical help immediately. ▪ If the person is bitten, apply pressure to stop bleeding. - Immediately wash the area thoroughly with soap and water. - Cover lightly with an antiseptic ointment. - Cover with a sterile bandage. - See medical attention for additional care and advice as appropriate. ▪ If bitten, contact authorities (the local animal care and control agency) and tell them everything you can about the dog: the owner's name and address, if you know it; color of the dog; size; where you saw it; if you've seen it before, if you know it is a stray, and in which direction the dog went. These details may help animal-control officers locate the dog	**L**
	2B) Rabid Animal	3A) Rabid Animal ▪ If the animal is a vaccinated pet, follow the steps for basic bite care above. ▪ If you can identify or safely capture the animal, this may help your doctor determine if you need anti-rabies therapy. The dog may need to be quarantined. ▪ If it is a wild animal, only try to capture it if you can do so without getting bitten again. If the animal cannot be contained and must be killed to prevent its escape, do so without damaging the head. The brain will be needed to test for rabies.	**L**

AHA – Dog and Wildlife Safety
Activity Description

U.S. Humane Society at (202) 452-1100

How to interpret dogs' body language, facial expressions and vocalizations.

Domestic dogs use body language, facial expressions, and vocalizations to communicate, and all of these signals are easily understood by other dogs. If you can learn to interpret how your dog is feeling by observing its posture and expression and listening to it, you'll be well on the way to successful communication with your pet and better equipped to solve any behavior problems that arise.

AGGRESSIVE

Ears	Forward or back, close to head.
Eyes	Narrow or staring challengingly.
Mouth/ Teeth	Lips open, drawn back to expose teeth bared in a snarl. Possible jaw snapping.
Body	Tense. Upright. Hackles on neck up. Completely Dominant position.
Tail	Straight out from body. Fluffed up.
Vocali-zation	Snarl. Growl. Loud bark.

ALERT

Ears	Perked-up. Turning to catch sounds.
Eyes	Open normally or wide.
Mouth/ Teeth	Mouth closed or slightly open with teeth covered.
Body	Normal. Possibly standing on tiptoe. Slightly Dominant position.
Tail	Up. Possibly wagging.
Vocali-zation	None. Low whine or alarm bark

.

AHA – Dog and Wildlife Safety
Activity Description

ANXIOUS

Ears	Partially back.
Eyes	Slightly narrowed.
Mouth/ Teeth	Mouth closed, or slightly open in a "grin."
Body	Tense. Slightly lowered in a Submissive position.
Tail	Partially lowered.
Vocali-zation	Low whine or moaning-type bark.

CHASE, BEGINNING STAGE

Ears	Perked-up, forward-pointing.
Eyes	Wide open. Very alert.
Mouth/ Teeth	Mouth slightly open. Excited panting.
Body	Tense. Crouched low in a predatory position. Legs bent, poised to run.
Tail	Extended straight out from body.
Vocali-zation	None.

AHA – Dog and Wildlife Safety
Activity Description

CURIOUS/EAGER/EXCITED

Ears	Perked-up, forward-pointing.
Eyes	Wide open.
Mouth/ Teeth	Mouth open, teeth covered. Possible panting.
Body	Normal stance. Possible wiggling, standing on tiptoe, or pacing.
Tail	Up. Wagging.
Vocali-zation	Excited short barking, whining.

DOMINANT

Ears	Up straight or forward.
Eyes	Wide open, staring.
Mouth/ Teeth	Mouth closed or slightly open.
Body	Very tall posture. Hackles may be up.
Tail	Stiffened and fluffed. Up or straight out from body.
Vocali-zation	Low, assertive growl or grunt.

AHA – Dog and Wildlife Safety
Activity Description

FEARFUL

Ears	Laid back flat and low on head.
Eyes	Narrowed, averted. Possibly rolled back in head, whites showing.
Mouth/ Teeth	Lips drawn back to expose teeth.
Body	Tense. Crouched low in submissive position. Shivering, trembling. Possible secretion from anal scent glands.
Tail	Down between legs.
Vocali-zation	Low, worried yelp, whine, or growl.

FLIGHT, BEGINNING STAGE

Ears	Back.
Eyes	Wide open. Possibly rolled back with whites showing.
Mouth/ Teeth	Slightly opened mouth. Possible drooling.
Body	Tense. Shivering. Low, poised to run.
Tail	Low or between legs.
Vocali-zation	None. Possible yelp or whine.

FRIENDLY

Ears	Perked-up.
Eyes	Wide open. Alert look.
Mouth/ Teeth	Relaxed, possibly slightly open, "smiling" mouth.
Body	Normal posture. Still, or possible wiggling of whole rear end.
Tail	Up or out from body. Wagging.
Vocali-zation	Whimpering, yapping, or short, high bark.

AHA – Dog and Wildlife Safety
Activity Description

GUARDING

Ears	Perked-up. Forward.
Eyes	Wide open, alert.
Mouth/ Teeth	Mouth slightly open, teeth bared. Snapping or gnashing of teeth.
Body	Tense. Rigid. Hackles up. Standing very tall in an aggressive or dominant stance.
Tail	Rigid. Held straight out from body. Sometimes fluffed.
Vocali-zation	Loud alert bark. Growl. Snarl.

PLAYFUL/HAPPY

Ears	Perked-up and forward, or relaxed.
Eyes	Wide open. Sparkly/merry-looking.
Mouth/ Teeth	Mouth relaxed and slightly open, teeth covered. Excited panting.
Body	Relaxed, or front end lowered, rear end up in the air, wiggling in a play-bow. Excited bouncing and jumping up and down. Circling around and running forward and back in an invitation to play.
Tail	Wagging vigorously.
Vocali-zation	Excited barking. Soft play-growling.

PREDATORY

Ears	Alert. Held forward or backward to catch sounds.
Eyes	Wide open. Staring, focusing.
Mouth/ Teeth	Mouth closed.
Body	Rigid. Low to ground, ready to spring forward. Quietly sniffing the air.
Tail	Straight and low.

AHA – Dog and Wildlife Safety
Activity Description

Vocali-zation	None (so the prey won't be alerted).

SUBORDINATE (SUBMISSIVE)

Ears	Down, flattened against head.
Eyes	Narrowed to slits or wide open, whites showing.
Mouth/ Teeth	Lips pulled way back from teeth in a "grin". Nuzzling or licking other animal or person on face.
Body	Lowered to ground, front paw raised. Lying on back, belly up. Possible urine leaking/dribbling. Possible emptying of anal scent glands.
Tail	Down, between legs.
Vocali-zation	None, or low, worried whining. Possible yelping/whimpering in fear.

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http://www.pawsacrossamerica.com/interpret.html

AHA – Drilling Operations
Activity Description

Activity/Work Task:	Drilling Operation		
Project Location:	**Kalamazoo River**		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **H**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for overseeing drilling

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart
E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Inspect all PPE prior to use. Inspect rig before service.

Job Steps	Hazards	Controls	RAC
1. Drive drilling rig onto site	1A) Malfunction of vehicle/equipment	1A) Drivers shall perform a pre-operational check of equipment, read and be familiar with any operator's manual. ▪ Report all needed repairs promptly. ▪ Operators shall not use defective/unsafe equipment.	**L**
	1B) Wreck of drill rig while being driven	1B) Wreck of drill rig while being driven ▪ All drivers shall be properly licensed.	**L**

AHA – Drilling Operations
Activity Description

Job Steps	Hazards	Controls	RAC
		▪ Supervisors shall verify that drivers are capable and qualified on each type of equipment before allowing the equipment to be used unsupervised. ▪ Keep wind shields, windshield wipers, side mirrors and side windows clean ▪ Drivers shall conduct a pre-operation vehicle safety check ▪ Drivers shall plan ahead to minimize or eliminate the need for backing. Always check to the rear before backing and use an observer when available. If an observer is not available, the driver shall walk around the vehicle to make sure rear is clear prior to backing. ▪ Seat belts shall be worn when driving by driver and passengers. ▪ Choose the safest location possible to park equipment. Avoid parking in blind spots of other equipment. ▪ Driver is to be sure the back-up alarm is working ▪ Adjust vehicle speed for load and weather. Tire chains should be utilized as dictated by weather conditions. ▪ Operators should always check and be sure of load height. ▪ When operating a vehicle off the roadway, be aware of possible hidden objects in the grass and unstable terrain. ▪ The mast shall always be in a lowered position when moving the drill rig. ▪ Never allow anyone between truck and trailer when backing to hook trailer ▪ Make sure tilt beds or ramps are secured before putting trailer in use ▪ Perform periodic checks of equipment on long trips to assure the load is secure. ▪ Do not leave equipment unattended with the engine running. Shut off engine and set the parking brake when equipment is not in use.	
2. Mounting and dismounting equipment	2A) Fall while mounting and dismounting equipment	2A) When mounting and dismounting equipment, use steps and handhold. Do not jump from vehicle.	**L**
3. Loading/unloading of equipment	3A) Crush and pinch points created when loading/unloading equipment	3A) Crush and pinch points created when loading/unloading equipment ▪ Be aware of crushing and pinching hazards when loading, unloading and fastening down equipment. ▪ Make sure cargo is properly loaded, secured and covered using only approved chain and load binders. Check for loose material on bed and trailer. Secure loose material. ▪ Wear protective equipment consistent with the hazard (hard hats, safety glasses, leather gloves, safety shoes, etc.) ▪ Hook/unhook on stable ground with the trailer secure.	**L**

AHA – Drilling Operations
Activity Description

Job Steps	Hazards	Controls	RAC
4. Rig equipment operation.	4A) Crushing injuries, slip trips and falls, material under stress, power equipment operations, utility lines, overhead loads, flying particles, rope or cable blocks, equipment limitations, lifting and pinch points	4A) Rig equipment operation. ▪ Before use, inspect cable, chain or wire for wear and replace if necessary. ▪ Observe OSHA guidelines for use of cable clamps, safety latches, chains and slings. ▪ Know rated capacity of chain, cable or wire rope being used and never exceed the rating. ▪ Avoid overloading and sudden jerks. ▪ Wear appropriate personal protective equipment with the hazard, including hard hats, safety glasses, leather gloves and safety shoes. ▪ Check loads to be lifted for balance and have the rigging inspected to ensure a safe and balanced condition exists. ▪ Do not allow employees to stand or work under suspended loads. ▪ Awkward loads shall have taglines attached to control the load. ▪ Review signals and operator communications with crew. Only one person shall direct the operator. ▪ Review the area for utility lines, tree limbs and other overhead hazards. Work no closer than 10 feet to active overhead power lines. Follow OSHA guidelines. ▪ Personnel working tag lines shall review the area for slipping, tripping and falling hazards. If not possible to eliminate the hazards, take precautions to avoid them.	**M**
5. Stabilize rig with hydraulic jack/pads	5A) Crushing injuries, slip, trip, fall hazards and potential back injuries.	5A) Crushing injuries, slip, trip, fall hazards and potential back injuries. ▪ Use proper lifting techniques. ▪ Ensure jack is rated for weight/operation with safe limits ▪ Assure that area is clear of personnel and obstacles. ▪ Place pads under jacks to prevent them from sinking into the ground.	**M**

AHA – Drilling Operations
Activity Description

Job Steps	Hazards	Controls	RAC
6. Start/operate drill rig	6A) Moving machinery parts, buried and overhead utilities, drill rod stacking, lifting, winching, cathead operations, moving equipment, noise, adverse weather conditions, animals, slippery surfaces, uneven terrain, poisonous plants/snakes/insects and overhead hazards	6A) Moving machinery parts, buried and overhead utilities, drill rod stacking, lifting, winching, cathead operations, moving equipment, noise, adverse weather conditions, animals, slippery surfaces, uneven terrain, poisonous plants/snakes/insects and overhead hazards ▪ Wear appropriate personal protective equipment consistent with the hazard (hard hat, safety glasses, leather gloves, safety shoes, etc.) ▪ Avoid contact with rotating equipment ▪ When cathead is in use, assure a safe travel path for the rope by using proper techniques. Avoid standing on the rope. ▪ Observe and stay clear (minimum of 10 feet for nominal system voltage, utility lines, rated 50kV and an additional 0.4 inch for each kV over 50kV or twice the length of the line insulator, but never less than 10 feet) of overhead utility lines. - In transit with no load and boom lowered, the equipment clearance shall be a minimum of 4 feet for voltage less than 50kV and 10 feet for voltages over 50kV up to and including 345kV and 16 feet for voltages up to and including 750kV. - A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. - Have underground utility lines properly located and marked prior to drilling. ▪ Employees on foot must use extreme caution to stay clear of operating equipment. Always establish eye contact with the operator before approaching the equipment. ▪ Be aware of drop-offs, uneven ground and potential hidden objects which may cause loss of control when maneuvering drill rigs or create unstable drill set-ups. In heavily wooded area, scout to locate hidden objects. ▪ Drill rod stacking must not exceed a length of 1.5 times the height of the tower. ▪ Be aware of poisonous plants, insects, snakes, animals and animal waste products and carcasses. Wear long sleeve shirts, gloves, and high top boots when hazards cannot be avoided. Proper first aid supplies, insect repellents shall accompany field crews. ▪ Be alert to conditions that can lead to slippery surfaces. Examples: high groundwater resulting in muddy soils brought to the surface by augers and the utilization of bentonite drilling fluid. ▪ Inspect all cables and clamps prior to winching operation. Stand clear of winching operations. ▪ Use proper lifting techniques. Get help or use lifting equipment. ▪ Suspend drilling operations during electrical storms ▪ Be aware of overhead hazards which may come in contact with the drill rig, when moving or setting up equipment. ▪ Complete a daily operations checklist to ensure that equipment is working properly. Make special note of emergency kill switches.	**M**

AHA – Drilling Operations
Activity Description

Job Steps	Hazards	Controls	RAC
	6B) Contaminated soils, buried power or gas lines, landfills and containment of spills	6A) Contaminated soils, buried power or gas lines, landfills and containment of spills ▪ During drilling operations, always be aware of the possibility of encountering potentially hazardous materials, such as petroleum hydrocarbons, herbicides, pesticides, chemical manufacturing by-products or solid waste materials. ▪ In the event that any unknown or questionable materials are encountered, then the drilling operations are to be suspended immediately until further instructions are received from supervision. ▪ Do not handle any suspected contaminated materials unless trained to do so and proper protective methods are followed. ▪ During drilling operations, always be aware of the possibility of striking an unlocated or improperly located gas or power line. ▪ In the event a buried utility line is struck, drilling operations are to be suspended **immediately**. - If the utility line is electric, keep personnel at least 10 feet from all metal surfaces connected with the drill rig. - If the utility is gas, then the area is to be evacuated and secured. Immediate notification to the utility company is MANDATORY. ▪ In the event of a gas or oil spill, the proper authorities are to be contacted immediately so that containment operations can be implemented.	**H**
7. Attach auger to drill	7A) Auger coming loose from drill	7A) Auger coming loose from drill Insert a holding pin in auger ▪ Insert a holding pin in auger ▪ Use personal protective equipment such as leather gloves, safety glasses, hard hat and safety shoes. ▪ Be aware of hand and finger positions when inserting holding pin	**L**
8. Start drill by lever operations	8A) Operation of wrong lever	8A) Label levers as to their operation and review equipment manual.	**L**
9. Maintain proper auger drill speed with down hole pressure speed.	9A) Unstable rig from improper speed of auger	9A) Use of trained drill rig personnel and follow equipment manual specification.	**L**
10. When auger has dug into ground unhook pin and insert another auger on top of the previous auger	10A) Auger coming loose (reference item #7)	10A) Insert another catch pin into newly installed auger (reference item #7)	**L**
11. Insert PVC pipe into hollow stem auger in 10 foot sections	11A) Reference Hazard item #6a	11A) Reference Control item #6A	**M**
12. Install filter pack (50 pound bags of sand) into hole (by pouring) to filter water into screen	12A) Back injuries, slips and falls	12A) Proper lifting procedures, team lifting and use of mechanical devices. Wear proper foot wear and maintain area in good housekeeping condition.	**M**
13. Reverse auger after each five foot section of sand is installed	13A) Reference hazard item #4	14A) Reference Control item #4	**M**

AHA – Drilling Operations
Activity Description

Job Steps	Hazards	Controls	RAC
14. Install Betonies on top of sand (3 foot) to seal up area above sand.	14A) Reference hazard item #12	14B) Reference control item #12	**M**
15. Remove auger	15A) Auger falling	15A) Insert auger- maintain auger at ground surface to prevent auger from falling into hole.	**M**
16. Release auger tension and remove pins. Remove auger from hole.	16A) Reference hazard item #4	16A) Reference control item #4	**M**
17. Lower drill head attached to auger remaining in bore hole attach with a pin	17A) Reference hazard in item #4	17A) Reference control in item #4	**M**
18. Decontamination of drill equipment-usually pressure water	18A) Contamination of personnel and environment	18A) Follow health and safety plan, dress to proper EPA level, contain material washed from contaminated equipment with proper containment materials. Trained/authorized personnel to use pressure washer and assure area is clean of personnel prior to operation of pressure water device.	**L**
19. Mix grout on site and fill/place in hole between the well pipe and bore hole wall	19A) Reference hazard item #12	19A) Reference control item #12	**M**
20. Cut PVC pipe off at determined height with a hand saw	20A) cutting of hand with hand saw	20A) Be aware of where hands are placed prior and during cutting with hand saw	**M**
21. Install a protective cover and fill with grout.	21A) Reference hazard item #12	21A) Reference control item #12	**M**
22. Driving drilling rig offsite.	22A) Reference item # 1	22A) Reference item #1.	**M**

AHA - Electrofishing
Activity Description

Activity/Work Task:	Electrofishing		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **H**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for electrofishing

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

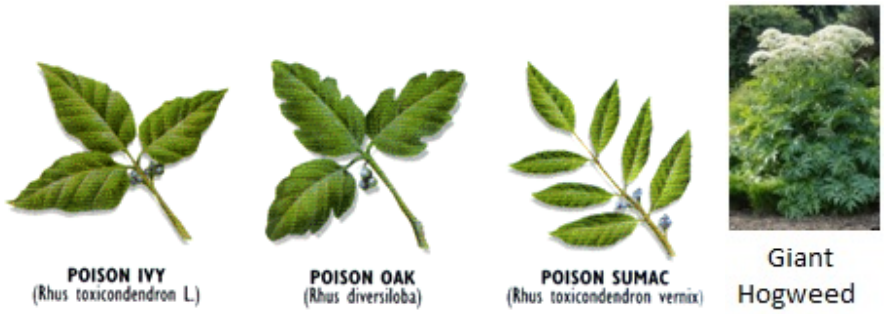
RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: Safety Boots/Shoes; Traction devices for shoes; long sleeves and pants; Safety Glasses; Rubber boots or Waders (if needed); Voltage Resistant Gloves; Personal Flotation Device	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

Job Steps	Hazards	Controls	RAC
1. Mobilization	1A) See AHA Mobilization/Demobilization/Site Preparation	1A) See AHA Mobilization/Demobilization/Site Preparation	L
2. Preparation	2A) Training	2A) Provide training on the hazards of Electrofishing to all workers	L

AHA - Electrofishing
Activity Description

Job Steps	Hazards	Controls	RAC
3. Walking to and from stream	3A) Insect bites/stings	3A) Insect bites/stings ▪ Avoid wearing heavy fragrances. ▪ Carry first-aid and sting relief kits. ▪ Make sure all crew members are informed about others who are allergic and what to do if they need assistance. ▪ Carry necessary emergency medication. ▪ See AHA Insect Bites and Stings	**L**
	3B) Contact with poisonous plants or the oil from those plants:	3B) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Do not allow plant to touch any part of your body/clothing. ▪ Wear PPE as described in the HASP and wear Tyveks, gloves and boot covers if contact with plant is likely ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate. ▪ See AHA Poisonous Plants if contact with poisonous plants is likely.	**L**
			
	3C) Slips and falls	3C) Slips and falls ▪ Use traction devices on shoes. ▪ Move slowly, take your time. ▪ Use a walking staff to provide a three point support.	**L**
	3D) Eye injuries	3D) Eye injuries ▪ Travel with care through heavy brush. ▪ Use eye protection in brushy areas.	**L**
	3E) Scrapes and punctures	3E) Scrapes and punctures ▪ Wear proper clothing, long sleeved shirts and pants. No shorts.	**L**

AHA - Electrofishing
Activity Description

Job Steps	Hazards	Controls	RAC
	3F) Cuts/Lacerations due to machete use	3F) Cuts/Lacerations due to machete use ▪ Wear chaps or snake legs ▪ Cut away from the body ▪ Ensure blade of machete is sharp ▪ See AHA Clearing Weeds, Brush and Trees for further information	**L**
	3G) Blow-down / heavy debris	3G) Blow-down / heavy debris ▪ Be aware of your surroundings, including hanging or leaning debris that may be dislodged and fall.	**L**
	3H) Animal encounters	3H) Animal encounters ▪ See AHA Dog and Wildlife Safety ▪ Moose: a. Make noise to avoid encounter. b. If you do encounter a moose, put a lot of room between you and the animal by walking around him/her if necessary. c. Do not look it in the eye. d. If charged, run away or climb a tree. e. Throwing something or shouting may deter an attack.	**L**
	3I) Severe injury in remote locations	3I) Severe injury in remote locations ▪ Carry a two-way radio and know how to use it. ▪ Work in teams. ▪ Make sure someone on crew is certified in first aid. ▪ Carry a first aid kit.	**L**
4. Equipment Preparation	4A) Malfunctioning Equipment	4A) Malfunctioning Equipment ▪ Pre-check waders or hip boots and rubber gloves for leaks. ▪ Take the time to do a pre-trip inspection of all equipment, including checking to make sure batteries are charged.	**L**
5. Equipment operation	5A) Electrical Shock	5A) Electrical Shock ▪ Wear waders or hip boots in good repair. ▪ Wear rubber gloves with proper voltage resistance. ▪ Operators of electroshock unit must have appropriate training in the operation of equipment. ▪ Operators must be trained in the prevention and treatment of electrical shock. ▪ Carry a first aid kit and radio or cell phone. ▪ Make sure the radio/cell phone works. Do a radio/cell phone check. Be aware that you may not be able to transmit in some areas. ▪ Never electrofish alone. ▪ Coordinate movements with other crew members. ▪ Know where anode is at all times.	**M**

AHA - Electrofishing
Activity Description

Job Steps	Hazards	Controls	RAC
6. Working in streams	6A) Slips, Falls	6A) Slips, Falls ▪ Use additional traction devices to improve footing, such as felt soles or cleats. ▪ Work only in water with safe velocity and depth. ▪ Use wading stick if necessary.	**M**
	6B) High flow velocity	6B) High flow velocity ▪ Evaluate a stream before entering. ▪ Follow the "rule of 10" a. If stream is 1 foot deep and flowing @10 ft./sec, it is too hazardous to wade b. If stream is 2 feet deep and flowing at 5 ft./second, it is too hazardous to wade. c. If you do enter a stream and discover it is too dangerous to wade, back out using your wading pole for balance.	**H**
	6C) Hypothermia	6C) Hypothermia ▪ Work in teams of two. ▪ Wear proper clothing in layers to maintain body temperature. ▪ Wear proper equipment that is in good condition. ▪ Be aware of signs of hypothermia, it's prevention, detection and treatment. ▪ Have extra protection available, in case of an emergency such as blankets and heating devices. ▪ Have warming devices available. ▪ Don't work under extremely adverse weather conditions ▪ Stay in tune to current weather and extended forecasts.	**L**
	2A) Sand or Mud – knee or ankle injury	2A) Sand or Mud ▪ Use shorter steps ▪ Use walking sticks to check firmness of soils ▪ Use buddy system ▪ Snowshoes that dissipate weight may be effective ▪ If leg gets caught, use slight back and forth motion to soften mud and remove slowly. Don't try to pull leg out with twisting or jerking motion. ▪ If possible, aeriate or bubble the mud to help releave suction.	**M**
	2B) Equipment	2B) Equipment ▪ Secure packs and hip waders with quick release straps and be ready to discard, if an emergency arises. ▪ Do not work in waders in water greater than 3 feet deep or in swift water. ▪ Wear bike or rafting helmets to protect from blows to the head.	**L**
	6D) Heavy Brush	6D) Heavy Brush ▪ Wear long sleeve shirts, full length trouser, hardhats and eye protection.	**L**
	6E) Severe weather	6E) Severe weather ▪ Suspend measurements during lightning storms or when a storm is approaching.	**L**

AHA - Electrofishing
Activity Description

Job Steps	Hazards	Controls	RAC
7. Communications	7A) Dead Zones	7A) Dead Zones ▪ Check radio communication periodically during assignment. ▪ Know where nearest communication is available.	**L**

AHA - Field Work General

Activity/Work Task:	Field Work General		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code): **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for staying safe while performing general field work

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: safety glasses, gloves (per HASP), steel toe work boots. Hard hat if overhead heavy equipment involved	**Competent / Qualified Personnel:** All AMEC employees with 40 hour training **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use.

Job Steps	Hazards	Controls	RAC
1. Mobilization/ See Mobilization/Demobilization and Site Preparation AHA Demobilization and Site Preparation	1A) See Mobilization/Demobilization and Site Preparation AHA	1A) See Mobilization/Demobilization and Site Preparation AHA	L

AHA - Field Work General

2. Communication	2A) Safety, crew unity	2A) Talk to each other. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazard trees (trees that are rotten, dead, damaged, etc.). ▪ Always know the wherabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone. ▪ Review Emergency Evacuation Procedures (see below).	**L**
3. Walking and working in the field	3A) Falling down, twisted ankles and knees, poor footing	3A) Always watch your footing. ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Wear laced boots with a minimum 8" high upper and non-skid Vibram-type soles for ankle support and traction.	**L**
	3B) Falling objects	3B) Protect head agains falling objects. ▪ Wear your hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers. ▪ Stay out of the woods during extremely high winds.	**L**
	3C) Damage to eyes	3C) Protect eyes: ▪ Watch where you walk, ecpecially around trees and brush with limbs sticking out. ▪ Exercise caution when clearing limbs from tree trunks. Advise wearing eye protection. ▪ Ultraviolet light from the sun can be damaging to the eyes; look for sunglasses that specify significant protection from UV-A and UV-B radiation. If safety glasses require, use one's with tinted lenses	**L**
	3D) Bee and wasp stings	3D) See AHA for Insect Stings and Bites	**L**
	3E) Ticks and infected mosquitos	3E) See AHA for Insect Stings and Bites	**L**
	3F) Lifting Injuries (e.g., Back Injuries)	3F) Lifting Injuries (e.g., Back Injuries) • Site personnel will be instructed on proper lifting techniques. • Perform warm-up excercises before starting work. • **DO NOT EXCEED THE AMEC LIFTING LIMIT OF 50 POUNDS.** • Use two people to lift, lower, or carry equipment or materials heavier than 50 pounds. • Mechanical devices should be used to reduce manual handling of materials. • Drive the field vehicle as close to the point that the heavy equipment/material will be used as long as the area is safe to drive into and you do not create hazards to you, your co-worker, or the vehicle.	**L**

	3G) Slips/Trips/Falls	3G) Slips/Trips/Falls • Maintain work areas safe and orderly; unloading areas should be on even terrain; mark or repair possible tripping hazards. • Site SHSO inspect the entire work area to identify and mark hazards. • Be aware of work area conditions that can cause slip hazards such as ponding of water on concrete surfaces. Ponding of water on smooth surfaces, such as concrete, coupled with the warm or freezing weather conditions has the potential to cause slippery condiitons such as growth of scum or ice, as applicable. Adding a layer of clean fill to the surface may prevent the growth of scum, and/or create a non-slippery walking surface.	**L**
	3H) Vehicular Traffic	3H) Vehicular Traffic ▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.	**L**
	3I) Overhead Hazards	3I) Overhead Hazards ▪ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. ▪ All ground personnel will stay clear of suspended loads. ▪ All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. ▪ All overhead hazards will be identified prior to commencing work operations.	**L**
	3J) Dropped Objects	3J) Dropped Objects ▪ Steel toe boots meeting ANSI Standard Z41 will be worn.	**L**
	3K) Noise	3K) Noise ▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); all equipment will be equipped with manufacturer's required mufflers. Hearing protection shall be worn by all personnel working in or near heavy equipment.	**L**
	3L) Eye Injuries	3L) Eye Injuries ▪ Safety glasses meeting ANSI Standard Z87 will be worn.	**L**

	3M) Heavy Equipment (overhead hazards, spills, struck by or against)	3M) Heavy Equipment ▪ Equipment will have seat belts. ▪ Operators will wear seat belts when operating equipment. ▪ Do not operate equipment on grades that exceed manufacturer's recommendations. ▪ Equipment will have guards, canopies or grills to protect from flying objects. ▪ Ground personnel will stay clear of all suspended loads. ▪ Ground personnel will wear high visibility vests ▪ Spill and absorbent materials will be readily available. ▪ Drip pans, polyethylene sheeting or other means will be used for secondary containment. ▪ Ground personnel will stay out of the swing radius of excavators. ▪ Eye contact with operators will be made before approaching equipment. ▪ Operator will acknowledge eye contact by removing his hands from the controls. ▪ Equipment will not be approached on blind sides. ▪ All equipment will be equipped with backup alarms and use spotters when significant physical movement of equipment occurs on-site, (i.e., other than in place excavation or truck loading).	**L**
	3N) Struck by vehicle/equipment	3N) Struck by vehicle/equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times and will wear high visibility vests. ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop!	**L**
	3O) Struck/cut by tools	3O) Struck/cut by tools ▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Guards will be kept in place while using hand and power tools.	**L**
	3P) Caught in/on/between	3P) Caught in/on/between ▪ Workers will not position themselves between equipment and a stationary object. ▪ Workers will not wear long hair down (place in pony-tail and tuck into shirt) or jewelry if working with tools/machinery.	**L**

	3Q) Contact with Electricity/Lightning	3Q) Contact with Electricity/Lighting ▪ All electrical tools and equipment will be equipped with GFCI. ▪ Electrical extension cords will be of the “Hard” or “Extra Hard” service type. ▪ All extension cords shall have a three-blade grounding plug. ▪ Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. ▪ Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. ▪ All electrical work will be conducted by a licensed electrician. ▪ All utilities will be marked prior to excavation activities. ▪ All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and 35 feet from all others.) ▪ The SHSO shall halt outdoor site operations whenever lightning is visible, outdoor work will not resume until 30 minutes after the last sighting of lightning.	**L**
	3R) Equipment failure	3R) Equipment failure ▪ All equipment will be inspected before use. If any safety problems are noted, the equipment should be tagged and removed from service until repaired or replaced.	**L**
	3S) Hand & power tool usage, cuts, burns, etc.	3S) Hand & power tool usage ▪ Inspect the tool daily. ▪ Remove broken or damaged tools from service. ▪ Use the tool for its intended purpose. ▪ Use in accordance with manufacturers instructions.	**L**

	3T) Burns and Exposure to Exhaust from Portable Propane Torch Use	3T) Portable propane torch usage • Read the manual to become familiar with the propane torch and follow all safety precautions. Don PPE (safety glasses, heavy leather gloves) before using the torch. • Inspect the propane cylinder and the torch tip to ensure there are no defects, damage, etc. • Assemble the torch kit per instruction manual. The torch is designed to be used with the small propane cylinder, do not attempt to attach the torch to any other gas cylinder. • Do not use the torch in areas where gasoline or other liquids having flammable vapors are stored or used. • Do not smoke while igniting or operating the propane torch. • Have an ABC type fire extinguisher readily accessible to the work area. • Be sure the torch tip has a tight seal to the cylinder. If you smell gas, do not try to light the torch. Check the seal between the cylinder and torch. Do not attempt to light the torch until the seal is secure and no gas is leaking. • To ignite the torch flame, first position the point of the torch tip away from you. • If the unit requires a striker to ignite the torch, only use the striker provided with the unit. Never use a match or lighter to ignite torch. • Do not place hand or any part of your body in the path of the flame while lighting or operating the propane torch. • Never leave an ignited torch unattended while in operation. When not in use, the torch tip must be removed from the propane cylinder. • Be aware of the weather conditions. On bright sunny days, the torch flame may be barely visible. On windy days, the wind may carry the torch's heat back towards you. • The torch can produce combustion products such as carbon monoxide. Do not breathe in the exhaust. Propane vapors are heavier than air and can accumulate in low or confined areas. Use the torch only in a well ventilated area. • Heating a surface may cause heat to be conducted to adjoining surfaces that may be combustible or become pressurized when heated. Always check to make sure no unintended parts or materials are being heated. • Torch will be extremely hot, allow the torch to cool before touching it to remove it from the cylinder. • Never store a torch that is still hot. • When cooled, disconnect the torch from the cylinder for storage, and store them in a safe manner to prevent damage.	**L**

4. Environmental health considerations	4A) HEAT Stress	4A) Take precautions to prevent heat stress ▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments. ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization. ▪ Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the work schedule to fit the climate, the physical condition of employees, and mission requirements. ▪ A reduction of work load markedly decreases total heat stress. ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.	**L**
	4B) Wet Bulb Globe Temperature (WBGT) Index	4B) WBGT ▪ Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index). ▪ Compute a Wet Bulb Globe Temperature Index to determine the level of physical activity (take WBGT index measurements in a location that is similar or closely approximates the environment to which employees will be exposed).	**L**
		WBGT THRESHOLD VALUES FOR INSTITUTING PREVENTIVE MEASURES 80-90 degrees F — Fatigue possible with prolonged exposure and physical activity. 90-105 degrees F — Heat exhaustion and heat stroke possible with prolonged exposure and physical activity. 105-130 degrees F — Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.	.

	4C) Cold Extremes	4C) Take precautions to prevent cold stress injuries ▪ Cover all exposed skin and be aware of frostbite. While cold air will not freeze the tissues of the lungs, slow down and use a mask or scarf to minimize the effect of cold air on air passages. ▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration.	**L**
	4D) Wind	4D) Effects of the wind ▪ Wind chill greatly affects heat loss (see attached Wind Chill Index). ▪ Avoid marking in old, defective timber, especially hardwoods, during periods of high winds due to snag hazards.	**L**
	4E) Thunderstorms	4E) Thunderstorms ▪ Monitor weather channels to determine if electrical storms are forcased. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thurnder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds. ▪ Only return to work 30 minutes after the after the last strike or sound of thunder	**L**
5. Check and calibrate industrial hygiene and other field instruments and equipment as required and as recommended by the manufacturer	5A) Exposure to Calibration Gases/Chemicals due to: • Use of damaged instruments.	5A) Verify proper operation of the instrument prior to calibration. Calibrate instruments in an area with adequate ventilation and follow the manufacturer's recommendations. ▪ Wear appropriate PPE to conduct calibrations as specified in the instrument manual.	**L**

	5B) Exposure to Site contaminants due to: • Improper instrument calibration; • Misinterpretation of calibration results; • Improper instrument repair; • Improper use of instrument due to lack of training.	5B) Calibrate the instrument in accordance with the manufacturer's recommendations (see instrument manual) using the applicable calibration standard and calibration procedure. • Perform calibrations at a frequency recommended by the manufacturer. Be aware of the instrument's limitations (e.g., detection limit, maximum sensitivity) and the conditions (e.g., humidity) that may affect correct operation or accuracy of that equipment. Possible sources of error that may affect the correct calibration of the instrument. • Use only calibration materials recommended by the manufacturer for calibration. Do not use substitutions. • Confirm that the connections between the instrument and the calibration gas/material is leak-free. • Record all instrument calibrations in the field logbook. Include the instrument ID (type/manufacture/serial number/lamp eV, etc.), calibration gas used (chemical and concentration), and instrument result. • Do not attempt to repair instrument. Return to the vendor for replacement. Report any damaged or malfunctioning instrument to the vendor. • All personnel must be familiar with operation of the instrument and understand: - Theroy of its operation including any alarms and their setpoints - Materials the instrument can and cannot detect, - Instrument's limitations - The expected responses to calibration gases/materials - Interfering gases/chemicals and their affects on the instrument readings - When re-zeroing is appropriate	**L**

AHA - Field Work General

Heat Index Chart

% Relative Humidity

Temperature	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
110	108	112	117	123	130											
105	102	105	108	113	117	122	130									
100	97	98	102	104	107	110	115	120	126	132						
95	91	93	95	96	98	100	104	106	109	113	119	124	130			
90	86	87	88	90	91	92	95	97	98	100	103	106	110	114	117	121
85	81	82	83	84	85	86	87	88	89	90	92	94	96	97	100	102
80	76	77	78	78	79	79	80	81	82	83	84	85	86	87	88	89

Legend	
80-89 degrees	Fatigue is possible with prolonged exposure and/or physical activity.
90-104 degrees	Sunstroke, heat cramps and heat exhaustion are possible with prolonged exposure and/or physical activity.
105-129 degrees	Sunstroke, heat cramps and heat exhaustion are likely. Heat stroke is possible with prolonged exposure and/or physical activity.
130+ degrees	Heatstroke/sunstroke is highly likely with continued exposure.

Wind Chill Chart

Wind (mph)	Temperature (°F)																	
Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

AHA - Field Work Oversight
Activity Description

Activity/Work Task:	Field Work Oversight		
Project Location:	**Kalamazoo River**		
Contract Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for performing oversight on field work on site

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: safety glasses, gloves, steel toe work boots. Hard hat if working with overhead hazards or heavy equipment	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use

AHA - Field Work Oversight
Activity Description

Job Steps	Hazards	Controls	RAC
1. Prepare for site visit	1a) N/A	▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Complete site specific/ client required training ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ First aid kits shall be available at the work site and on each transport vehicle. ▪ Familiarize yourself with route to the site ▪ Check weather forecast. Pack appropriate clothing and other items (e.g., sunscreen) for anticipated weather conditions ▪ Verify that subsurface utilities have been identified.	**L**
2. Traveling to the site by vehicle	2a) See AHA for Mobilization, Demobilization and Site Preparation	▪ See AHA for Mobilization, Demobilization and Site Preparation	**L**
3. Initial arrival—assess site conditions	3a) Communication with subcontractor and other site personnel	▪ Develop communication methods (agree on hand signals, warning alarms) ▪ Log all workers and visitor on and off the site. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazards. ▪ Always know the whereabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone ▪ Hold and document Safety tailgate meetings ▪ Establish work zones, evacuation routes and rally locations.	**L**
	3b) Insect Bites and Stings	▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects. ▪ Inform crew members if allergic to insects and what to do if you need assistance. ▪ Avoid wearing heavy fragrances. ▪ Carry first-aid and sting relief kits. ▪ Carry identification of known allergies and necessary emergency medication. ▪ Spray clothing with insect repellant as a barrier. ▪ Wear light colored clothing that fits tightly at the wrists, ankles, and waist. ▪ Cover trouser legs with high socks or boots. ▪ Tuck in shirt tails.	**L**
	3c) Poisonous plants	▪ Wear long sleeves, long pants and boots ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with high visibility spray paint if working at a fixed location. ▪ Look for signs of poisonous plants and demark area to aid in avoiding plant. ▪ Do not touch any plant part to any part of your body/clothing. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.	**L**

AHA - Field Work Oversight
Activity Description

Job Steps	Hazards	Controls	RAC
	3d) Vermin, leaches, animal borne disease	▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Wear long sleeve shirt and full length pants ▪ Be aware of your surroundings. ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Do not put hand/arm into/under an area that you cannot see into/under clearly ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers.	**L**
	3e) Chemical Hazards	▪ Wear chemical resistant PPE as identified in the HASP ▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone ▪ Read MSDSs for all chemicals brought to the site ▪ Be familiar with hazards associated with site contaminants. ▪ Ensure that all containers are properly labeled	**L**
	3f) Overhead Power Lines	▪ Identify the location of all overhead power lines at the site. ▪ Maintain clearances depending on voltage - All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV or less). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead power lines known to be 50 kV or less and 35 feet from all others.) ▪ Re-locate work so it is not close to power lines ▪ Avoid storing materials under overhead power lines	**L**
	3g) Underground Utilities	▪ All utilities will be marked prior to excavation activities ▪ For areas where utility locations cannot be verified, workers must hand dig for the first 3 feet ▪ Use lineman's gloves when locating underground power lines ▪ Work at adequate offsets from utility locations ▪ Immediately cease work if unknown utility markings are discovered.	**L**
	3h) Cold Stress	▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration. ▪ Be aware of signs of hypothermia, its prevention, detection and treatment. ▪ Have extra protection available, in case of an emergency such as blankets and heating devices. ▪ Don't work under extremely adverse weather conditions ▪ Stay in tune to current weather and extended forecasts.	**L**

AHA - Field Work Oversight
Activity Description

Job Steps	Hazards	Controls	RAC
	3i) Heat Stress	▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.	L
	3j) Lightning and Thunder	▪ Monitor weather channels to determine if electrical storms are forecasted. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thunder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds.	L
	3k) Severe Weather	▪ Watch for clouds and incoming weather. ▪ Monitor weather forecasts. ▪ Train workers about weather and appropriate precautions. ▪ Identify a shelter and a safe place in event of tornado etc	L
	3l) Sun	▪ Keep body protected ▪ Wear sunscreen, wide brimmed hat or hardhat. ▪ Schedule work for cool part of day. ▪ Take breaks in the shade.	L
	3m) High Crime Areas	▪ Do not enter areas where threats are present. ▪ Contract security where applicable. Use the buddy system. ▪ Maintain contact with support such as radio or cell phone ▪ Do not work after dark.	L
	3n) Operations conducted at an active facility	▪ Stay well clear of operations being conducted at the facility ▪ Keep alert for moving materials, equipment or vehicles ▪ Determine client specific PPE needs prior to arriving at the site ▪ Determine client specific emergency response procedures and follow as appropriate ▪ Participate in client required safety training ▪ Get copies of Clients MSDSs for any client chemicals that workers may be exposed to. ▪ Provide MSDSs to client for all chemicals brought to the site.	L
	3o) Remote Locations	▪ Carry a two-way radio and know how to use it. ▪ Work in teams. Account for all at the end of the work day. ▪ Make sure someone on crew is certified in first aid. ▪ Carry a first aid kit.	L

AHA - Field Work Oversight
Activity Description

Job Steps	Hazards	Controls	RAC
	3p) Set up Decon Station	▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.), if appropriate (see HASP) ▪ Removal of PPE will be performed by the following tasks in the listed order: o Gross boot wash and rinse and removal o Outer glove removal o Suit removal o Respirator removal (if worn). o Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ Decon solutions will be disposed of according to the work plan.	L
4. Walk around the Site	4a) Poisonous plants	▪ See section 3C above	L
	4b) Vermin, leaches, animal borne disease	▪ See Section 3 D above	L
	4c) Chemical Hazards	▪ See Section 3 E above	L
	4d) Slips/Trips/Falls	▪ Wear slip resistant footwear preferably laced boots with a minimum 8" high upper and non-skid soles for ankle support and traction. ▪ Pay attention to where you place your feet ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Site SHSO will inspect the entire work area to identify and mark hazards. ▪ Clear area of trip hazards; mark or barricade those that cannot be moved; ▪ Use caution when walking around excavated areas ▪ Stay back at least 5 feet from excavated areas ▪ Use caution when walking on or around loose soil. ▪ Be aware of surroundings. Avoid muddy areas if possible.	L
5. Oversight during drilling, or construction operations	5a) Heavy Equipment/ Vehicles	▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. ▪ Ground personnel will be aware of the swing radius and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ Personnel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers. Ground personnel will stay clear of all suspended loads. ▪ Ground personnel will wear high visibility vests ▪ Eye contact with operators will be made before approaching equipment.	L

AHA - Field Work Oversight
Activity Description

Job Steps	Hazards	Controls	RAC
	5b) Eye Injury	▪ Wear appropriate safety glasses (tinted for sun). ▪ Watch where you walk, especially around trees and brush with protruding limbs.	L
	5c) Foot Injury	▪ Wear steel toed boots ▪ Wear insulated steel toed boots during winter ▪ Ensure shoes/boots have good traction ▪ Pay attention to where you place your feet, especially when walking on uneven terrain	L
	5d) Head Injury	▪ Wear hardhat ▪ Do not walk or work under scaffolding or other elevated work unless there are guardrails and toeboards in place ▪ Flag or mark protruding objects at head level	L
	5e) Chemical Hazards	▪ See Section 3E above ▪ Wash hands and face prior to consumption of food, beverage or tobacco.	L
	5f) Dust - particulates (respiratory)	▪ Use dust suppression methods ▪ Stand upwind of point of dust generation	L
	5g) Overhead Power Lines	▪ See Section 3F above.	L
	5h) Underground Utilities	▪ See Section 3G above	L
	5i) Standing/Static Posture	▪ Change posture on a frequent basis ▪ Stretch prior to any physical activity	L
	5j) Slips/`Trips/Falls	▪ See Section 4D above	L
	5k) Noise	▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs). ▪ All equipment will be equipped with manufacturer's required mufflers. ▪ Hearing protection shall be worn by all personnel working in or near heavy equipment. ▪ Hearing protection will be worn when workers need to shout when standing two feet away from each other. ▪ Segregate noisy equipment from the operators ▪ Use sound dampening around noisy equipment	L
	5L) Moving Equipment	▪ Clear area of obstructions and communicate with all workers involved that drilling is beginning ▪ Do not exceed manufacturer's recommended speed, force, torque, or other specifications. and penetrate the ground slowly with hands on the controls for at least the first foot of soil to minimize chance of auger kick-out ▪ Stay clear of rotating auger ▪ Use long-handled shovel to clear away cuttings when auger has stopped ▪ Do not wear loose clothing ▪ Wear appropriate PPE including leather gloves and steel-toed boots (See HASP)	L
6. Sampling Oversight	6a) Chemical Hazards	▪ See Section 3E above ▪ Wash hands and face prior to consumption of food, beverage or tobacco. ▪ Calibrate meters in a clean, well ventilated area ▪ Store calibration gases in well vented area. Ensure chemical labels and warnings are legible.	L

AHA - Field Work Oversight
Activity Description

Job Steps	Hazards	Controls	RAC
	6b) Personnel Decontamination	▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.), if appropriate (see HASP) ▪ Removal of PPE will be performed by the following tasks in the listed order: o Gross boot wash and rinse and removal o Outer glove removal o Suit removal o Respirator removal (if worn). o Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ Decon solutions will be disposed of according to the work plan.	**L**
	6c) Lifting	▪ Good lifting techniques (lift with legs not back) ▪ Mechanical devices (e.g., hand truck, cart, forklift, etc.) should be used to reduce manual handling of materials and drums. ▪ Team lifting should be utilized if mechanical devices are not available. (mandatory for items over 50 lbs) ▪ Split heavy loads in to smaller loads ▪ Make sure that path is clear prior to lift. ▪ Redesign work area to avoid low lifts ▪ Stretch prior to lifting ▪ Maintain a healthy life style and level of physical fitness.	**L**
	6d) Hand Tools	▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Do not drop or throw tools. Tools shall be placed on the ground or work surface or handed to another employee in a safe manner. ▪ Guards will be kept in place while using hand and power tools. ▪ Daily inspections will be performed. ▪ Remove broken or damaged tools from service and tag out as defective ▪ No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.) ▪ Do not use excessive force or impact ▪ Do not use tool improperly. Ensure all workers are trained	**L**
	6e) Slips/Trips/Falls	▪ See Section 4D above.	**L**

AHA - Field Work Oversight
Activity Description

Job Steps	Hazards	Controls	RAC
	6f) Struck by Vehicle	▪ Ground personnel in the vicinity of vehicles operations will be within the view of the operator at all times. ▪ Ground personnel will not stand directly behind vehicles when it is in operation ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads. ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary ▪ Place cones in the font and rear of the vehicle ▪ Prior to driving off, walk around vehicle to collect cones and identify any hazards - especially low level hazards that may be difficult to see when in the vehicle. ▪ Set up "Workers in the Road" or similar warning signs and cones to alert traffic. ▪ Use emergency flashers and roof top flashing light (recommended) to alert oncoming vehicular traffic. ▪ Remain alert at all times as to the traffic outside the vehicle. Step to the side of the road when distracted by by-standers. Keep unofficial personnel out of the work area. ▪ Exit vehicle with caution. ▪ Wear High Visibility Vest when outside the vehicle. Utilize vehicle as a shield from oncoming traffic, as practical	**L**
7. IDW pickup oversight	7a) Foot Injury	▪ See Section 5C above.	**L**
	7b) Chemical Hazards	▪ See Section 3E above.	**L**
	7c) Lifting	▪ See Section 6C above.	**L**
	7d) Slips/Trips/Falls	▪ See Section 4D above	**L**
8. Return to office/home	8a)See Mobilization/ Demobilization and Site Preparation AHA	**See Mobilization/ Demobilization and Site Preparation AHA**	**L**

AHA – Working with Gasoline
Activity Description

Activity/Work Task:	Working with Gasoline		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for working with Gasoline
- An appropriate fire extinguisher must be readily available to fueling sites when working with gasoline

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: safety glasses, gloves An appropriate fire extinguisher must be readily available to fueling sites when working with gasoline	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use, including pressure and inspection date on fire extinguisher.

AHA – Working with Gasoline
Activity Description

Job Steps	Hazards	Controls	RAC
1. Filling up gasoline containers	1A) Fire, Explosion	1A) Fire, Explosion ▪ Shut off the vehicles engine. ▪ Do not smoke while filling container. ▪ Touch the side of the vehicle to discharge any static build up on you prior to filling the containers. ▪ Only use approved containers with approved labels. ▪ Remove gasoline cans from field vehicle to fill. Place gasoline container on the ground to help dissipate electrical charges. Do not fill gasoline containers in pickup truck, especially those with plastic bed liners. Static electricity may cause fire or explosion. ▪ Manually control the nozzle valve throughout the filling process. ▪ Fill container slowly – will decrease the chance of static ignition buildup and minimize incidents of spillage or splattering. ▪ Keep nozzle in contact with gasoline container at all times to avoid static build-up. ▪ Fill container no more than 95 percent full to allow for expansion. ▪ Place cap tightly on the container after filling – do not use containers that do not seal properly. ▪ Report spills to the attendant.	**L**
	1B) Chemical Exposure	1B) Chemical Exposure ▪ Have gasoline MSDS on site. ▪ Keep face away from the nozzle or container opening. ▪ Avoid prolonged breathing of gasoline vapors. ▪ Never siphon gasoline by mouth. ▪ If gasoline spills on the container, make sure that it has evaporated before placing container in your vehicle. ▪ Place cap tightly on the container after filling – do not use containers that do not seal properly.	**L**
2. Transporting gasoline	2A) Fire, Explosion	2A) Fire, Explosion ▪ Transport gasoline in an approved container with a flash arrestor vent and proper labeling. ▪ Transport no more than 5 gallons. ▪ Make sure the container is secure from tipping and sliding. ▪ Do not store gasoline overnight in field vehicles. ▪ Do not leave gasoline containers in the trunk of the vehicle or in direct sunlight.	**L**
	2B) Breathing gasoline vapors	2C) Breathing gasoline vapors ▪ Use only cans that are in good working order. ▪ Secure caps tightly to prevent vapors from entering the vehicle. ▪ Avoid transporting containers in the cab of the vehicle.	**L**

AHA – Working with Gasoline
Activity Description

Job Steps	Hazards	Controls	RAC
3. Storage	3A) Fire, Explosion	3A) Fire, Explosion ▪ Store gasoline in approved container. ▪ Store gasoline containers in a flammable liquid storage cabinet if available. ▪ Gasoline is a flammable liquid and should be stored at room temperature. ▪ Store away from potential heat sources such as the sun, hot water heater, space heater, furnace, generator, and other potential ignition sources. ▪ Store in well ventilated area. ▪ Gasoline is heavier than air and can travel along the floor to ignition sources.	**L**
4. Refueling small gasoline engines	4A) Fire, Explosion	4A) Fire, Explosion ▪ Before using safety cans, open vent to release any built up pressure. ▪ Turn off engine and let engine cool down before refueling. ▪ Do not smoke while refueling equipment.	**L**

AHA - Groundwater Sampling
Activity Description

Activity/Work Task:	Groundwater Sampling		
Project Location:	**Kalamazoo River**		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for groundwater sampling

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart
E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE - safety glasses, gloves, steel toe work boots, (See project specific HASP)	**Competent / Qualified Personnel:** See HASP (Name – Position/Employer) **Training requirements:** HAZCOM Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use.

Job Steps	Hazards	Controls	RAC
1. Mobilization	3A) See AHA Mobilization/Demobilization/Site Preparation	1A) See AHA Mobilization/Demobilization/Site Preparation	**L**

AHA - Groundwater Sampling
Activity Description

Job Steps	Hazards	Controls	RAC
2. General Site Hazards	2A) See AHA Field Work - General	2A) See AHA Field Work - General	
	2B) Chemical exposure	2B) Chemical Exposure ▪ Read HASP TO determine air monitoring and PPE needs.	L
3. Calibrate monitoring equipment	4A) Exposure to calibration gases	4A) Exposure to calibration gases ▪ Review equipment manuals ▪ Calibrate in a clean, well ventilated area	L
4. Opening the well cap, taking water level readings	5A) Contact with poisonous plants or the oil from poisonous plants	5A) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Wear PPE as described in the HASP. ▪ Do not touch any part of your body/clothing. ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.	L
	5B) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	5B) Contact with stinging/biting insects ▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects in and around the well. ▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the AHA "Insects Stings and Bites." ▪ If necessary, wear protective netting over your head/face. ▪ Avoid contact with the insects if possible. ▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. ▪ Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.	L
	5C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated groundwater/ soil); liquid splash; flammable atmospheres.	5C) Exposure to hazardous substances ▪ Wear PPE as identified in HASP. ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Immediately monitor breathing zone after opening well to determine exposure and verify that level of PPE is adequate – see Action Levels in HASP ▪ Monitor headspace in well. After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before obtaining water level and before sampling. ▪ When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.	L

AHA - Groundwater Sampling
Activity Description

Job Steps	Hazards	Controls	RAC
	5D) Back strain due to lifting bailers or pumps and from moving equipment to well locations	5D) Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques	L
	5E) Foot injuries from dropped equipment	5E) Foot Injuries ▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. ▪ Do not carry more than you can handle safely ▪ Wear Steel toed boots	L
5. Collecting water samples	6A) Fire/Explosion/Contamination hazard from refueling generators	6A) Fire/Explosion/Contamination hazard from refueling generators ▪ Turn the generator off and let it cool down before refueling ▪ Segregate fuel and other hydrocarbons from samples to minimize contamination potential ▪ Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited ▪ See AHA for Gasoline use	L
	6B) Electrocution	6B) Electrocution ▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. ▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. ▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water ▪ Do not stand in wet areas while operating power equipment ▪ Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. ▪ When unplugging a cord, pull on the plug rather than the cord. ▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.	L
	6C) Exposure to contaminants	6C) Exposure to Contaminants ▪ Stand up wind when sampling ▪ Monitor breathing zone with appropriate monitoring equipment (see HASP) ▪ Wear chemical resistant PPE as identified in HASP ▪ See section 4C) under Safe Practices above	L
	6D) Infectious water born diseases	6D) Infectious water born diseases ▪ Wear chemical resistant gloves and other PPE – as identified in HASP ▪ Prevent water from contacting skin ▪ Wash exposed skin with soap and water ASAP after sampling event ▪ Ensure that all equipment is adequately decontaminated using a 10% bleach solution	L

AHA - Groundwater Sampling
Activity Description

Job Steps	Hazards	Controls	RAC
	6E) Exposure to water preservatives	6E) Exposure to water preservatives ▪ Work in a well ventilated area, upwind of samples ▪ Wear chemical resistant PPE as identified in HASP ▪ When preserving samples always add acid to water, avoid the opposite. ▪ See Working With Preservatives AHA	**L**
	6F) Slips/trips/falls	6F) Slips/trips/falls ▪ Ground can become wet/muddy, created by spilled water ▪ Place all purged water in drums for removal ▪ Wear good slip resistant footwear	**L**
	6G) Repetitive Motion and other Ergonomic Issues	6G) Ergonomic Issues ▪ Use mechanical means where possible to raise and lower equipment into well. ▪ Alternate raising and lowering equipment between field sampling team members, and alternate bailing the well. ▪ Use safe lifting techniques.	**L**
6. Sample Processing	7A) Contaminated water	7A) Contaminated water ▪ Wear appropriate PPE as identified in HASP ▪ Decontaminate outside of bottles ▪ Prevent water from contacting skin ▪ Work in well ventilated area – upwind of samples ▪ Waste will be returned to the operation office for storage and disposal	**L**
7. Shipping Samples	8A) Freeze burns, back strain, hazardous chemical exposure, sample leakage	8A) Freeze burns, back strain, hazardous chemical exposure, sample leakage ▪ Wear appropriate chemical resistant gloves as identified in HASP. ▪ Wear leather or insulated gloves when handling dry ice. ▪ Follow safe lifting techniques – get help lifting heavy coolers. ▪ Samples that contain hazardous materials under the DOT definition, must be packaged, manifested and shipped by personnel that have the appropriate DOT HAZMAT training.	**L**

AHA - Insect Stings and Bites

Activity/Work Task:	Insect Stings and Bites		
Project Location:	**Kalamazoo River**		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

This AHA involves the following:

- Establishing site specific measures for dealing with insect stings and bites

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Overall Risk Assessment Code (RAC) (Use highest code): **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart
E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Safety glasses, gloves (HASP), steel toe work boots, and long pants.)	**Competent / Qualified Personnel:** See HASP - Name – Position/Employer **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use

AHA - Insect Stings and Bites

Job Steps	Hazards	Controls	RAC
1. Traveling/working in areas with potential Tick Bites – Example outdoor wooded areas or fields.	1. Lyme Disease, Rocky Mountain Spotted Fever, etc.	▪ Spray clothing with insect repellant as a barrier. ▪ Wear light colored clothing that fits tightly at the wrists, ankles, and waist. ▪ Each outer garment should overlap the one above it. ▪ Cover trouser legs with high socks or boots. ▪ Tuck in shirt tails. ▪ Search the body on a regular basis, especially hair and clothing; ticks generally do not attach for the first couple of hours. ▪ If a tick becomes attached, pull it by grasping it as close as possible to the point of attachment and pull straight out with gentle pressure. Wash skin with soap and water then cleanse with rubbing alcohol. Place the tick in an empty container for later identification, if the victim should have a reaction. Record dates of exposure and removal. ▪ Do not try to remove the tick by burning with a match or covering it with chemical agents. ▪ If you can not remove the tick, or the head detaches, seek propmt medical help. ▪ Watch for warning signs of illness: a large red spot on the bite area; fever, chills, headache, joint and muscle ache, significant fatigue, and facial paralysis are reactions that may appear within two weeks of the attack. Symptoms specific to Lyme disease include: confusion, short-term memory loss, and disorientation.	**L**
2. Working/traveling in areas with potential bee and wasp stings-Example wooded areas and fields	2. Allergic reactions, painful stings	▪ Be alert to hives in brush or in hollow logs. Watch for insects travelling in and out of one location. ▪ If you or anyone you are working with is known to have allergic reactions to bee stings, tell the rest of the crew and your supervisor. Make sure you carry emergency medication with you at all times. ▪ Wear long sleeve shirts and trousers; tuck in shirt.. Bright colors and metal objects may attract bees. ▪ If you are stung, cold compresses may bring relief. ▪ If a stinger is left behind, scrape it off the skin. Do not use a tweezers as this squeezes the venom sack, worsening the injury. ▪ If the victim develops hives, asthmatic breathing, tissue swelling, or a drop in blood pressure, seek medical help immediately. Give victim antihistime, (Benadryl, chlo-amine tabs).	**L**
3. Traveling/working in areas of potential Mosquito Bites-Example- Woods, fields, near bodies of water and etc.	3. Skin irritation, encephalitis	▪ Wear long sleeves and trousers. ▪ Avoid heavy scents. ▪ Use insect repellants. If using DEET, do not apply directly to skin, apply to clothing only. ▪ Carry after-bite medication to reduce skin irritation.	**L**

AHA - Mobilization/Demobilization and Site Preparation
Activity Description

Activity/Work Task:	Mobilization/Demobilization and Site Preparation		
Project Location:	Kalamazoo River		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for mobilizing to, and demobilizing from the site

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart
E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest) Note: When initially entering the site the following PPE must be donned: • Work Uniform or Work Clothes • Hard Hat • Safety Glasses • Steel Toe Boots • Reflective Vests	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use.

AHA - Mobilization/Demobilization and Site Preparation
Activity Description

Job Steps	Hazards	Controls	RAC
1. Prepare for Site Visit	1A) N/A	Prior to leaving for site: ▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ If respiratory protection is required/potentially required, ensure that training and fit-testing has occurred within the past year. ▪ Familiarize yourself with route to the site	L
	1b) Vehicle defects	Inspect company owned/leased vehicle for defects such as: ▪ Flat tires ▪ Windshield wipers worn or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working	L
	1c) Insufficient emergency equipment, unsecured loads	Insufficient emergency equipment, unsecured loads: ▪ Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site) ▪ Ensure vehicle is equpped with warning flashers and/or flares and that the warning flashers work ▪ Cell phones are recommended to call for help in the event of an emergency ▪ Vehicles carrying tools must have a safety cage in place. All tools must be properly secured ▪ Vehicles must be equipped with chocks if the vehicle is to be left running, unattended. ▪ Ensure sufficient gasoline is in the tank	L
2. Operating vehicles	2a) Collisions, unsafe driving conditions	Drive Defensively!: ▪ Seat belts must be used at all times when operating any vehicle on company business. ▪ Drive at safe speed for road conditions ▪ Maintain adequate following distance ▪ Pull over and stop if you have to look at a map ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary	L
3. Driving to the jobsite (mobilization)	3a) Dusty, winding, narrow roads	Dusty, winding, narrow roads ▪ Drive confidently and defensively at all times. ▪ Go slow around corners, occasionally clearing the windshield.	L
	3b) Rocky or one-lane roads	Rocky or one-lane roads: ▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.	L

AHA - Mobilization/Demobilization and Site Preparation
Activity Description

Job Steps	Hazards	Controls	RAC
	3c) Stormy weather, near confused tourists	Stormy weather, near confused tourists: ▪ Inquire about conditions before leaving the office. ▪ Be aware of oncoming storms. ▪ Drive to avoid accident situations created by the mistakes of others.	**L**
	3d) When angry or irritated	When angry or irritated: ▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.	**L**
	3e) Turning around on narrow roads	Turning around on narrow roads: ▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a backer if available.	**L**
	3f) Sick or medicated	Sick or medicated: ▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.	**L**
	3g) On wet or slimy roads	On wet or slimy roads ▪ Drive slow and safe, wear seatbelts.	**L**
	3h) Animals on road	Animals on road ▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas	**L**
4. Gain permission to enter site	4a) Hostile landowner, livestock, pets	Hostile landowner, livestock, pets ▪ Talk to land owner, be courteous and diplomatic ▪ Ensure all animals have been secured away from work area	**L**
5. Mobilization/ Demobilization of Equipment and Supplies	5a) Struck by Heavy Equipment/Vehicles	Struck by heavy equipment: ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times ▪ Employees shall wear a high visibility vest or T-shirt (reflective vest required if working at night). ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation.	**L**
	5b) Struck by Equipment/Supplies	Struck by Equipment/Supplies: ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.	**L**
	5c) Overexertion Unloading/Loading Supplies	Overexertion Unloading/Loading Supplies: ▪ Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting.	**L**

AHA - Mobilization/Demobilization and Site Preparation
Activity Description

Job Steps	Hazards	Controls	RAC
		▪ Tightly secure all loads to the truck bed to avoid load shifting while in transit.	
	5d) Overexertion Unloading/Loading Supplies	Caught in/on/between: ▪ Do not place yourself between two vehicles or between a vehicle and a fixed object.	**L**
	5e) Slip/Trip/Fall	Slip/Trip/Fall: ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. ▪ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ▪ Drivers will check surface before stepping, not jumping down.	**L**
	5f) Vehicle accident	Vehicle accident: ▪ Employees should follow AMEC vehicle operation policy and be aware of all stationary and mobile vehicles.	**L**
6. Site Preparation	6a) Slip/Trip/Fall	Slip/Trip/Fall: ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas	**L**
7. Installation of soil erosion and sediment controls	7a) Overexertion	Overexertion: ▪ Workers will be trained in the proper method of placing erosion controls. ▪ Do not bend and twist at the waist while lifting or exerting force.	**L**
	7b) Struck by Equipment/Supplies	Struck by Equipment/Supplies: ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.	**L**
8. Driving back from the jobsite	7c) See hazards listed under item #3	See safe work practices under item #3	**L**

AHA - Field Work - Poisonous Plants

Activity/Work Task:	Field Work – Poisonous Plants		
Project Location:	**Kalamazoo River**		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for field work with potential for poisonous plants.

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

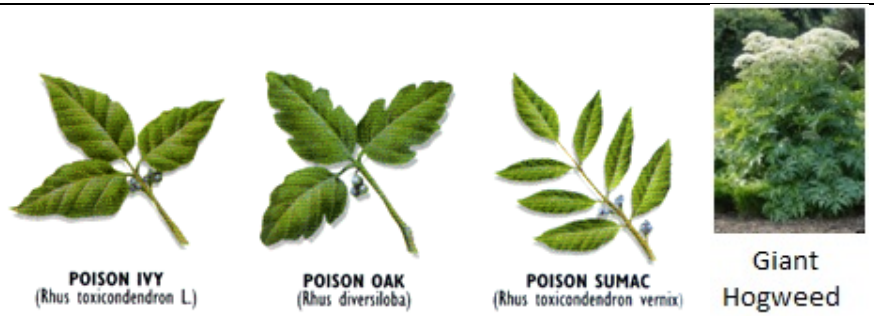
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart
E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (safety glasses, gauntlets, steel toe work boots, long pants, long sleeve shirt) Keep IvyX and Tecnu (or similar supplies) on hand to prevent exposure and mitigate if it occurs	**Competent / Qualified Personnel:** All AMEC employees **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Inspect all PPE prior to use.

AHA - Field Work - Poisonous Plants

Job Steps	Hazards	Controls	RAC
1. Mobilization		See AHA - Mobilization, Demobilization and Site Preparation	L
2. Preparation	Training – Identifying Poisonous Plants	Provide training on identifying the specific poisonous plants that could be present at the site	L
			L
	Giant Hogweed 	2A) Giant Hogweed: ▪ Heracleum mantegazzianum is a recent invasive species from the Caucasus ▪ Grows in the northeastern United States (and Illinois) and Canada, and the Pacific Northwest of the United States and Canada. ▪ Can grow to 22 feet tall with a large white umbrella shaped flower ▪ may look similar to Queen Anne's lace and cow parsnip ▪ Furocoumarins in sap can cause a phototoxic reactions	L

AHA - Field Work - Poisonous Plants

	Poison Ivy	2B) Poison Ivy: ▪ Grows everywhere in United States except Hawaii and Alaska. ▪ In the East, Midwest, and the South, it grows as a vine. ▪ In the Northern and Western United States, it grows as a shrub. ▪ Each leaf has three leaflets. ▪ Leaves are green in the summer and red in the fall. ▪ In the late summer and fall, white berries may grow from the stems.	L

	Poison Oak	2C) Poison Oak:
		▪ Oak-like fuzzy leaves in clusters of three.
		▪ It has two distinct kinds:
		  ▪ Eastern poison oak (New Jersey to Texas) grows as a low shrub.
		  ▪ Western poison oak (Pacific Coast) grows to six-foot-tall clumps or vines up to 30 feet long.
		▪ It may have clusters of yellow berries.
			L

	Poison Sumac	2D) Poison Sumac ▪ Grows in standing water in peat bogs in the Northeast and Midwest and in swampy areas in parts of the Southeast. ▪ Each leaf has clusters of seven to 13 smooth-edged leaflets. ▪ The plants can grow up to 15 feet tall. ▪ The leaves are orange in spring, green in summer and red, and orange or yellow in fall. ▪ There may be clumps of pale yellow or cream-colored berries.	L
3. Contact with poisonous plants	3A) Hand Contact	3A) Hand Contact ▪ Apply IvyX (or similar product) to hands, forearms and other potentially exposed parts of the body, prior to starting work in the morning and again right after lunch. ▪ Leather Gloves must be worn at all times when digging, screening or carrying field equipment. ▪ Leather gloves should be of sufficient length to cover the entire wrist and cuff of the shirt. ▪ Carefully remove gloves, without touching the exterior surface, when taking notes and prior to lunch or restroom breaks. ▪ Gloves that become worn should be replaced immediately. ▪ Do not scratch or rub the face or other exposed skin while wearing gloves ▪ Workers will apply Tecnu (or similar product) to the hands and forearms immediately after removing their gloves, prior to lunch and again at the end of the day. Tecnu will help cleanse the urushiol oil from the skin before it can be absorbed. Sensitive individuals can also apply prior to showering in the evening.	L

	3B) Arm Contact	3B) Arm Contact ▪ Apply IvyX (or similar product) to hands, forearms and other potentially exposed parts of the body, prior to starting work in the morning and again right after lunch ▪ Wear light weight, long sleeved shirts as the sleeves will provide a physical barrier between the skin and any urushiol oil encountered. Disposable gauntlets may we worn over arms to keep oil from clothing as well. ▪ Have the sleeves pulled down to the base of the hand, covering the forearm and wrist (all exposed skin). ▪ Workers will apply Tecnu (or similar product) to the hands and forearms immediately after removing their gloves, prior to lunch and again at the end of the day. Tecnu will help cleanse the urushiol oil from the skin before it can be absorbed. Sensitive individuals can also apply prior to showering in the evening.	**L**
	3C) Leg Contact	3C) Leg Contact ▪ Wear long pants and boots. ▪ Assume boots are contaminated with the urushiol oil and only handle with gloved hands.	**L**
4. Handling Contaminated Equipment and Clothing	4A) Exposure from Handling Contaminanted Equipment	4A) Exposure from Handling Contaminanted Equipment ▪ Do not handle any field equipment that may have come in contact with poison ivy/oak/sumac without gloves ▪ Decontaminate all equipment at the end of each workday with a solution of water and dish soap. ▪ Scrub all surfaces of the screens and shovels with a brush. ▪ Rinse with cool water using a portable garden sprayer.	**L**
	4B) Exposure from Handling Contaminated Clothing	4B) Exposure from Handling Contaminated Clothing ▪ Wash clothing potentially contaminated with urushiol oil prior to wearing again. ▪ Handle contaminated clothing with gloves as the oil can remain on environmental surfaces for up to 5 years.	**L**

AHA - Pore Water Sampling From Shore
Activity Description

Activity/Work Task:	Pore Water Sampling from Shore		
Project Location:	**Kalamazoo River**		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code): **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for pore water sampling from shore

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Safety Boots/Shoes; Safety Glasses; Rubber boots; Waders; Personal Flotation Device (if over or in water))	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

Job Steps	Hazards	Controls	RAC
1. Prepare for site visit	1A) Slips, trips, falls	1A) Familiarize self with site prior to visit. ▪ Complete appropriate training before going on site. ▪ Provide appropriate person in district office your itinerary. ▪ Prepare listing of emergency phone numbers, both on and offsite.	L

AHA - Pore Water Sampling From Shore
Activity Description

Job Steps	Hazards	Controls	RAC
		▪ Identify site/activity PPE needs. ▪ Ensure that First Aid training is current, and that tetanus booster are current.	
2. Check and calibrate sampling equipment.	2A) Muscle Strain - lifting, twisting, tugging	2A) Muscle Strain - lifting, twisting, tugging ▪ Inspect all PPE and equipment and ensure that it is working properly. ▪ Get assistance from a coworker or use mechanical means to move equipment (dolly, cart, etc.)	L
	2B) Slips, trips, falls, strain	2B) Slips, trips, and falls ▪ Wear proper footwear. ▪ Pay attention to where walking.	L
3. Load/carry equipment to the site.	3A) Slips, trips, falls,	3A) Slips, trips, falls ▪ See AHA for Mobilization / Demobilization and Site Preparation ▪ Survey and clear the pathway. See AHA for Clearing Brush and Trees	L
	3B) Muscle Strain - lifting, twisting, tugging	3B) Muscle Strain - lifting, twisting, tugging ▪ Proper lifting, ergonomic practices and body mechanics. ▪ Share the load, move items in smaller shifts, or use cart.	L
4. Field parameters	4A) Falling into water	4A) Falling into water ▪ Limit access to water. ▪ Use equipment that facilitates reaching the location from a safe distance. ▪ Work using the buddy system. Wear PFD if working over or in water.	L
	4B) Slips trips and falls	4B) Slips trips and falls ▪ Wear appropriate footwear. ▪ Survey and clear walking area. ▪ Do not walk on slippery surfaces. ▪ Housekeeping.	L
	4C) Stuck in the mud or sand	4C) Stuck in the mud or sand ▪ Ensure secure footing. ▪ Provide walkways, platforms or secure walking surface. ▪ Use the buddy system and maintain communications with support staff. ▪ (See AHA for working in muddy areas)	L
	4D) Vermin, leaches, Insect/animal born disease	4D) Vermin, leaches, Insect/animal born disease ▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Be aware of your surroundings. ▪ Wear insect netting clothing or apply insect repellant on all exposed skin surfaces as appropriate – consider sample contamination ▪ Wear long sleeve shirt and full length pants ▪ Wear appropriate footwear (snake boots, etc.)	L

AHA - Pore Water Sampling From Shore
Activity Description

Job Steps	Hazards	Controls	RAC
		▪ Avoid high grass areas if possible ▪ Tuck pants leg into boot ▪ Do not put hand/arm into/under an area that you can not see into/under clearly ▪ Do not touch any suspected contaminant without appropriate hand PPE ▪ Wash hands as soon as possible upon completion of task. ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. ▪ Contract vermin relocation, if applicable. ▪ Remain vigilant and respectful of wildlife. ▪ See AHA for Insects, Stings and Bites ▪ See AHA for Dog – Wildlife Safety.	
	4E) Weather – temperature extremes	4E) Weather – temperature extremes ▪ Train workers about weather and appropriate precautions. ▪ Heat: o Familiarize self with signs of heat related illnesses: cramps, heat rash, dehydration, heat exhaustion, and heat stroke. ▪ Sun: o Keep body protected o Wear sunscreen, wide brimmed hat or hardhat. o Drink plenty of fluids to remain hydrated. o Schedule work for cool part of day. o Take breaks in the shade. ▪ Wind: o Wear layered clothing, gloves, hard hat with winter liner, etc. ▪ Cold: o During cold weather - layer clothing and wear wind impervious outerwear o During warm months – wear a long sleeve cotton/breathable fabric shirt and pant.	L
5. Sample collection	5A) Same as Item #4 above.	5A) Same as Item #4 above.	L
	5B) Bending, pulling, twisting	5B) Bending, pulling, twisting ▪ Use a vibrating or wiggling motion on the sample device to break the soil suction. ▪ Proper lifting technique.	L
	5C) Splash	5C) Splash ▪ Wear appropriate safety glasses (tinted for sun). ▪ Be aware if sampling water through a filter, if it becomes plugged with sediment it may unexpectedly “blow off” the hose and splash. ▪ Change filter prior to sedimentation back pressure.	L
	5D) Chemical exposure	5D) Chemical exposure	L

AHA - Pore Water Sampling From Shore
Activity Description

Job Steps	Hazards	Controls	RAC
		▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Work upwind of the sample location. ▪ Minimize exposure using a shovel/spoon or tool to collect the sample. ▪ Review and understand MSDS for all chemicals being handled. ▪ Be careful when handling acids and caustic substances. ▪ Wear adequate PPE and wash hands after completion of task.	
	5E) Vegetation, sticks, reeds, - cuts and punctures	5E) Vegetation, sticks, reeds, - cuts and punctures ▪ Clear access to site. ▪ Be familiar with toxic plants such as poison ivy. Avoid such plants. ▪ Wash thoroughly after accidental contact with toxic materials and plants.	**L**
6. Sample preparation.	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain ▪ Use proper ergonomics when lifting heavy objects ▪ Use appropriate mechanical assistance and tools when possible.	**L**
	6B) Chemical Exposure	6B) Chemical Exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Wash/wipe or decontaminate exterior of sample containers and equipment. ▪ Use care handling preservatives (acids/bases.)	**L**
	6C) Sharps and knives	6C) Sharps and knives ▪ Use care handling tape dispensers, knives and sharp objects.	**L**
	6D) Extreme cold (ice preservation)	6D) Extreme cold (ice preservation) ▪ Minimize exposure to ice. ▪ Use a shovel/spoon or tool to fill bags for preserving samples in coolers.	**L**
7. Site exit and drive home or next site.	7A) Vehicle contamination	7A) Vehicle contamination ▪ Wash hands promptly. ▪ Contaminated PPE (booties, Tyvek, nitrile gloves) should be disposed on-site. ▪ Remove boots and soiled clothing for secure storage in trunk; decontaminate as soon as possible. ▪ Update exposure log.	**L**
	7B) Traffic hazards.	7B) Traffic hazards. ▪ See AHA for Mobilization / Demobilization and Site Preparation.	**L**

AHA – Sediment and Surface Water Sampling from Shore
Activity Description

Activity/Work Task:	Sediment and Surface Water Sampling from Shore		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for sampling sediment and surface water from shore

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: Safety Boots/Shoes; Safety Glasses; Rubber boots; Waders; Personal Floatation Device	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use.

AHA – Sediment and Surface Water Sampling from Shore
Activity Description

Job Steps	Hazards	Controls	RAC
1. Prepare for site visit	1A) Slips, trips, falls	1A) Familiarize self with site prior to visit. ▪ Complete appropriate training before going on site. ▪ Provide appropriate person in district office your itinerary. ▪ Prepare listing of emergency phone numbers, both on and offsite. ▪ Identify site/activity PPE needs. ▪ Ensure that First Aid training is current, and that tetanus booster are current.	L
2. Check and calibrate sampling equipment.	2A) Muscle Strain - lifting, twisting, tugging	2A) Muscle Strain - lifting, twisting, tugging ▪ Inspect all PPE and equipment and ensure that it is working properly. ▪ Get assistance from a coworker or use mechanical means to move equipment (dolly, cart, etc.)	L
	2B) Slips, trips, falls, strain	2B) Slips, trips, and falls ▪ Wear proper footwear. ▪ Pay attention to where walking.	L
3. Load/carry equipment to the site.	3A) Slips, trips, falls,	3A) Slips, trips, falls ▪ See AHA for Mobilization / Demobilization and Site Preparation ▪ Survey and clear the pathway. See AHA for Clearing Brush and Trees	L
	3B) Muscle Strain - lifting, twisting, tugging	3B) Muscle Strain - lifting, twisting, tugging ▪ Proper lifting, ergonomic practices and body mechanics. ▪ Share the load, move items in smaller shifts, or use cart.	L
	3C) Irate property owners, pets	3C) Irate property owners, pets ▪ Call property owners in advance. ▪ Check in to introduce yourself upon arrival. ▪ Be courteous and diplomatic	L
	3D) Crime	3D) Crime ▪ Do not enter areas where threats are present. ▪ Contract security where applicable. ▪ Use the buddy system. ▪ Maintain contact with support such as radio or cell phone.	L
	3E) Struck by traffic - sampling from a bridge or roadway.	3E) Struck by traffic - sampling from a bridge or roadway. ▪ Wear orange/yellow safety vest ▪ Use buddy system. ▪ Use traffic cones and a lookout. ▪ Attempt to sample away from the bridge if possible	L
4. Field parameters	4A) Falling into water	4A) Falling into water ▪ Limit access to water. ▪ Use equipment that facilitates reaching the location from a safe distance. ▪ Work using the buddy system. Wear PFD if working over water.	L
	4B) Slips trips and falls	4B) Slips trips and falls ▪ Wear appropriate footwear. ▪ Survey and clear walking area. ▪ Do not walk on slippery surfaces. ▪ Housekeeping.	L
	4C) Stuck in the mud or sand	4C) Stuck in the mud or sand ▪ Ensure secure footing. ▪ Provide walkways, platforms or secure walking surface. ▪ Use the buddy system and maintain communications with support staff. ▪ (See AHA for Working in Muddy Areas)	L

AHA – Sediment and Surface Water Sampling from Shore
Activity Description

Job Steps	Hazards	Controls	RAC
	4D) Vermin, leaches, Insect/animal born disease	4D) Vermin, leaches, Insect/animal born disease ▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Be aware of your surroundings. ▪ Wear insect netting clothing or apply insect repellant on all exposed skin surfaces as appropriate – consider sample contamination ▪ Wear long sleeve shirt and full length pants ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Tuck pants leg into boot ▪ Do not put hand/arm into/under an area that you can not see into/under clearly ▪ Do not touch any suspected contaminant without appropriate hand PPE ▪ Wash hands as soon as possible upon completion of task. ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. ▪ Contract vermin relocation, if applicable. ▪ Remain vigilant and respectful of wildlife. ▪ See AHA for Insects, Stings and Bites ▪ See AHA for Dog – Wildlife Safety.	**L**
	4E) Weather – temperature extremes	4E) Weather – temperature extremes ▪ Train workers about weather and appropriate precautions. ▪ Heat: o Familiarize self with signs of heat related illnesses: cramps, heat rash, dehydration, heat exhaustion, and heat stroke. ▪ Sun: o Keep body protected o Wear sunscreen, wide brimmed hat or hardhat. o Drink plenty of fluids to remain hydrated. o Schedule work for cool part of day. o Take breaks in the shade. ▪ Wind: o Wear layered clothing, gloves, hard hat with winter liner, etc. ▪ Cold: o During cold weather - layer clothing and wear wind impervious outerwear o During warm months – wear a long sleeve cotton/breathable fabric shirt and pant.	**L**
5. Sample collection	5A) Same as Item #4 above.	5A) Same as Item #4 above.	**L**
	5B) Bending, pulling, twisting	5B) Bending, pulling, twisting ▪ Use a vibrating or wiggling motion on the sample device to break the soil suction. ▪ Proper lifting technique.	**L**
	5C) Splash	5C) Splash ▪ Wear appropriate safety glasses (tinted for sun). ▪ Be aware if sampling water through a filter, if it becomes plugged with sediment it may unexpectedly “blow off” the hose and splash. ▪ Change filter prior to sedimentation back pressure.	**L**

AHA – Sediment and Surface Water Sampling from Shore
Activity Description

Job Steps	Hazards	Controls	RAC
	5D) Chemical exposure	5D) Chemical exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Work upwind of the sample location. ▪ Minimize exposure using a shovel/spoon or tool to collect the sample. ▪ Review and understand MSDS for all chemicals being handled. ▪ Be careful when handling acids and caustic substances. ▪ Wear adequate PPE and wash hands after completion of task.	**L**
	5E) Vegetation, sticks, reeds, - cuts and punctures	5E) Vegetation, sticks, reeds, - cuts and punctures ▪ Clear access to site. ▪ Be familiar with toxic plants such as poison ivy. Avoid such plants. ▪ Wash thoroughly after accidental contact with toxic materials and plants.	**L**
6. Sample preparation.	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain ▪ Use proper ergonomics when lifting heavy objects ▪ Use appropriate mechanical assistance and tools when possible.	**L**
	6B) Chemical Exposure	6B) Chemical Exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Wash/wipe or decontaminate exterior of sample containers and equipment. ▪ Use care handling preservatives (acids/bases.) ▪ See Working with Preservatives AHA	**L**
	6C) Sharps and knives	6C) Sharps and knives ▪ Use care handling tape dispensers, knives and sharp objects.	**L**
	6D) Extreme cold (ice preservation)	6D) Extreme cold (ice preservation) ▪ Minimize exposure to ice. ▪ Use a shovel/spoon or tool to fill bags for preserving samples in coolers.	**L**
7. Site exit and drive home or next site.	7A) Vehicle contamination	7A) Vehicle contamination ▪ Wash hands promptly. ▪ Contaminated PPE (booties, Tyvek, nitrile gloves) should be disposed on-site. ▪ Remove boots and soiled clothing for secure storage in trunk; decontaminate as soon as possible. ▪ Update exposure log.	**L**
	7B) Traffic hazards.	7B) Traffic hazards. ▪ See AHA for Mobilization / Demobilization and Site Preparation.	**L**

AHA – Sediment Sampling from a Canoe or Kayak
Activity Description

Activity/Work Task:	Sediment Sampling from a Canoe or Kayak		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for sampling from a canoe or kayak

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (work gloves, PFDs, safety glasses, gloves, steel toe work boots) Boating first Aid kit Boating Safety Kit (flares, air horn, cell phone, tool kit)	**Competent / Qualified Personnel:** Any AMEC employee **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Full boat inspection prior to use. Inspect all PPE prior to use

Job Steps	Hazards	Controls	RAC
1. Going to site, work preparation	Mobilization / Demobilization and Site Preparation	See JHA for Mobilization Demobilization and Site Preparation	**L**

AHA – Sediment Sampling from a Canoe or Kayak
Activity Description

Job Steps	Hazards	Controls	RAC
2. Working at the site	General Field Work – Walking and working in the field, Environmental conditions, communication	See JHA for Field Work – General.	**L**
3. Working Near or in the Water	Drowning Hazards	Drowning Hazards ▪ Inspect the canoe/ kayak to ensure it is safe to use (no holes, defects, etc.). ▪ Ensure that the anchors are adequate weight and the anchor ropes are adequate length to securely anchor the canoe/kayak in the river at each proposed sampling location. ▪ Don a Coast Guard approved personal flotation device rated for your weight when working in the canoe/kayak or working within 6 feet of the water's edge. Keep the PFD fastened at all times. Due to the amount of gear, equipment, etc. that personnel will need to transport, a Coast Guard approved inflatable PFD may be used in lieu of the standard type PDF. Rescue procedures are included at the end of this JHA. ▪ Attach a safety line anchored to a stable point on shore to the canoe/kayak if the body of water is fast moving. ▪ Have two anchors for the canoe/ kayak, one from the bow and one from the stern. ▪ Do not overload the canoe/kayak. ▪ Distribute the weight of people and equipment evenly to keep the canoe/kayak stabile. ▪ Keep the load as low as possible and secure equipment to prevent it from shifting and affecting the stability of the canoe/kayak. ▪ Have one person hold steady the canoe/kayak while the other person enters it. ▪ When entering or exiting the canoe/kayak, maintain three points of contact (with the canoe/kayak) and stay low to maintain balance. ▪ While in the canoe/kayak, maintain your body weight low and towards the centerline of the canoe/kayak. ▪ Try shifting your weight carefully as you push off with your paddle or pole. ▪ Do not lean your shoulders too far outside of the canoe/kayak as this can capsize the vessel. ▪ Canoe/kayaks are not easily seen by other larger boats. Try to stay out of the center of the river, and be as predictable and visible as possible. ▪ Stay away from dams. It is illegal and dangerous to boat near them. ▪ Never paddle farther from shore than you are prepared to swim. ▪ Stay clear of "strainers" (fallen trees, branches, etc.). **Rescue Procedures** ▪ If you fall out of the canoe/kayak, hold onto the canoe/kayak - unless it presents a life-threatening situation. If floating in current, position yourself on the upstream side of the capsized canoe/kayak. Keep your feet up (on the surface) and pointed downstream and swim to shore. The spotter can attempt to pull the canoe/kayak to shore using the tether line attached to the canoe/kayak. ▪ Swim to calm water before attempting to stand up in the water.	**M**
	Stuck in the mud or sand	Stuck in the mud or sand ▪ Ensure secure footing. ▪ Provide walkways, platforms or secure walking surface. ▪ Use the buddy system and maintain communications with support staff. (See JHA for Rescue from Mud footing)	**L**

AHA – Sediment Sampling from a Canoe or Kayak
Activity Description

Job Steps	Hazards	Controls	RAC
	Vermin, leaches, Insect/animal born disease	Vermin, leaches, Insect/animal born disease ▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Be aware of your surroundings. ▪ Wear insect netting clothing or apply insect repellant on all exposed skin surfaces as appropriate – consider sample contamination ▪ Wear long sleeve shirt and full length pants ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Tuck pants leg into boot ▪ Do not put hand/arm into/under an area that you can not see into/under clearly ▪ Do not touch any suspected contaminant without appropriate hand PPE ▪ Wash hands as soon as possible upon completion of task. ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. ▪ Contract vermin relocation, if applicable. ▪ Remain vigilant and respectful of wildlife. ▪ See JHA for Insects, Stings and Bites ▪ See JHA for Dog – Wildlife Safety.	**L**
4. Weather Extremes	Weather extremes (thunder, wind, etc.)	See JHA for Field Work – General.	**L**
5. Maneuvering Canoe/kayak up and down river bank	Back injury from lifting and twisting equipment	Back injury from lifting and twisting equipment ▪ Complete appropriate stretching exercises prior to paddling. ▪ Use proper lifting and bending techniques. ▪ Use buddy system to move canoe/kayak. ▪ Tie a rope to the canoe/kayak to ease it down the river bank and to assist with the retrieval up the river bank at the end of sampling event. ▪ Ensure that all personnel are aware of the path that will be used to move the canoe/kayak from the vehicle to the point of launch.	**L**
	Injuries from transporting equipment/canoe/kayak to river, i.e., stumbling or falling	Injuries from transporting equipment/canoe/kayak to site i.e., stumbling or falling ▪ Ensure surrounding area is clear of personnel and obstacles as you approach the work area. ▪ Transport equipment in manageable loads. ▪ Use 2 person lift for heavy items. ▪ Assure pathway from the vehicle to the point of launch (for the canoe/kayak) is clear.	**L**
6. Entering and Exiting the Canoe/kayak and Sampling from the Canoe/kayak	Falling into the Water	Falling into the Water ▪ Have spotter hold canoe/kayak stead as other workers get into the canoe/kayak ▪ Use caution when sampling to avoid tipping canoe/kayak too much to one side. Have second person in canoe/kayak counter balance canoe/kayak ▪ Wear PFD.	**L**
7. Removal of Canoe/kayak from River	Injury to others as equipment is removed	Injury to others as canoe/kayak is removed ▪ Assure that others are standing at a safe distance before removing canoe/kayak. ▪ Use 2 people to maneuver canoe/kayak from river.	**L**

AHA - Soil Sampling
Activity Description

Activity/Work Task:	Soil Sampling		
Project Location:	**Kalamazoo River**		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures soil sampling by hand (direct push or hand auger). For safety measures associated with drilling for soil sampling, also look at the drilling AHA

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use

Job Steps	Hazards	Controls	RAC
1. Prepare for sampling event	1A) Chemical exposure	1A) Chemical Exposure ▪ Read HASP and determine air monitoring and PPE needs.	L

AHA - Soil Sampling
Activity Description

Job Steps	Hazards	Controls	RAC
2. Carrying equipment to site location	2A) Back or muscle strain	2A) Back or muscle strain ▪ Use proper lifting techniques when lifting pumps or generators ▪ Use mechanical aids if available ▪ Use 2 person lift for heavy items	**L**
3. Calibrate monitoring equipment	1A) Exposure to calibration gases	3A) Exposure to calibration gases ▪ Review equipment manuals ▪ Calibrate in a clean, well ventilated area	**L**
4. Preparing sampling location	4A) Contact with poisonous plants or the oil from poisonous plants	4A) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Wear PPE as described in the HASP. ▪ Do not touch anything part of your body/clothing. ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP.	**L**
	4B) Contact with biting insects (i.e., spiders, bees, etc.)	4B) Contact with stinging/biting insects ▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects in and around the well. ▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the AHA “Insects Stings and Bites.” ▪ If necessary, wear protective netting over your head/face. ▪ Avoid contact with the insects if possible. ▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. ▪ Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.	**L**
	4C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated soil); flammable atmospheres.	4C) Exposure to hazardous substances ▪ Wear PPE as identified in HASP. ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Monitor breathing zone air in accordance with HASP to determine levels of contaminants present. ▪ When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.	**L**
	4D) Back strain due to lifting or moving equipment to sampling locations	4D) Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques	**L**

AHA - Soil Sampling
Activity Description

Job Steps	Hazards	Controls	RAC
	4E) Foot injuries from dropped equipment	4E) Foot Injuries ▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. ▪ Do not carry more than you can handle safely ▪ Wear steel toed boots	L
5. Collecting soil samples	5A) Working around drill rigs	5A) See AHA - Drilling	L
	5B) Encountering underground or overhead utilities	5B) Have all utilities located.	L
	5C) Fire/Explosion/Contamination hazard from refueling generators	5C) Fire/Explosion/Contamination hazard from refueling generators ▪ Turn the generator off and let it cool down before refueling ▪ Segregate fuel and other hydrocarbons from samples to minimize contamination potential ▪ Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited ▪ See AHA for Gasoline use	L
	5D) Electrocution	5D) Electrocution ▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. ▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. ▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water ▪ Do not stand in wet areas while operating power equipment ▪ Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. ▪ When unplugging a cord, pull on the plug rather than the cord. ▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.	L
	5E) Exposure to contaminants	5E) Exposure to Contaminants ▪ Stand up wind when sampling ▪ Monitor breathing zone with appropriate monitoring equipment (see HASP) ▪ Wear chemical resistant PPE as identified in HASP ▪ See section 4C) under Safe Practices above	L
	5F) Exposure to preservatives	5F) Exposure to preservatives ▪ Work in a well ventilated area, upwind of samples ▪ Wear chemical resistant PPE as identified in HASP ▪ Review MSDSs	L
	5G) Slips/trips/falls	5G) Slips/trips/falls ▪ Ground can become wet/muddy ▪ Wear good slip resistant footwear	L

AHA - Soil Sampling
Activity Description

Job Steps	Hazards	Controls	RAC
	5H) Lifting Injury	5H) Lifting injury ▪ Use proper lifting techniques when carrying quantities of samples ▪ Use proper ergonomics when hand digging for samples	L
	5I) Eye injury	5I) Eye Injury ▪ Wear eye protection when using picks or similar devices to loosen soil	L
	5J) Fire	5J) Fire ▪ When using gas powered auger, maintain fire watch whenever fueling or otherwise handling gasoline ▪ See AHA - Gasoline	L
6. Soil sampling using floor corer	6A) Back injury	6A) Back Injury ▪ Use proper lifting techniques when moving floor corer and generator ▪ Use mechanincal aids if available ▪ Use two person lift for heavy items.	L
	6B) Electric Shock	6B) Electric Shock ▪ Use electric cords free from defects ▪ Keep cords out of water ▪ Ensure all electrical equipment is properly grounded ▪ Use GFCI	L
	6C) Hearing	6C) Hearing ▪ Wear hearing protection	L
	6D) Fire	6D) Fire ▪ When using generator, maintain fire watch whenever refueling or otherwise handling gasoline ▪ See AHA - Gasoline	L
	6E) Contamination	6E) Contamination ▪ Use appropriate PPE for the contaminants of concern (see HASP). ▪ Minimize sample contact ▪ Label sample in accordance with procedures ▪ Monitor breathing zone levels.	L

AHA – Streams-Wetlands and Fish Surveys
Activity Description

Activity/Work Task:	Streams-Wetland and Fish Surveys		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for stream, wetland, and fish surveys
- Note tasks require helmet and traction assistance, as well as PFD

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (work gloves, PFDs, safety glasses, gloves, steel toe work boots, high traction devices on feet, rafting helmet, high visibility safety vest)	**Competent / Qualified Personnel:** See HASP (Name – Position/Employer) **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use

AHA – Streams-Wetlands and Fish Surveys
Activity Description

Job Steps	Hazards	Controls	RAC
1. Walking to and from stream or wetland	1A) Insect bites/stings	2A) Insect bites/stings ▪ Avoid wearing heavy fragrances. ▪ Carry first-aid and sting relief kits. ▪ Make sure all crew members are informed about others who are allergic and what to do if they need assistance. ▪ Carry necessary emergency medication. ▪ See AHA Insect Bites and Stings	**L**
	1B) Slips and falls	2B) Slips and falls ▪ Use traction devices on shoes. ▪ Move slowly, take your time. ▪ Use a walking staff to provide a three point support.	**L**
	1C) Eye injuries	2C) Eye injuries ▪ Travel with care through heavy brush. ▪ Use eye protection in brushy areas.	**L**
	1D) Scrapes and punctures	2D) Scrapes and punctures ▪ Wear proper clothing, long sleeved shirts and pants. No shorts.	**L**
	1E) Cuts/Lacerations due to machette use	2E) Cuts/Lacerations due to machette use ▪ Wear chaps or snake legs ▪ Cut away from the body ▪ Ensure blade of machette is sharp	**L**
	1F) Blow-down / heavy debris	2F) Blow-down / heavy debris ▪ Be aware of your surroundings, including hanging or leaning debris that may be dislodged and fall.	**L**
	1G) Animal encounters	2G) Hostile animal encounters • Make noise to avoid encounter. • If you do encounter an animal, put a lot of room between you and the animal by walking around him/her if necessary. • Do not look it in the eye. • If charged, run away or climb a tree. • Throwing something or shouting may deter an attack.	**L**
	1H) Severe injury in remote locations	2H) Severe injury in remote locations ▪ Carry a two-way radio and know how to use it. ▪ Work in teams. ▪ Make sure someone on crew is certified in first aid. ▪ Carry a first aid kit.	**L**

AHA – Streams-Wetlands and Fish Surveys
Activity Description

Job Steps	Hazards	Controls	RAC
2. Entering Stream	3A) Slips and falls	3A) Slips and falls ▪ Use traction devices on shoes and waders. ▪ Move slowly, take your time. ▪ Use a walking staff to provide a three point support.	**L**
	3B) Sand or Mud – knee or ankle injury	3B) Sand or Mud ▪ Use shorter steps ▪ Use walking sticks to check firmness of soils ▪ Use buddy system ▪ Snowshoes that dissipate weight may be effective ▪ If leg gets caught, use slight back and forth motion to soften mud and remove slowly. Don't try to pull leg out with twisting or jerking motion. ▪ If possible, aeriate or bubble the mud to help releave suction.	**L**
	3C) Equipment	3C) Equipment ▪ Secure packs and hip waders with quick release straps and be ready to discard, if an emergency arises. ▪ Do not work in waders in water greater than 3 feet deep or in swift water. ▪ Wear bike or rafting helmets to protect from blows to the head.	**L**
	3D) Hypothermia	3D) Hypothermia ▪ Work in teams of two. ▪ Have warming devices available. ▪ Wear proper equipment that is in good condition. ▪ Be aware of signs of hypothermia, it's prevention, detection and treatment. ▪ Stay in tune to current weather and extended forecasts. ▪ See AHA Field Work - General	**L**
	3E) High flow velocity	3E) High flow velocity ▪ Evaluate a stream before entering. ▪ Follow the "rule of 10" a. If stream is 1 foot deep and flowing @10 ft./sec, it is too hazardous to wade b. If stream is 2 feet deep and flowing at 5 ft./second, it is too hazardous to wade. c. If you do enter a stream and discover it is too dangerous to wade, back out using your wading pole for balance.	**M**
	3F) Severe weather	3F) Severe weather ▪ Suspend measurements during lightning storms or when a storm is approaching.	**L**
3. Entering Wetland	3A) Slips and falls	3A) Slips and falls • Use traction devices on shoes and boots. • Move slowly, take your time. • Use a walking staff to provide a three point support.	**L**

AHA – Streams-Wetlands and Fish Surveys
Activity Description

Job Steps	Hazards	Controls	RAC
	3B) Sand or Mud – knee or ankle injury	3B) Sand or Mud ▪ Use shorter steps ▪ Use walking sticks to check firmness of soils ▪ Use buddy system ▪ Snowshoes that dissipate weight may be effective ▪ If leg gets caught, use slight back and forth motion to soften mud and remove slowly. Don't try to pull leg out with twisting or jerking motion. ▪ If possible, aeriate or bubble the mud to help releave suction.	**L**
	3C) Equipment	3C) Equipment ▪ Secure packs and boots with quick release straps and be ready to discard, if an emergency arises. ▪ Wear hard hat to protect from blows to the head if using an auger. ▪ Wear steel toe boots to protect feet from dropping equipment (auger)	**L**
	3D) Temperature extremes (hot or cold)	3D) Hypothermia ▪ Work in teams of two. ▪ Have warming devices available. ▪ Wear proper equipment that is in good condition. ▪ Be aware of signs of hypothermia and/or heat stroke, it's prevention, detection and treatment. ▪ Stay in tune to current weather and extended forecasts. ▪ See AHA Field Work - General	**L**
	3E) Severe weather	3E) Severe weather ▪ Suspend measurements during lightning storms or when a storm is approaching.	**L**

AHA - Surface Water Sampling
Activity Description

Activity/Work Task:	Surface Water Sampling		
Project Location:	**Kalamazoo River**		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for surface water sampling on site

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: safety glasses, gloves, steel toe work boots, PFD	**Competent / Qualified Personnel:** See HASP (Name – Position/Employer) **Training requirements:** HAZCOM Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

AHA - Surface Water Sampling
Activity Description

Job Steps	Hazards	Controls	RAC
1. Prepare for site visit	1A) Slips, trips, falls	1A) Familiarize self with site prior to visit. ▪ Complete appropriate training before going on site. ▪ Provide appropriate person in district office your itinerary. ▪ Prepare listing of emergency phone numbers, both on and offsite. ▪ Identify site/activity PPE needs. ▪ Ensure that First Aid training is current, and that tetanus booster are current.	L
2. Check and calibrate sampling equipment.	2A) Muscle Strain - lifting, twisting, tugging	2A) Muscle Strain - lifting, twisting, tugging ▪ Inspect all PPE and equipment and ensure that it is working properly. ▪ Get assistance from a coworker or use mechanical means to move equipment (dolly, cart, etc.)	L
	2B) Slips, trips, falls, strain	2B) Slips, trips, and falls ▪ Wear proper footwear. ▪ Pay attention to where walking.	L
3. Load/carry equipment to the site.	3A) Slips, trips, falls,	3A) Slips, trips, falls ▪ See AHA for Mobilization / Demobilization and Site Preparation ▪ Survey and clear the pathway. See AHA for Clearing Brush and Trees	L
	3B) Muscle Strain - lifting, twisting, tugging	3B) Muscle Strain - lifting, twisting, tugging ▪ Proper lifting, ergonomic practices and body mechanics. ▪ Share the load, move items in smaller shifts, or use cart.	L
	3C) Irate property owners, pets	3C) Irate property owners, pets ▪ Call property owners in advance. ▪ Check in to introduce yourself upon arrival. ▪ Be courteous and diplomatic	L
	3D) Crime	3D) Crime ▪ Do not enter areas where threats are present. ▪ Contract security where applicable. ▪ Use the buddy system. ▪ Maintain contact with support such as radio or cell phone.	L
	3E) Struck by traffic - sampling from a bridge or roadway.	3E) Struck by traffic - sampling from a bridge or roadway. ▪ Wear orange/yellow safety vest ▪ Use buddy system. ▪ Use traffic cones and a lookout. ▪ Attempt to sample away from the bridge if possible	L
4. Field parameters	4A) Falling into water	4A) Falling into water ▪ Limit access to water. ▪ Use equipment that facilitates reaching the location from a safe distance. ▪ Work using the buddy system. Wear PFD if working over water.	L

AHA - Surface Water Sampling
Activity Description

Job Steps	Hazards	Controls	RAC
	4B) Slips trips and falls	4B) Slips trips and falls ▪ Wear appropriate footwear. ▪ Survey and clear walking area. ▪ Do not walk on slippery surfaces. ▪ Housekeeping.	L
	4C) Stuck in the mud or sand	4C) Stuck in the mud or sand ▪ Ensure secure footing. ▪ Provide walkways, platforms or secure walking surface. ▪ Use the buddy system and maintain communications with support staff. ▪ (See AHA for Working in a Muddy Area)	L
	4D) Vermin, leaches, Insect/animal born disease	4D) Vermin, leaches, Insect/animal born disease ▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Be aware of your surroundings. ▪ Wear insect netting clothing or apply insect repellant on all exposed skin surfaces as appropriate – consider sample contamination ▪ Wear long sleeve shirt and full length pants ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Tuck pants leg into boot ▪ Do not put hand/arm into/under an area that you can not see into/under clearly ▪ Do not touch any suspected contaminant without appropriate hand PPE ▪ Wash hands as soon as possible upon completion of task. ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. ▪ Contract vermin relocation, if applicable. ▪ Remain vigilant and respectful of wildlife. ▪ See AHA for Insects, Stings and Bites ▪ See AHA for Dog – Wildlife Safety.	L

AHA - Surface Water Sampling
Activity Description

Job Steps	Hazards	Controls	RAC
	4E) Weather – temperature extremes	4E) Weather – temperature extremes ▪ Train workers about weather and appropriate precautions. ▪ Heat: o Familiarize self with signs of heat related illnesses: cramps, heat rash, dehydration, heat exhaustion, and heat stroke. ▪ Sun: o Keep body protected o Wear sunscreen, wide brimmed hat or hardhat. o Drink plenty of fluids to remain hydrated. o Schedule work for cool part of day. o Take breaks in the shade. ▪ Wind: o Wear layered clothing, gloves, hard hat with winter liner, etc. ▪ Cold: o During cold weather - layer clothing and wear wind impervious outerwear o During warm months – wear a long sleeve cotton/breathable fabric shirt and pant.	L
5. Sample collection	5A) Same as Item #4 above.	5A) Same as Item #4 above.	L
	5B) Bending, pulling, twisting	5B) Bending, pulling, twisting ▪ Use a vibrating or wiggling motion on the sample device to break the soil suction. ▪ Proper lifting technique.	L
	5C) Splash	5C) Splash ▪ Wear appropriate safety glasses (tinted for sun). ▪ Be aware if sampling water through a filter, if it becomes plugged with sediment it may unexpectedly “blow off” the hose and splash. ▪ Change filter prior to sedimentation back pressure.	L
	5D) Chemical exposure	5D) Chemical exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Work upwind of the sample location. ▪ Minimize exposure using a shovel/spoon or tool to collect the sample. ▪ Review and understand MSDS for all chemicals being handled. ▪ Be careful when handling acids and caustic substances. ▪ Wear adequate PPE and wash hands after completion of task.	L
	5E) Vegetation, sticks, reeds, - cuts and punctures	5E) Vegetation, sticks, reeds, - cuts and punctures ▪ Clear access to site. ▪ Be familiar with toxic plants such as poison ivy. Avoid such plants. ▪ Wash thoroughly after accidental contact with toxic materials and plants.	L

AHA - Surface Water Sampling
Activity Description

Job Steps	Hazards	Controls	RAC
6. Sample preparation.	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain ▪ Use proper ergonomics when lifting heavy objects ▪ Use appropriate mechanical assistance and tools when possible.	**L**
	6B) Chemical Exposure	6B) Chemical Exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Wash/wipe or decontaminate exterior of sample containers and equipment. ▪ Use care handling preservatives (acids/bases.)	**L**
	6C) Sharps and knives	6C) Sharps and knives ▪ Use care handling tape dispensers, knives and sharp objects.	**L**
	6D) Extreme cold (ice preservation)	6D) Extreme cold (ice preservation) ▪ Minimize exposure to ice. ▪ Use a shovel/spoon or tool to fill bags for preserving samples in coolers.	**L**
7. Site exit and drive home or next site.	7A) Vehicle contamination	7A) Vehicle contamination ▪ Wash hands promptly. ▪ Contaminated PPE (booties, Tyvek, nitrile gloves) should be disposed on-site. ▪ Remove boots and soiled clothing for secure storage in trunk; decontaminate as soon as possible. ▪ Update exposure log.	**L**
	7B) Traffic hazards.	7B) Traffic hazards. ▪ See AHA for Mobilization / Demobilization and Site Preparation.	**L**

AHA - Utility Clearance
Activity Description

Activity/Work Task:	Utility Clearance and Survey		
Project Location:	**Kalamazoo River**		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

This AHA involves the following:

- Establishing site specific measures for the locating of utilities before drilling, excavating, or other intrusive activities

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Overall Risk Assessment Code (RAC) (Use highest code) **H**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest)	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use.

AHA - Utility Clearance
Activity Description

Job Steps	Hazards	Controls	RAC
1. Pre-planning	1a) Property Access ▪ Animal bites ▪ Dangerous social areas/ violent neighborhoods ▪ Lost ▪ Electrocution	Ensure communications with the property owner. Request pets and animals to be confined during the survey: ▪ Maintain communications via two way radios or cell phones. ▪ Learn animal posturing including how to identify rabid animals. ▪ Contract security as appropriate for safety and equipment theft. ▪ Be prepared with a map and compass as necessary. ▪ Be aware of overhead and underground utilities. Ensure Dig-Safe has been contacted. When working with electrical equipment avoid wet surfaces and exposed connections.	**L**
	1b) Utilities Not Cleared (damage to utilities, worker injury)	Utilities Not Cleared: ▪ Provide sufficient time and budget to ensure that utilities have been adequately located, prior to the start of up of work. ▪ Contact One Call Utility identifier organization at least 6 days prior to the project start date. ▪ Cite or have subcontractor cite a start date of at least 3 working days prior to actual planned start date (provides window to inspect locations prior to job start-up. ▪ Verify via emails or phone that all utilities have visited the site and marked their respective utilities. ▪ If subcontractor calls One Call organization, require them to forward all e-mail responses from member utilities as they receive them. ▪ If verification cannot be done remotely, send worker to site to inspect ground for markings (cheaper to identify issues prior to mobilization to the site). ▪ Document all phone communications with driller about utility clearance issues and requests (e-mail the conversation highlights or document in a field notebook – it becomes part of the file record) ▪ Call any member utilities that have not responded indicating they have cleared or marked-out utilities. Place the call morning of ticket start date (e.g., 3 days prior to actual start date). Document the phone conversations in notes or e-mails to the file. ▪ If town services (e.g., sanitary sewer, storm sewer, water) aren't listed as a One Call member, contact the town office to schedule mark-out, obtain copies of utility networks, and identify the appropriate town contacts. ▪ If town maps have lateral connections to private lots marked and /or if we are drilling along road right-of way opposite developed properties, identify the locations of the lateral connections. This may mean contacting abutters and asking to look in basements for location of pipes. If possible do this during a site visit prior to field start. If not, it should occur during the first day of work so any issues can be identified and decisions made on the risk of proceeding. ▪ Walk all planned locations with the subcontractor, prior to start of excavation/drilling to identify marked utilities and note any uncertainties. Field Lead should call PM and relay any issues. Document this inspection in the field book and note subcontractor's responses to any AMEC concerns.	**H**
	1c) Locating Utilities on Private Property	Locating Utilities on Private Property: ▪ Hire private utility locater company	**H**

AHA - Utility Clearance
Activity Description

Job Steps	Hazards	Controls	RAC
		▪ Locate underground utilities by ground penetrating radar, electromagnetic, deep metal detector, pipe transmitter, vibracator, etc ▪ Review locations with property owner, member of operations and maintenance. ▪ Check as built drawings when available. Be aware possible drawing error or construction drawings may not be representative of actual locations. ▪ Use field clues such as manhole covers, repaved areas, depressions, disturbed areas, signs and postings, etc. as indications of access to utilities or recently installed/moved utilities.	
	1d) Lack of Reliable Data on Utility Locations	Lack of Reliable Data on Utility Locations: ▪ If the surveys are not providing reliable data, plan to use non-destructive means to drill/excavate e.g., soil vacuum, water jet, air knife and/or hand tools. ▪ Use caution and proper PPE when using hand tools (hand augers, posthole diggers, shovels, steel rods, etc.). ▪ Involve the Project Manager, Technical Lead and/or Office Manager to make a decision to proceed or move the location	**H**
	1e) Working Near Live Utilities	Working Near Live Utilities: ▪ If live utilities are known to be present near drilling/excavation location, if possible, move drilling/excavation to another location. ▪ Lockout/Tagout utilities, if possible. ▪ Use non-destructive means to drill/excavate (see # 1D) until safe to proceed.	**H**
2. Walking Around Site Identifying Utility Clearances.	2a) Slips/Trips/Falls	Slips/Trips/Falls ▪ Keep work area free of excess material and debris ▪ Remove all trip hazards by keeping materials/objects organized and out of walkways ▪ Keep work surfaces dry when possible ▪ Wear appropriate PPE (see HASP) including non-slip rubber boots if working on wet or slick surfaces ▪ Install rough work surface covers where possible ▪ Stay aware of footing and do not run	**L**
	2b) Heat/Cold Stress	Heat/Cold Stress: ▪ Take breaks if feeling faint or overexerted ▪ Consume adequate food/beverages (water, sports drinks) ▪ If possible, adjust work schedule to avoid temperature extremes	**L**
	2c) Biological Hazards: Insects, Snakes, Wildlife, Vegetation	Biological Hazards: Insects, Snakes, Wildlife, Vegetation ▪ Inspect work areas when arrive at site to identify hazard(s) ▪ Use insect repellant if observe mosquitoes/gnats ▪ Survey site for presence of biological hazards and maintain safe distance ▪ Wear appropriate PPE including leather gloves, long sleeves and pants, and snake chaps as warranted by site conditions	**L**

AHA - Utility Clearance
Activity Description

Job Steps	Hazards	Controls	RAC
	2d) Traffic (including pedestrian)	Traffic (including pedestrian): ▪ Notify attendant or site owner/manager of work activities and location ▪ Use cones, signs, flags or other traffic control devices ▪ Wear appropriate PPE including high visibility clothing such as reflective vest ▪ Inspect area behind vehicle prior to backing and use spotter	**M**
	2e) Back strain due to lifting, pulling or tugging equipment	Back strain: ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques	**L**

AHA - Vehicle Travel
Activity Description

Activity/Work Task:	Vehicle Travel (car or truck)		
Project Location:	**Kalamazoo River**		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for driving a car or truck to or from the site.

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Safe Vehicle	**Competent / Qualified Personnel:** See HASP (Name – Position/Employer) **Training requirements:** Current Driver's license	Daily inspection of equipment per manufacturer's instructions.

Job Steps	Hazards	Controls	RAC
1. Prepare for travel	1A) Distractions - loss of focus	▪ Ensure you have all materials with you necessary to conduct work effort. ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current. ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment). ▪ Familiarize yourself with route to destination. ▪ Ensure that a copy of the current insurance certificates and incident reporting procedures/forms are available during travel.	L

AHA - Vehicle Travel
Activity Description

Job Steps	Hazards	Controls	RAC
	1B) Vehicle defects	Inspect vehicle for defects such as: ▪ Inadequate fluids (e.g., fuel, antifreeze, oil, windshield washer) ▪ Worn/flat tires ▪ Windshield wipers loose, worn, or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working ▪ Exterior or interior damage (e.g., scratches, dents)	**L**
	1C) Insufficient emergency equipment, unsecured loads	▪ Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site). ▪ Ensure vehicle is equipped with warning flashers and/or flares and that the warning flashers work. ▪ Cell phones are recommended to call for help in the event of an emergency. ▪ Vehicles carrying tools must have a safety cage in place; all tools must be properly secured. ▪ Ensure parking cones are present, if applicable.	**L**
2. Operating vehicles	2A) Collisions, unsafe driving conditions	▪ Drive defensively! ▪ Do not use cruise control during inclement weather. ▪ Do not drive more than 500 miles per day or for extended distances from 11:00pm to 5:00 am. ▪ Do not eat or use tobacco products in the vehicle. ▪ No unrestrained pets or nonwork riders (e.g., hitch hikers, girl friend, mother-in-law) allowed in vehicles. ▪ Seat belts must be used at all times when operating any vehicle on company business. ▪ Drive at safe speed for road conditions. ▪ Maintain adequate following distance. ▪ Pull over and stop if you have to look at a map or use a cell phone. ▪ Try to park so that you don't have to back up to leave. ▪ If backing is required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary.	**L**
	2B) Intersections	▪ Proceed carefully through intersections ▪ Ensure that cross traffic has stopped before proceeding, especially if the light has just turned green. Look out for drivers running red lights! ▪ When merging into traffic or turning, ensure vehicles in front have merged/turned (and not stopped) prior to proceeding.	**L**
	2C) Dusty, winding, narrow roads	▪ Go slow around corners, occasionally clearing the windshield.	**L**
	2D) Rocky or one-lane roads	▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.	**L**
	2E) Stormy weather	▪ Inquire about conditions before leaving the office. ▪ Be aware of oncoming storms.	**L**
	2F) When angry or irritated	▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.	**L**

AHA - Vehicle Travel
Activity Description

Job Steps	Hazards	Controls	RAC
	2G) Turning around on narrow roads	▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a spotter if available.	L
	2H) Sick or medicated	▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.	L
	2I) On wet or slick roads	▪ Drive slow and safe.	L
	2J) Animals on road	▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas	L
	2K) Vehicle accident	▪ Employees should follow AMEC vehicle operation policy and be aware of all stationary and mobile vehicles.	L
3. Parking at job site	3A) Striking other vehicles, objects	▪ Choose parking spot that is away from other vehicles, if possible. ▪ Choose a spot that will allow the driver to drive forward when leaving the site. ▪ Back into parking spots, or pull through when parking in perpendicular parking spaces (drive forward into angle/herring bone type parking spots). ▪ Place cones in front of and behind company-owned vehicles as applicable.	L
	3B) Leaving parking spaces	▪ Walk around the vehicle before leaving and identify hazards (low lying objects, location of other vehicles or pedestrians, other vehicles with drivers that may be leaving at the same time, etc. ▪ Collect cones (Company vehicles only) and secure them into their holder. ▪ If backing is unavoidable, use a spotter if a second person is available; if no spotter available, back slowly, checking for other vehicles, pedestrians, etc. ▪ Keep alert!	L
4. Driving back from the job site	4A) See hazards listed for “Operating vehicles” Key Work Step	▪ See safe work practices for “Operating vehicles” Key Work Step	L
5. Parking at office	5A) Striking other vehicles, objects	▪ See safe work practices for “Striking other vehicles, objects” Hazard/Potential Hazard for “Parking at job site” Key Work Step	L
6. End travel	6A) Vehicle defects	▪ Inspect vehicle. ▪ Repair or initiate repair of all vehicle deficiencies that occurred due to the trip.	L

AHA – Working in a Muddy Area
Activity Description

Activity/Work Task:	Working in a Muddy Area		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code): **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for working in a muddy area and extracting oneself from mud

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Walking stick, appropriate boots, and over-boots or waders if necessary	**Competent / Qualified Personnel:** Any AMEC employee **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	None

Job Steps	Hazards	Controls	RAC
1. Prepare for site visit	1A) See AHA Mobilization/ demobilization/site preparation	1A) See AHA Mobilization/ demobilization/site preparation	**L**

AHA – Working in a Muddy Area
Activity Description

Job Steps	Hazards	Controls	RAC
2. Traveling/working in areas with potential muddy locations –Example outdoor surface water areas.	2A) Poor footing - sip, suction, entrapment or fall.	2A) Poor footing - slip, suction, entrapment or fall. ▪ Use a walking stick or probe to check footing and potietial deep holes prior to entering area. ▪ Wear appropriate foot wear such as boots. Over shoe boots provide protection to foot wear as well as a layer to remove if foot gets stuck. ▪ Be aware of surroundings. Avoid muddy areas if possible. ▪ Use the buddy system. Keep a safe distance between workers to avoid both workers getting stuck. ▪ Be prepared with rope, plywood, shovel, pole to assist "rescue" from being stuck in the mud. ▪ If walking in mud is required to reach sample area, several techniques may be employeed to limit foot suction and sinking in mud or quicksand. - Provide a walkway or elevated surface. - Use of snow fencing on the surface or snow shoes to disperse your weight. - Use a skating motion and keep moving until on location. Use a platform to stand on for sampling.	**L**
3.	3A) Allergic reactions, painful stings	3A) Allergic reactions, painful stings ▪ Be alert to hives in brush or in hollow logs. Watch for insects travelling in and out of one location. ▪ See AHA – Insect bites and stings.	**L**
4. .	4A) Skin irritation, encephalitis	4A) Skin irritation, encephalitis ▪ Wear long sleeves and trousers.	**L**

AHA – Working Near Water
Activity Description

Activity/Work Task:	Working near Water		
Project Location:	**Kalamazoo River**		
Project Number:	**Varies**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for working near Water

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart
E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE: Safety Boots/Shoes; Safety Glasses; Rubber boots; Waders; Personal Floatation Device	**Competent / Qualified Personnel:** Name – Position/Employer **Training requirements:** Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect all PPE prior to use.

Job Steps	Hazards	Controls	RAC
1. Field Work Near Water	1A) Slips, trips, falls	1A) Familiarize self with site prior to visit. ▪ Complete appropriate training before going on site. ▪ Provide appropriate person in district office your itinerary. ▪ Prepare listing of emergency phone numbers, both on and offsite. ▪ Identify site/activity PPE needs. ▪ Ensure that First Aid training is current, and that tetanus booster is current. ▪ Be aware of your surroundings	L

AHA – Working Near Water
Activity Description

Job Steps	Hazards	Controls	RAC
	1B) Falling into water	1B) Falling into water ▪ Use equipment that facilitates reaching the location from a safe distance (extensions, etc.). ▪ Work using the buddy system. ▪ Wear PFD when working on or near the water. ▪ Avoid leaning over edge of land to water. ▪ Anchor or secure yourself to a permanent and secure structure when working near water.	**M**
	1C) Vermin, leaches, Insect/animal born disease	1C) Vermin, leaches, Insect/animal born disease ▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Be aware of your surroundings. ▪ Wear insect netting clothing or apply insect repellant on all exposed skin surfaces as appropriate – consider sample contamination. ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas along shoreline if possible. ▪ Tuck pants leg into boot. ▪ Do not put hand/arm into/under an area that you can not see into/under clearly. ▪ Do not touch any suspected contaminant without appropriate hand PPE. ▪ Wash hands as soon as possible upon completion of task. ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. ▪ Contract vermin relocation, if applicable. ▪ Remain vigilant and respectful of wildlife. (See JHA for Insects, Stings and Bites, and JHA for Dog – Wildlife Safety. ▪ Wear wind impervious outerwear. ▪ During warm months – wear a long sleeve cotton/breathable fabric shirt and pants.	**L**
	1D) Bending, pulling, twisting	1D) Bending, pulling, twisting ▪ Balance weight with other personnel and equipment. ▪ Proper lifting technique.	**L**

AHA - Working with Preservatives
Activity Description

Activity/Work Task:	Working with Preservatives (Acids)		
Project Location:	**Kalamazoo River**		
Project Number:	**Various**		
Date Prepared:	**6/25/2013**	**Date Accepted:**	**7/3/2013**
Prepared by (Name/Title):	Kenneth McRowe/Project Geologist		
Reviewed by (Name/Title):	Cynthia Sundquist		

Overall Risk Assessment Code (RAC) (Use highest code) **L**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

This AHA involves the following:

- Establishing site specific measures for working with sample preservatives
- Majority of site sampling is for PCBs

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (safety glasses, gloves), ventilate if necessary First aid kit with eye wash or water for eye wash available if needed	**Competent / Qualified Personnel:** All AMEC employees **Training requirements:** HAZCOM PPE Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's/suppliers instructions. Inspect all PPE prior to use Check preservative expiration dates prior to use

Job Steps	Hazards	Controls	RAC
1. Opening the box of ampoules	1A) Cuts or punctures with a knife	1A) Cuts or punctures with a knife ▪ Use appropriate techniques when handling a knife. Always cut away from you.	L

AHA - Working with Preservatives
Activity Description

Job Steps	Hazards	Controls	RAC
	1B) Broken ampoules in the box. Cuts from the broken glass.	1B) Broken ampoules in the box. Cuts from the broken glass. ▪ Wear safety glasses and protective gloves. ▪ Dispose of the preservative and broken glass by approved methods.	**L**
	1C) Broken ampoules in the box. Breathing fumes.	1C) Broken ampoules in the box. Breathing fumes. ▪ Wear safety glasses and protective gloves. ▪ Always work in a well-ventilated area.	**L**
2. Breaking top of glass ampoule	2A) Cuts from the broken glass.	2A) Cuts from the broken glass ▪ Wear safety glasses and protective gloves. ▪ Use a paper towel to wrap ampoule in to snap the top or use an ampoule breaker. Always point the ampoule away from you when you snap off the top.	**L**
	2B) Skin contact chemical burns.	2B) Skin contact chemical burns. ▪ Wear safety glasses and protective gloves. ▪ Fumes may come into contact with the perspiration on your skin and rehydrate to form an acid. ▪ If your skin itches, flush affected area for 15 minutes with water.	**L**
	2C) Eye contact	2C) Eye contact ▪ Wear safety glasses. ▪ If acid splashes in the eyes, flush eyes for 15 minutes with water. Seek medical advice.	**L**
	2D) Breathing fumes	2D) Breathing fumes ▪ HNO_3 and HCL have high vapor pressure. Always work in a well-ventilated area.	**L**
3. Adding acid to sample	3A) Chemical reaction	3A) Chemical reaction ▪ Wear safety glasses and protective gloves. Acid may react with high alkaline sample and fizz (releases CO_2).	**L**
	3B) Eye contact	3B) Eye contact ▪ Wear safety glasses. ▪ If acid splashes in the eyes, flush eyes for 15 minutes with water. Seek medical advice.	**L**
	3C) Skin contact chemical burns.	3C) Skin contact chemical burns. ▪ Wear safety glasses and protective gloves.	**L**
4. Ampoule disposal	4A) Cuts from the broken glass.	4A) Cuts from the broken glass. ▪ Wear safety glasses and protective gloves. ▪ Place used ampoules in an empty, non-reactive container in the field and bring it back to the office. Dispose of the preservative and broken glass by approved methods.	**L**

APPENDIX C

INCIDENT ANALYSIS FORMS

Doc No: HSE-X.XXX
Owner: Vice President, Health, Safety and Environment
Author: Corporate Health, Safety and Environment Department
Function: Health, Safety and Environment
Region: North America

Incident Reporting Procedure

Revision History			
Revision no.	**Date adopted**	**Nature of change**	**Approved by:**
0	TBD	Initial Issuance	

1.0 PURPOSE

To provide a method so near misses, occupational injuries and illnesses, property damages, motor vehicle collisions, inspections conducted by any health, safety and environment (HSE) regulatory agency, and other incidents associated with AMEC activities are reported and investigated in a timely and uniform manner. To help prevent reoccurrence of incidents within AMEC, incidents must be investigated, root causes identified, corrective actions developed, implemented, tracked to closure and verified, and lessons learned shared as needed.

2.0 SCOPE

This procedure applies to all incidents in any operation under AMEC control that may affect the well-being of AMEC employees, subcontractors, public, the environment and HSE compliance.

3.0 REFERENCES

All applicable regulations or laws.

AMEC plc procedure *Recording, Reporting and Investigation of Incidents* (A-XX-A021).

AMEC plc document *A-Z of Incident Causes – Glossary (Dec 2010 - draft);* AMEC

4.0 ACRONYMS AND DEFINITIONS

Causal Factors - Events or conditions in the incident sequence that contributes to the unwanted result. There are three types of causal factors: immediate/**direct cause**, which is the immediate event or condition that caused the incident; the **contributing causes**, such as personal and job factors that are the events or situations that collectively, with the other causes, increase the likelihood of an incident but that did not directly cause the incident, and the **root cause**, which, if corrected, would help prevent the recurrence of the incident.

Chemical Release - An uncontrolled release of a chemical or material into the environment including air, soil or body of water.

Chemical Spill - Any spillage of a chemical that is considered harmful, such as hydrochloric acid, motor oil, methanol, etc. A chemical spill that can be cleaned up with a rag or a small amount of absorbent material is exempt from reporting requirements of this procedure (unless impact to surface water, soil or enters any drainage system). All spills that occur within AMEC duty of care must be reported to the Corporate HSE Department within 60 minutes of discovery. All spills except those meeting all of the following criteria will be required to be reported to regulatory agencies:

1. The quantity is known to be less than state, provincial and federal reporting quantities; and
2. The spill is contained and under the control of the spiller; and
3. The spill has not and will not reach water or any land; and
4. The spill is cleaned up within 2 hours of discovery.

A spill is considered to have not impacted land if it occurs on a paved surface such as asphalt or concrete. Spills that do not meet the above criteria are defined as a release. A spill in a dirt or gravel parking lot is considered to have impacted land and is reportable.

Company Vehicle - A vehicle that is owned, leased, or rented for the conduct of Company business and includes an employee's personal vehicle operated on Company business where mileage is paid to the employee.

Ground Disturbance Incident Report (GDIR) - The official form, **Attachment 3,** used to report a ground disturbance incident and provides investigation results. The GDIR is to be completed for all incidents involving unanticipated encounter with an underground utility or service as a result of subsurface work that has the potential for personal injury, environmental impact, utility damage and associated risk exposure from third party liability, regardless of fault along with a completed IAR, **Attachment 1**. The report requires various information and is to be distributed to required personnel as a WORD (.doc).

High Potential Incident (HIPO) - A high potential incident is one where the worst probable outcome is not realized. The use of the word "probable" is important. The outcome must be credible in terms of potential circumstances and severity. In order to determine the potential circumstances, it is necessary to look at what happened and give consideration to what could have happened. In the same way, it is necessary to look at the actual severity and to consider how severe the incident could have been.

Incident - Any occupational injury or illness, environmental release of chemicals or materials that cannot be easily and quickly cleaned up, property loss or theft, damage to property belonging to AMEC or others as a result of AMEC's activities the property of third-parties including motor vehicle collision with another vehicle or objects, damage done by heavy equipment, field operations or an event that can negatively impact AMEC or its reputation.

Incident Analysis Report (IAR) - The official form, **Attachment 1,** used to report an incident, documents results of an investigation, where applicable. The report addresses what happened and to whom, casual factors and corrective actions.

Incident Potential Matrix – Method to rate incidents and define the worst *probable* outcome of a situation; outcome must be credible in terms of potential circumstances and severity. In order to determine the potential circumstances, it is necessary to consider what could have happened and how severe the incident could have been. The outcome of an incident may not realize the ultimate potential outcome.

Near Miss – An incident where an unplanned event could have caused injury/illness, an environmental release or property damage, but did not as one or several barriers remained that prevented a more serious incident.

Occupational Illness - Any abnormal physical condition or disorder experienced by an employee, other than one resulting from an occupational injury, caused by exposure to factors associated with employment. Work-related illness includes, but is not limited to, acute and chronic illnesses or diseases, which may be caused, by inhalation, absorption, ingestion, direct contact with a chemical, metal or radioactive material in the workplace. This type of incident is determined by a physician or other licensed health care professional.

Occupational Injury - Any injury, which results from a work-related activity such as, but not limited to, a bruise from a slip, trip, or fall, laceration from a sharp object, an abrasion, muscle sprain or fracture or break of a bone.

OSHA Recordable Injury/Illness - AMEC utilizes US OSHA recordkeeping standard defined in 29 CFR 1904 to classifying occupational injuries and illness across its world-wide operations to

ensure consistency. As such, an incident is considered recordable if it results in any of the following:

- Death
- Days away from work.
- Restricted work or transfer to another job.
- Medical treatment beyond first-aid.
- Loss of consciousness.
- A work-related injury or illness diagnosed by a physician or other licensed health care professional. Examples of these are:

❖ A work-related case involving cancer, chronic irreversible disease, a fractured or cracked bone, punctured eardrum, laceration requiring stitches, issuance of a prescription.

❖ A needle-stick injury or cut from a sharp contaminated with another person's blood or potentially infectious material.

❖ A case requiring medical removal based on an OSHA health standard.

Property Loss, Theft or Damage – Is considered an incident when property of AMEC is lost, by theft or other means, or is damaged. This applies to AMEC owned property (i.e. computers, equipment, supplies, trailers, boats, vehicles, etc.). Reporting of such incidents is required regardless of the cause if the incident potential is greater than A1, B1, C1, or D1. For such low incident potential incidents, that do not involve third-parties, the local office is responsible for reporting the incident to the appropriate AMEC functional department.

Regulatory Agency Inspection - An inspection conducted by a representative of a local, state, provincial or governmental agency for the purposes of determining compliance with regulatory requirements. This procedure does not apply to those inspections that are required by contract, routine inspections required by site-specific activities (e.g., tunneling, UST removal, etc.) and does not apply to inspections by clients, certification association or groups or other agencies with a client/oversight relationship with AMEC.

Root Cause - The fundamental cause of an incident that, if previously corrected, would have helped prevent the incident from occurring and if implemented, would help prevent reoccurrence of a similar incident. Root causes can be determined by application of various analytical processes.

Serious Incident - An incident that results in:

- serious injury (hospitalization, loss of a body part of any other injury that is life-threatening) or death
- reporting required to a local, state, provincial or governmental regulatory body
- enforcement action (governmental agency inspection, citation)
- issuance of an enforcement notice (e.g. Stop Work)
- an injury to a member of the public or a visitor
- A near miss, first aid case or property damage that has a high potential as defined in **Attachment 5**.

Vehicle Incident Report (VIR) - The official form, **Attachment 2,** used to report a motor vehicle incident and provides investigation results. The VIR is to be completed for all motor vehicle incidents involving AMEC owned, leased or rented or personal vehicles used while conducting company business with permission regardless of fault along with a completed IAR, **Attachment 1**. The report requires various information and is to be distributed to required personnel as a WORD (.doc) document.

5.0 INCIDENT REPORTING REQUIREMENTS

5.1. In the event of an incident the following steps shall be followed:

NON-EMERGENCY INCIDENT	EMERGENCY INCIDENT
Steps 1 & 2 must be completed before seeking medical attention other than local first aid. 1. Provide first-aid as necessary. Report the situation to your immediate supervisor AND HSE coordinator (all incidents with the apparent starting event should be reported immediately but no later than within 1 hour of occurrence). 2. WorkCare will assess the injured employee's situation and determine whether the incident requires further medical attention. During this process, WorkCare will perform the following: • Explain the process to the employee. • Determine the nature of the injury/illness. • Provide appropriate medical advice to the employee. • Determine appropriate path forward with the employee. • Maintain appropriate medical confidentiality. • Help employee to execute path forward, including referral to the appropriate local medical facility. • Send an email notification to the Corporate HSE Department.	1. Provide emergency first aid. Supervisor on duty must immediately call 911 or local emergency number; no employee may respond to outside queries without prior authorization. Any outside media calls concerning this incident must be referred immediately to external communications manager at 602-757-3211. 2. Once medical attention is sought WorkCare will be responsible for performing the following: • Contact the treating physician. • Request copies of all medical records from clinic. • Send an email update to the Corporate HSE Department.

3. **IMMEDIATELY** after contacting WorkCare the injured employee's supervisor, and employee if they are able, must send a brief email notification AND inform verbally (direct contact is required) ONE HSE Corporate Representatives listed at:

   http://ee.amecnet.com/she/sheweb/incident_reporting.htm

4. Make all other local notifications and client notifications.

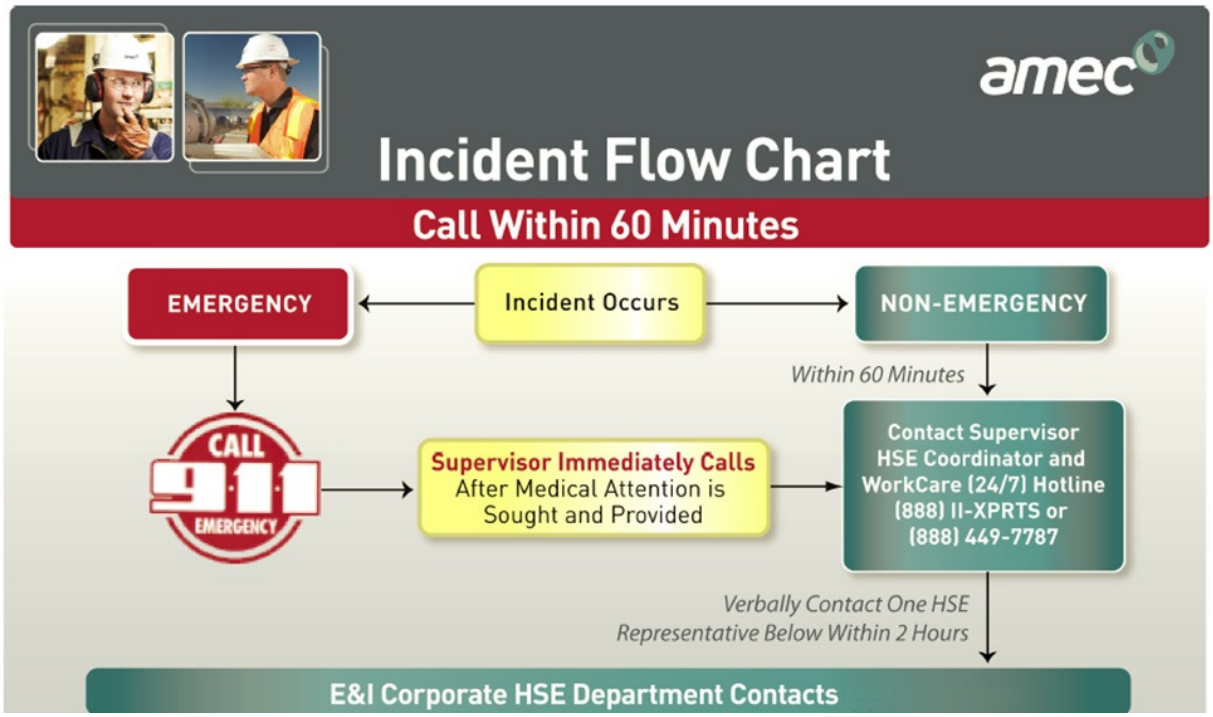
5. Local Supervisor, HSE Coordinator, Project HSE Officer and any applicable safety committees to complete preliminary investigation, along with the initial Incident Report within 24 hours.

6. Corporate Loss Prevention Manager to complete Worker's Compensation Insurance notifications as needed.

7. Corporate HSE to conduct further incident notifications, investigation, include in statistics, classify, and develop lessons learned materials.

Call WorkCare 24/7 Triage Hotline
(888) II-XPRTS or (888) 449-7787

The following flowchart establishes the process of reporting an incident:



- In the case of any workplace injury, our primary concern is for the employee's health and safety. As such, it is critical that the injured employee seeks any and all necessary medical assistance as soon as possible. The notification of an incident or the completion of the initial incident report shall not take precedent over ensuring that any injured person (i.e. AMEC employee, subcontractor or member of the public) shall receive immediate and appropriate medical attention.

- When possible, photographs and diagrams shall be taken and prepared to document the incident site, conditions, equipment, access routes, tools, personal protective equipment being used, etc. to help support the determination of all casual factors associated with the incident. Such photographs and diagrams shall contain captions defining what they represent and be included as part of the IAR in the space provided on **Attachment 1**.

- When follow-up reporting is necessary, updated written reports are to be provided as soon as reasonably practical based on the availability of new information. The *Update* box on **Attachment 1** shall be marked and the date provided indicating when the update was issued.

- The Group HSE Manager shall confirm the investigation level based on the description detailed below:

LEVEL 1 – a basic investigation involving site personnel initiated after any incident

LEVEL 2 – a detailed investigation carried out by a team appointed by the Project Manager and HSE Manager. This team may include specialists brought in to assist with the investigation process.

Consequences				Number of People				
	Injury/ Health	Environmental	Damage	0	1	1-2	2-10	10+
1	Minor injury/ health effect	Minimal reversible environmental impact	Minor loss/ damage/ business impact <1K	A1	B1	C1	D1	E1
2	Medical treatment/ restricted work case/ moderate health effect	Minor pollution with short term impact	Moderate loss/ damage/ business impact 1-10K	A2	B2	C2	D2	E2
3	Lost time injury/ significant health effect	Moderate pollution with medium term localised impact	Significant loss/ damage/ business 10-100K	A3	B3	C3	D3	E3
4	Serious injuriy/ severe health effect/ long term disability	Severe pollution with long term localised impact	Severe loss/ damage/ business impact 100K -1M	A4	B4	C4	D4	E4
5	Fatality	Major pollution with long term environmental change	Major loss/ damage/ business impact 1M+	A5	B5	C5	D5	E5
				A	B	C	D	E

High Potential Incidents (Red) LEVEL 2

Medium Potential Incidents (Amber) LEVEL 1 or 2 (at the Group HE Managers discretion)

Low Potential Incidents (Green) LEVEL 1

The Group HSE Manager shall have the authority to overrule these levels to reflect low potential incidents that may have significant learning potential, of medium/high potential incidents that may have had little impact or consequences.

- The IAR will be completed electronically and delivered to the Group HSE Manager for review and approval in writing via e-mail or fax. Signed originals will be retained at the office where the IAR was generated. When electronic signatures are not available, use the symbol: "/S/" to indicate that the original IAR has been signed.
- IARs and associated VIRs, if applicable, including photographs and diagrams that are part of the IAR are to be transmitted via email or fax **without the associated instructions contained with Attachment 4 to** the applicable Group HSE Manager to finalize the IAR process within the following time frames:
- Complete and distribute an **initial** IAR **within 24 hours** of the incident after having initially notifying all applicable personnel. Regardless of the day the incident occurs, the initial IAR shall include known facts related to the incident and be forwarded to the applicable Group HSE Manager and any other AMEC personnel as required.
- Provide updates as new and significant facts and details are established regarding the incident (i.e. direct causes, contributing factors, extent of injuries or damage, etc.) to the applicable Group HSE Manager and any other AMEC personnel as required.
- Provide a written IAR **within 5 days** of the incident, so that the Group HSE Manager can conduct an incident analysis and verify the root cause(s) and recommended corrective actions. If an extension of time is required by the reporting individual, the applicable Group HSE Manager will authorize the extension via email with a copy sent to the Loss Prevention Manager.
- All IARs must be recorded and archived at the office where the incident occurred for five (5) years. The record must be in English, indelible, signed or equivalent, and dated.
- IARs shall be factual but not characterize an incident as involving a "noncompliance" or "violation" of any law, regulation, permit, provision or other legal requirement. Consultation with AMEC's Legal Department prior to issuing the IAR is desirable in serious cases including those that may involve third parties and members of the public.
- In addition to (**not in place of**) completing an IAR, a Vehicle Incident Report (VIR), **Attachment 2**, must be completed by the person involved in a motor vehicle incident or, if the person is not capable of completing the report, by the employee's supervisor, local manager, or designated person. Whenever possible, a police report shall be obtained and attached to the final VIR along with pictures taken at the scene (use cell phone camera if necessary). A copy of the VIR is to accompany the IAR in its distribution as described in this Procedure.
- Completed copies of all VIRs, shall be provided to the applicable Group HSE Manager as soon as possible. See Claims Reporting instructions located on the AMEC intranet at:

http://ee.amecnet.com/template/default.asp?pageUrl=SHE/Index.asp

- Projects and offices shall use personnel with the appropriate skills and experience in root cause analysis techniques to participate in any investigation. If the project or office does not have such trained individuals, the Group HSE Manager will provide the necessary support to ensure that all causal factors are properly defined, for recordable and HiPo incidents and in accordance with the Potential Severity and corresponding level of investigation prescribed. All HiPo incidents shall involve: i) a review through an Incident Review Panel (IRP); and, ii) sharing of incident learning within the organization by distribution of a safety flash, which does not contain confidential information.

- Where applicable, the requirements of the Human Resource Department's policies regarding post-incident drug and alcohol testing must be followed.

- All personnel subcontracted to AMEC and working on an AMEC project must follow this procedure in addition to any procedures required by the subcontracting company, general contractor or client.. All reports will be transmitted to the Project Manager or supervisor, who will then forward the forms to the appropriate personnel stated above.

- Near misses that are not considered high potential, shall be documented at the following location on AMEC E&I Website at:

http://ee.amecnet.com/she/Near_Miss_Report/near_miss_add.asp

- AMEC uses a process to quickly report recordable, serious or high potential incidents to relevant personnel called a "First Alert". This document is generated by the Group HSE Manager or designate to ensure that such incidents are reported quickly.

NOTE: The FIRST ALERT system is not meant to take the place of a formal investigation and formal report preparation as required by this procedure. It is used as a quick means of informing appropriate individuals within the company.

6.0 PROCEDURE

Step No.	PERFORMER	Action
6.1	Employee	**Non-Emergency Incidents** • Before seeking medical attention other than first aid, report the situation to your immediate supervisor and the HSE Coordinator. All incidents should be reported within 1 hour of their occurrence. • Within North America, call WorkCare 24/7 Hotline at **(888) II-XPRTS or (888) 449-7787** WorkCare will assess the situation telephonically and determine whether the incident requires medical attention. During this process, WorkCare will: ❖ Explain the process to the caller ❖ Determine the nature of the concern ❖ Provide appropriate medical advice to the caller ❖ Determine appropriate path forward with the caller ❖ Maintain appropriate medical confidentiality ❖ Help caller to execute path forward, including referral to the appropriate local medical facility, ❖ Send an email notification to the corporate safety contact • Within 2 Hours of the incident inform verbally (direct contact is required) contact ONE of the following: ❖ Applicable Group HSE Manager ❖ Loss Prevention Manager ❖ HSE VP **Emergency Incident Involving AMEC Personnel** • Supervisor on duty must immediately call 911 or local emergency number; no employee may respond to outside queries from the media without prior authorization. Any media calls concerning this incident must be referred immediately to Vice President of Communications or 1.602.757.3211. • Properly control the site, if needed, and follow the emergency action plan (a part of your project health and safety plan). • Once medical attention is sought and provided, the supervisor must contact WorkCare 24/7 Hotline (this step is applicable to the North American operations only) **(888) II-XPRTS or (888) 449-7787**

WorkCare will be responsible for performing the following duties:

- Contact the treating physician
- Inform the physician of the injury/illness
- Request to be consulted on treatment
- Determine appropriateness of treatment
- Request copies of all medical records from clinic
- Remind the treating physician of the care management philosophy
- Send an email update to the Corporate Safety contact
- IMMEDIATELY after contacting WorkCare inform verbally (direct contact is required) contact ONE of the following AMEC individuals:
- Notify the local HSE Coordinator and Safety Committee worker representative (if applicable) to complete initial investigation with the Supervisor.
- Follow the Client notification protocols, if applicable.
- Local HSE Coordinator to complete the initial Incident Report within 24 hours
- Loss Prevention Manager will complete Workers' Compensation Insurance notifications as required.
- Corporate HSE Department will conduct further incident notifications, investigation and develop internal communications

6.2 Unit or Project Manager

- Designate a responsible person or persons to report and investigate incidents and provide their name(s) to the appropriate Group HSE Manager.
- Verify that the completed IAR contains photographs, diagrams, police reports, witness accounts and other supporting documentation as required to establish causal factors and root causes of the incident, as applicable.
- Ensure requirements of this procedure are integrated into project plans, HASPs, budgets, activities and other project specific documents, as applicable.
- Prepare an Incident Review Panel Presentation for any high potential incident or a lost time injury or illness occurring from you office's operations with support from the applicable Group HSE Manager.

6.3	Supervisor, Unit or Project Manager, HSE Coordinator, or designated person	• Upon discovery or by notification of an incident, and after addressing immediate issues associated with the incident: ❖ Immediately contact and provide current incident information to the applicable Group HSE Manager and then follow up by email. ❖ Prepare an Incident Analysis Report (IAR) form, **Attachment 1**, and if the incident involves a vehicle **Attachment 2** is also required to be prepared. Categorize the incident based on the Incident Potential Matrix and distribute the completed IAR and VIR as required in Section 5.7. ❖ Immediately notify the Vice President of Communications or call +1-602-757-3211 if a situation that affects people's safety, a project, the environment or AMEC's reputation could come to the attention of the media. Contact phone number is a 24 x 7 basis.
6.4	Group HSE Manager	• Inform Corporate HSE VP of upon learning of an incident by e-mail. • Forward all Final IARs to the Corporate HSE VP and Initial, Updated and Final copies to the Lost Prevention Manager. • Forward all incident reports involving AMEC vehicles (leased, owned or rental) to the Fleet Manager. • Forward all incident reports to the HSE Administrator for uploading into all required databases. • Provide support and guidance in incident investigation, causal factor determination and recommended corrective actions to be taken at the local or corporate level, when needed. • Review and approve, as appropriate for completeness and accuracy, the final IAR generated by the local office. • Prepare a "Safety Flash" on all applicable incidents that provide learning opportunities to AMEC and forward to the Corporate HSE VP/Director and the Lost Prevention Manager for review and distribution. • Support the generation of an Incident Review Panel Presentation for all HiPo incidents occurring within your Group.

6.6 Corporate HSE VP

- Make arrangements to ensure that:

❖ Lessons learned from incident investigations are transmitted throughout AMEC when appropriate.

❖ HSE incidents are trended and analyzed annually.

❖ IARs and any other investigation reports are used in performance measurement reporting and archived.

7.0 RECORDS

All IARs associated with occupational injuries and illnesses are to be archived for five (5) years at the office reporting the incident. The report must be dated and contain the names and signatures of all applicable individuals.

8.0 ATTACHMENTS

Attachment 1: Incident Analysis Report (IAR)

Attachment 2: Vehicle Incident Report (VIR)

Attachment 3: Ground Disturbance Incident Report (GDIR)

Attachment 4: Instructions for Completing Incident Report Forms

Attachment 5: Incident Potential Matrix

Attachment 6: Example of Safety Flash

ATTACHMENT 1

Check one
Initial Report: ☐
Update: ☐
Final Report: ☐ ____

INCIDENT ANALYSIS REPORT
AMEC Environment & Infrastructure

Group: Select One HSE Manager: ____
Incident Review Panel Team (if applicable): ____

Incident Potential
Letter: Select One
Number: Select One
Investigation Level: Select One

Incident Date: ____
Report Date: ____

Section 1 – General Information

Employee Name: ____ Sex: ☐ M ☐ F Date of Birth: : ____ Age Range: Select One Time of incident: ____ ☐ am | ☐ pm
Job Position: Select One Hire Date: ____ Time employee began work: ____
Business Line: Select One Department Number: ____ Project Manager: ____
Project Name: ____ Project Number: ____ Client: ____
Office where employee works from: ____ Immediate Supervisor: ____ Hours employee worked during last 7 days: ____ hrs
Location: Select One Is this a Company controlled work site: ☐ Yes ☐ Incident Assigned to: Select One
Location description: ____

Section 2 – Incident Type - Process (mark at least ONE BOLD TYPE and all that apply)

☐ **Fatality** ☐ **Environmental** ☐ **Injury/Illness Incident** If Injury/illness: Select One
☐ **Security** ☐ **Near Miss / Hazard ID** ☐ **Property Damage** If Damage: Select One ☐ 3rd Party?
☐ Hospitalization ☐ Regulatory Inspection ☐ Notice of Violation or Citation ☐ Agency Reportable?
☐ Motor Vehicle Incident Involving Injury ☐ Other (describe): ____

Outcome/Result: Select One Source of Hazard: Select One If "other", specify: ____ Immediate Cause: Select One

A. If **injury/illness**: Indicate the part of the body: Select One If "other", specify: ____
Indicate body part location: Select One If "other", specify: ____
Injury Type: Select One If "other", specify: ____ Illness Type: Select One If "other", specify: ____
B. If **property damage**: describe what happened and estimate ($) of damage to all objects involved? ____
C. If **environmental**: Type of Environmental incident?: Select One Name, CAS#, physical state and quantity? ____
Receiving Environment?: Select One Mechanism of Incident?: Select One If "other", specify: ____
Nature of Breach?: Select One Duration of Breach?: Select One
D. If **security**: Security Incident Type: Select One If Physical: Select One If Criminal: Select One If Intellectual: Select One
E. If an **inspection by a regulatory agency**, what agency, who were the inspectors, inspector contact information? ____

Section 3 – Incident Description

Attach and number additional pages, as needed, to ensure all details related to the incident are captured.

A. List the names of all persons involved in the incident, and employer information: ____
B. List the names of any witnesses, their employer, and a local/company telephone number or address: ____
C. Name of Employee's supervisor: ____ Contact phone number for supervisor: ____
D. What specific job/task or action was the employee(s) doing just prior to the incident: ____
E. Was a tool or equipment involved? ☐ Yes ☐ No What was it: ____ Last Inspection Date: ____ Defects: ____
F. Explain in **detail** what happened: ____
G. Explain in **detail** what object or substance directly harmed the employee: ____

H. What were the weather conditions at time of incident?: ____

I. What was the lighting like at time of incident? Bright ☐ Shadows ☐ Dark ☐ Other: ____

J. List any damaged equipment or property (other than motor vehicles). Provide model and serial number **and** estimated costs to repair/replace damaged equipment or property, if applicable: ____

Section 4 - Incident Analysis

A. Was a Health and Safety Plan (HASP) or Job Hazard Analysis (JHA) completed for the work being performed? ☐ Yes ☐ No
If "yes", Who prepared the document?: ____

B. Who and when was the last manager (Project, Unit, etc.) at the site of the incident?: ____

C. When and what safety training **directly related** to the incident has the person(s) involved had?: ____

D. List attached documentation (HASP acknowledgement forms, kickoff/daily/weekly meetings, inspections, photographs): ____

Section 5 - Incident Investigation Results and Corrective Actions

This section to be completed by the Group HSE Manager/IRP with support from location where incident occurred.

Causal Factors (Acts or Omissions / Conditions)

(Attach and number any additional pages as needed to completely address this section)

	IMMEDIATE CAUSE	IMMEDIATE CAUSE SUB-TYPE	DESCRIPTION
1	Select One	____	____
2	Select One	____	____
3	Select One	____	____
4	Select One	____	____

Root Cause(s) Analysis - The below items represents major root cause categories which have been determined to be Less Than Adequate (LTA). A more detailed determination of the root cause will be facilitated, if needed, by the applicable Group HSE Manager / IRP.

	ROOT CAUSE TYPE	ROOT CAUSE SUB-TYPE	DESCRIPTION
1	Select One	____	____
2	Select One	____	____
3	Select One	____	____
4	Select One	____	____

Corrective Actions

Root Cause #	Corrective Actions Taken (Attach additional pages as needed to completely address this section)	Responsible Person	Proposed Completion Date	Closed on Date	Verified by and Date Verified
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____

Section 6 - Notifications, Certification & Approvals

Check the appropriate boxes indicating the applicable reports have been made to the following applicable organizations:

Auto Insurance Carrier was called ☐ Group HSE Manager Notified ☐

WorkCare was called ☐ Post-incident Drug/Alcohol Testing Performed ☐

Incident Report prepared by: ____

Employee (s): ____	Date: ____	Employee's Supervisor: ____	Date: ____
HSE Coordinator/Project/Unit Manager: ____	Date: ____	Group HSE Manager:____	Date: ____

ATTACHMENT 2
VEHICLE INCIDENT REPORT

Section 1 - General Information Date of Incident: _____

Time incident occurred: _____ AM PM Illumination: Dark Dusk Light Road Condition: ☐ Dry ☐ Wet ☐ Icy/snow

Were police summoned to scene? ☐ Yes ☐ No Police Department and Location: _____

Report #: _____ Officer's Name and Badge Number: _____

Section 2 - Company Driver and Vehicle

Driver's name _____ D/L # _____ State: _____

Driver's home office address: _____ Driver's Phone # _____

Company Vehicle # _____ Year _____ Model _____ License # _____ State _____

Company car? _____ Personal Vehicle? _____ Rental Vehicle? _____

Rented from _____

Passenger/Witness Name(s) _____ Address:_____

Telephone:_____

Passenger/Witness Name(s) _____ Address:_____

Telephone: _____

Damage to vehicle:
_____

Was an employee injured?
_____

Injuries to others_____

Vehicle was being used for: Company business ☐ Yes ☐ No Personal business ☐ Yes ☐ No

Towed: ☐ Yes ☐ No By Whom: _____ To Where:_____

Section 3 - Other Driver and Vehicle Information

Driver's Name: _____ D/L # _____State _____

Current address _____ City _____State _____

Telephone: ( )_____ Work: ( )_____ Cell: ( )_____

Registered Owner's Name:_____ Address:_____ City:_____ State:_____
(verify registration document)

The Other Vehicle: Make _____ Model _____ Year _____License # _____ State _____

Insurance company name: _____Address:_____ Phone # _____

Policy No. _____Contact Person _____ Phone # _____

Passenger/Witness Name(s) _____ Address:_____ Telephone:_____

Passenger/Witness Name(s) _____ Address:_____ Telephone:_____

Damage: (*Make note of pre-existing damage and take pictures if possible.* ***Attach additional pages as needed****):* _____

_____

_____

Injuries to other driver/passengers:

_____

_____

Section 4 – Approvals (signatures required)

Form completed by: _____Signature:_____ Date:_____
Please Print

Office/Project Manage: _____ Signature:_____ Date:_____
Please Print

Things to Do First In The Event Of a Motor Vehicle Incident

GENERAL INFORMATION

1. Do not decide on your own whether a particular incident is "covered" by insurance. Should there be any doubt, it is always preferable to report an occurrence, as this allows underwriters, the Risk Management Department and insurance adjusters to determine if a covered loss has taken place.

2. Policy Conditions do require that all losses and occurrences, which may result in a claim be promptly reported.

3. Do not admit liability or offer your opinion of liability to anyone.

4. Complete this IAR/VIR form promptly and forward with all applicable supporting documentation. It is essential both division and location information be provided.

5. For automobile collisions within the **United States**, please indicate on the IAR form that you have contacted Zurich at:

Zurich Insurance Company
1-800-987-3373 or
1-877-928-4531
24 hours a day, 7 days a week

6. For automobile collisions within **Canada**, please indicate on the IAR form that you have contacted Zurich at:

Crawford Adjusters Canada
Claims Alert
1-888-218-2346
24 hours a day, 7 days a week

The more details you have the better but, don't delay reporting if you don't have all of the information - that may be obtained later. A Zurich trained operator will answer your call and ask for all relevant information regarding the incident. The initial information required includes:

- Your division,
- Office location and division contact name – advise that you are an AMEC Company
- Name, drivers license and phone number of the driver involved in the loss
- Description of the vehicle which he/she was driving (i.e., year, make, model, license plate number, serial number)
- Date, time and location of incident
- Passenger information (if applicable)
- Third party information (i.e., name, phone number, address, vehicle information, insurance information)
- If any injuries occurred (if applicable)
- Police information
- Witness information (if applicable)

Call 911 if there are serious injuries!

If you are injured or think you were injured, **contact your supervisor and call WorkCare at 888-449-7787**. Your supervisor will notify your HSE Coordinator and your Group HSE Manager. For additional instructions on what to do, go to AMEC's HSE website at:

http://ee.amecnet.com/she/sheweb/incident_reporting.htm

1. Call for an officer if the incident occurred on public property (streets, highways or roads). Disputes often arise between the parties involved as to who was at fault; therefore, a police report is important. If an officer is unable to attend the scene of the collision, a counter police report may be filed at most stations. Insurance companies rely on police reports to determine liability.

2. Complete the Incident Investigation Report and the Vehicle Incident Report forms. It is important that both these forms are completed in detail. Include a diagram of the incident on the provided sheet. Incomplete information may lead to delays in processing associated claims and in helping to prevent this type of incident from occurring again.

3. Give only information that is required by the authorities or as directed by AMEC contractual requirements.

4. Sign only those statements required by the authorities or as directed by AMEC contractual requirements. Do not sign away your or the company's rights.

Vehicle Incident Diagram

This or a similar diagram <u>must be completed</u> with all VIRs

Instructions:

1. Number each vehicle and show directions
2. Use a solid line to show path before incident and use a dotted line to show path after incient

   (before) (after)
3. Show pedestrian/non-motorist by:
4. Show railroad by:
5. Indicate north by arrow as:
6. Show street or highway names or numbers
7. Show signs, signals, warning and traffic controls.

Indicate North by Arrow

Prepared by: _____ Date: _____

ATTACHMENT 3
GROUND DISTURBANCE INCIDENT REPORT
AMEC Environment & Infrastructure

Section 1 – General Information

Employee Name: _____ Time of incident: _____ ☐ am | ☐ pm Time Reported: _____ ☐ am | ☐ pm Report Date: _____
Project Name: _____ Project Number: _____ Client: _____

List of All Parties Present

Name	Company	Telephone No.	Role
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____

Describe the chronological description of Incident and response:____

Section 2 – Date and Location of Event

A. *Date of Event: (MM/DD/YYYY)
B. ***Country** ***State** ***County** **City**

C. **Street address** **Nearest Intersection**

D. *Right of Way where event occurred
E. Public: ☐ City Street ☐ State Highway ☐ County Road ☐ Interstate Highway ☐ Public-Other
F. Private: ☐ Private Business ☐ Private Land Owner ☐ Private Easement
G. ☐ Pipeline ☐ Power /Transmission Line ☐ Dedicated Public Utility Easement
☐ Federal Land ☐ Railroad ☐ Data not collected ☐ Unknown/Other

List attached documentation (Public Utility Locates, Private Utility Locates, Copy of notifications submitted to Owner or other utility Owners, photographs): _____

Section 3 – Affected Facility Information

***What type of facility operation was affected?**
☐ Cable Television ☐ Electric ☐ Natural Gas ☐ Liquid Pipeline ☐ Sewer (Sanitary Sewer)
☐ Steam ☐ Telecommunications ☐ Water ☐ Unknown/Other
***What type of facility was affected?**
☐ Distribution ☐ Gathering ☐ Service/Drop ☐ Transmission ☐ Unknown/Other
Was the facility part of a joint trench?
☐ Unknown ☐ Yes ☐ No
Was the facility owner a member of One-Call Center?
☐ Unknown ☐ Yes ☐ No

Section 4 – Excavation Information

***Type of Excavator**

☐ Contractor ☐ County ☐ Developer ☐ Farmer ☐ Municipality ☐ Occupant
☐ Railroad ☐ State ☐ Utility ☐ Data not collected ☐ Unknown/Other

***Type of Excavation Equipment**

☐ Auger ☐ Backhoe/Trackhoe ☐ Boring ☐ Drilling ☐ Directional Drilling
☐ Explosives ☐ Farm Equipment ☐ Grader/Scraper ☐ Hand Tools ☐ Milling Equipment
☐ Probing Device ☐ Trencher ☐ Vacuum Equipment ☐ Data Not Collected ☐ Unknown/Other

***Type of Work Performed**

☐ Agriculture ☐ Cable Television ☐ Curb/Sidewalk ☐ Bldg. Construction ☐ Bldg. Demolition
☐ Drainage ☐ Driveway ☐ Electric ☐ Engineering/Survey ☐ Fencing
☐ Grading ☐ Irrigation ☐ Landscaping ☐ Liquid Pipeline ☐ Milling
☐ Natural Gas ☐ Pole ☐ Public Transit Auth. ☐ Railroad Maint. ☐ Road Work
☐ Sewer (San/Storm) ☐ Site Development ☐ Steam ☐ Storm Drain/Culvert ☐ Street Light
☐ Telecommunication ☐ Traffic Signal ☐ Traffic Sign ☐ Water ☐ Waterway Improvement
☐ Data Not Collected ☐ Unknown/Other

Section 5 – Pre-Excavation Notification

***Was the One-Call Center notified?**

☐ Yes ☐ No If Yes, which One-Call Center? Ticket number:

Was Private Contract Locator used?

☐ Yes ☐ No

Section 6 – Locating and Marking

***Type of Locator**

☐ Utility Owner ☐ Contract Locator ☐ Data Not Collected

***Were facility marks visible in the area of excavation?**

☐ Yes ☐ No ☐ Data Not Collected

***Were facilities marked correctly?**

☐ Yes ☐ No ☐ Data Not Collected

What technology was used to locate utilities?

☐ Maps ☐ Active(transmitter+receiver) ☐ Passive (receiver only) ☐ GPR
☐ Acoustic ☐ Magnetic ☐ Infrared ☐ Unknown/Other

What Factors affected the ability to locate services?

☐ Soil Type:_____ ☐ Non-Grounded ☐ Common Bonded ☐ Depth
☐ Electromagnetic interference ☐ Parallel facilities ☐ Congested facilities ☐ Unknown/Other

Section 7 – Excavator Downtime

Did Excavator incur down time?

☐ Yes ☐ No

If yes, how much time?

☐ Unknown ☐ Less than 1 hour ☐ 1 hour ☐ 2 hours ☐ 3 or more hours Exact Value _____If

Estimated cost of down time?

☐ Unknown ☐ $0 ☐ $1 to 500 ☐ $501 to 1,000 ☐ $1,001 to 2,500 ☐ $2,501 to 5,000
☐ $5,001 to 25,000 ☐ $25,001 to 50,000 ☐ $50,001 and over Exact Value _____

Section 8 – Description of Damage

***Was there damage to a facility?**
☐ Yes ☐ No (i.e. near miss)
***Did the damage cause an interruption in service?**
☐ Yes ☐ No ☐ Data Not Collected ☐ Unknown/Other
If yes, duration of interruption
☐ Unknown ☐ Less than 1 hour ☐ 1 to 2 hrs ☐ 2 to 4 hrs ☐ 4 to 8 hrs ☐ 8 to 12 hrs ☐ 12 to 24 hrs
☐ 1 to 2 days ☐ 2 to 3 days ☐ 3 or more days ☐ Data Not Collected Exact Value _____
Approximately how many customers were affected?
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 10 ☐ 11 to 50 ☐ 51 or more Exact Value _____
Estimated cost of damage / repair/restoration
☐ Unknown ☐ $0 ☐ $1 to 500 ☐ $501 to 1,000 ☐ $1,001 to 2,500 ☐ $2,501 to 5,000
☐ $5,001 to 25,000 ☐ $25,001 to 50,000 ☐ $50,001 and over Exact Value _____
Number of people injured
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 9 ☐ 10 to 19 ☐ 20 to 49 ☐ 50 to 99
☐ 100 or more Exact Value _____
Number of fatalities
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 9 ☐ 10 to 19 ☐ 20 to 49 ☐ 50 to 99
☐ 100 or more Exact Value _____

Was there a Product Release?
Product Release: ☐ No ☐ Yes ☐ N/A Type: ____ **If Yes, Incident Type is Environmental Report.**
Volume: ____ Spill Controls: ____
Repair Process: ____

Section 9 – Description of the Root Cause

Please choose one

One-Call Notification Practices Not Sufficient
☐ No notification made to the One-Call Center
☐ Notification to one-call center made, but not sufficient
☐ Wrong information provided to One Call Center

Locating Practices Not Sufficient
☐ Facility could not be found or located
☐ Facility marking or location not sufficient
☐ Facility was not located or marked
☐ Incorrect facility records/maps

Excavation Practices Not Sufficient
☐ Failure to maintain marks
☐ Failure to support exposed facilities
☐ Failure to use hand tools where required
☐ Failure to test-hole (pot-hole)
☐ Improper backfilling practices
☐ Failure to maintain clearance
☐ Other insufficient excavation practices

Miscellaneous Root Causes
☐ One-Call Center error
☐ Abandoned facility
☐ Deteriorated facility
☐ Previous damage
☐ Data Not Collected
☐ Other

Section 10 - Notifications, Certification & Approvals

Check the appropriate boxes indicating the applicable reports have been made to the following applicable organizations:

One Call was called ☐ **Spills Reporting Agency Notified ☐**

Emergency Responders (Fire) was called ☐ **Post-incident Drug/Alcohol Testing Performed**

List of All Agencies Contacted

Name/Agency	Phone #	Date	Time

Incident Report prepared by: ____

Employee (s): ____	Date: ____	Employee's Supervisor: ____	Date: ____
HSE Coordinator/Project/Unit Manager: ____	Date: ____	Group HSE Manager:____	Date: ____

ATTACHMENT 4

Instructions for Completing Incident Report Forms

All required information must be completed as requested.
Attachment 4 provides additional guidance for completing this report.

The purpose of the Incident Analysis Report (IAR) form is to identify the facts associated with an incident and its associated investigation. The goal of this process is to learn from its causal factors and to make improvements so similar incidents can be prevented in the future. It is imperative that all applicable fields on the form be completed in detail and that additional pages be used, as needed, to ensure that all appropriate information is provided. Upon finalizing the investigation and defining any applicable corrective actions on **Attachment 1**, all applicable signatures need to be completed. This can be accomplished via electronic signature or as an original prior to forwarding to the appropriate Group HSE Manager for review and approval. Upon approval, the Group HSE Manager will forward it to the Corporate HSE VP/Director as a final IAR.

The following left to right, line by line instructions are provided to help facilitate the completion of each section of **Attachment 1**.

Section 1 (General Information) - Mark in the box on the top left if this is the **Initial Report** containing all the information available at the issuance of the report, if it is an **Update** with more current information indicate the date the IAR was reissued, or if it is the **Final Report,** indicate the date it was issued to the right of the check box marked Final Report.

i. Mark the letter and number of the Incident Potential based on **Attachment 5**. Mark Investigation Level based on Indicent Potential (Green: Level 1, Red: Level 2, Yellow: Level 1 or 2 at discretion of HSE Manager/VP HSE). (Use drop-down boxes)

ii. Indicate the Group and the name of your Group HSE Manager. List the names of the members of the Incident Review Panel (IRP) investigation team for Level 2 Investigations.

iii. Job Position should reflect the type of work done by employee involved in the incident. (Use drop-down box to identify correct job position)

iv. Business Line should reflect one of the following: Admin, Air Quality, Archeology, Civil, CM, Env, Geo, Mat, Water. . (Use drop-down box to identify correct Business Line.)

v. Indicate in the LOCATION drop-downs the type of location the incident occurred at or involved.

Section 2 (Incident Type) – Mark all appropriate boxes. Use the *Outcome/Result*, *Source of Hazard* and *Immediate Cause* drop-down boxes to provide the appropriate information. Address questions in Subsections A through E, as appropriate, using drop-down boxes or provide additional pages as needed. For instance, Subsection A, *Indicate the Part of the Body* provides a drop-down to identify the specific part of the body that was injured such as: thumb, knee, etc.

Section 3 (Incident Description) - Subsections A through J requires information regarding all applicable items associated with the incident. These Subsections require as much objective information as possible to help document what happened. Use additional pages to properly document the detail of the incident to facilitate incident reconstruction and determination of causal factors including the root cause(s).

Section 4 (Incident Analysis) - Subsection A requests information regarding the work controls that were used (i.e. JHA, HASP or other formal document) by marking the appropriate box. Identify who prepared the work controls. Subsection B documents who the manager (Project, Unit) was and when they last were last present at the site prior to the incident occurring. Subsection C requires the listing of specific training information, type and date, directly related to the incident. Example: if the incident occurred while an employee was working on a ladder such as Fall Protection and Ladder training would be relevant while, training in Hazard Communication or Confined Space would not be relevant to the reported incident. Subsection D requires the listing of any attached documentation, preferably copies of those utilized on-site containing signatures such as HASP acknowledgment forms, kickoff/daily/weekly meetings, inspections, photographs, training certificates, etc).

Section 5 (Incident Investigation Results and Corrective Actions) - list here and on additional paper, if needed, the causal factors associated with the incident. As indicated in Section 4**,** Acronyms and Definitions of this Procedure, causal factors are events or conditions in the incident sequence that contributed to the unwanted result or outcome. There are three types of causal factors: immediate/**direct cause**, which is the immediate event or condition that caused the incident, which includes Acts or Omissions and, Conditions; the **contributing causes**, which are the Personal Factors and/or Job Factors (events or situations) that collectively, with the other causes, increase the likelihood of an incident but that did not cause the incident, and the **root cause**, which, if corrected, would have prevented the recurrence of the incident. The investigation of these root causes can lead to specific root causes that will need correction to prevent reoccurrence. They are:

1. **Physical capability** – aspects of a person's physical abilities such as eye sight, hearing, breathing due to use of respirator, etc. that lead to the incident.
2. **Physical Condition** – aspects of a person's temporary condition such as previous illness, fatigue, impairment due to blood sugar deficiency, medication, drugs or alcohol.
3. **Mental Capability** – aspects of a person's long term issues affecting their mental capability such as mental illness, memory failure, fears or phobias, long term impairment due to medication/drugs/ alcohol, poor coordination or low learning aptitude.
4. **Mental** Stress – aspects of a person's short term issues affecting their level of mental stress such as preoccupation with problems, frustration, confusing or conflicting directions, extreme judgement, intense concentration or extreme boredom.
5. **Behavior** – primarily activators of intentional unsafe acts, lack of disciplinary process, inappropriate peer or production pressure, poor supervisory example, etc.
6. **Skill Level** – aspects pertaining to skills including inadequate identification of skill requirements, inadequate practice of skills or no coaching on skills.
7. **Competence/Training/Knowledge Transfer** - inadequate employee selection or induction, inadequate training, needs assessment, design, delivery, resources, record keeping refresher training, no training provided.
8. **Safety Leadership** – inadequate accountability, reporting relationship, poor example of requirements, lack of demonstrated commitment, failure to enforce or utilize standard of care.
9. **Contractor selection and engagement** – lack of safety pre-qualification, inadequate pre-qualifications, selection and positive engagement of contractor, use of unapproved contractor.
10. **Engineering Design/Comissioning** – aspects of engineering including inadequate design input/output, inadequate assessment of design risks, inadequate assessment of constructability/mantainability or Inadequate O&M manuals.
11. **Planning** – unrealistic timescale, inadequate resources, identified skill sets, roles and responsibilities, budget material schedule, documentation or implementation.
12. **Materials** – inadequate procurement of, QC processes of, health and safety data of, identification of hazardous materials, packaging, improper salvage and/or waste deposal, shelf-life exceeded.
13. **Equipment –** Inadequate assessment of needs and risks, standard or specifications of , QC process, information on operation, use of information on operation or maintenance, use of maintenance information, removal or replacement of unsuitable items.
14. **Standards/Processes(S/P)** – lack of S&P, inadequate briefing, implementation, monitoring of , understanding of, or configuration management of S&P.
15. **Communications** – inadequate in work team, between work teams, supervisor and work team, manager and supervisor/workteam, shifts, method available, communication method, framework for 2-way communication on safety.
16. **Risk Management** – inadequate hazard identification, consultation on hazards, identification of controls, definition of responsibilities for controls, implementation of controls, management of change.
17. **Learning from Experience** – aspects related to failure to capture/communicate/act on previous learning.
18. **Monitoring and review** – no system in place, inadequate system, failure to identify trends through monitoring, communication of output of monitoring and review, monitor closeout of corrective actions.

The Analysis of Root Cause(s) is to be completed on the final IAR by the Group HSE Manager to ensure all details of the incident have been reviewed and the Root Cause(s) and corrective actions are appropriate to help prevent reoccurrence of a similar incident.

Section 7 (Notification, Certification and Approvals) - Indicate which organizations have been contacted by placing a check in the applicable box(es). Place a check in the appropriate box certifying that a post-incident substance abuse test had been conducted. Prior to emailing an **Initial, Update** or **Final** IAR to the applicable Group HSE Manager for approval, obtain the required dated signatures. Signatures may be electronic or in ink. If the original signed copy of the IAR is retained in the office, send a PDF copy of the IAR documenting the appropriate signatures.

Instructions for Completing Vehicle Incident Report Form

All required information must be completed as requested.

Section 1 (General Information) - This section provides the when, where, conditions at the time of the incident and what law enforcement representative responded to the incident scene. Complete **Vehicle Incident Diagram** documenting the before and after motions of all vehicles and objects involved.

Section 2 (Company Driver and Vehicle) - This section documents **who was driving** the AMEC owned, rental or personal vehicle used for company business. Mark "See IAR" if any requested information has been previously provided on the IAR, **Attachment 1**.

Section 3 (Other Driver and Vehicle Information) - Provides contact information on the other party involved in the incident. Complete each question making sure that the registration information of the other driver's vehicle is reviewed and indicate any unusual relationship between the registered owner and the driver. If you have a digital camera, camera phone, etc. with you document the extent of the damage and any other issues that should be captured.

Section 4 (Approvals) - Electronic or ink signatures of each of the two individuals who completed the form is required. The form should then be **immediately sent** either as a PDF or WORD file to the applicable Group HSE Manager and the Corporate HSE VP/Director upon completion.

Sign the original and **file it within the office vehicle information** at the office where the employee involved in the incident is based.

Instructions for Completing Ground Disturbance Incident Report Form

All required information must be completed as requested.

Section 1 (General Information) - Provides a foundation for when and what agencies / parties were involved in the incident.

Section 2 (Date and Location of Event) - Documents the when and where associated with the incident. Provide list of attached documentation demonstrating due diligence regarding ground disturbance procedures and site-specific circumstances.

Section 3 (Affected Facility Information) - Provide information on the type of utilities/service that was impacted and whether the owner was affiliated with a One-Call Center.

Section 4 (Excavation Information) - Provide, by checking the applicable boxes information on the classification of the excavator, equipment used and nature of the work being performed.

Section 5 (Pre-Excavation Notification) - Provide information on the notifications made during the ground disturbance clearance process.

Section 6 (Locating and Marking) - Indicate applicable information on the locating services and techniques that were utilized during the ground disturbance clearance process.

Section 7 (Excavator Downtime) - This section helps to estimated the financial impact to the excavator operations/project budget.

Section 8 (Description of Damage) - Indicate the nature of damage (if any) and extent of consequences as a result of the damage.

Section 9 (Description of Root Cause) - This section is to be completed to identify the root causes specific to the ground disturbance incidents and as a supplement to the causes identified in the IAR Form, **Attachment 1**. Consult with your Group HSE Manager if you need additional support or explanation.

Section 10 (Notification, Certification and Approvals) - Indicate which organizations have been contacted by placing a check in the applicable box(es). Place a check in the appropriate box certifying that a post-incident substance abuse test had been conducted (as applicable for serious incidents, as per Substance Use Policy). List the agencies contacted, if any , as a result of the ground disturbance incident (Labour, Environmental, etc).

Prior to emailing an initial, updated or final GDIR to the applicable Group HSE Manager for approval, obtain the required dated signatures. Signatures may be electronic or in ink. If the original signed copy of the IAR is retained in the office, send a PDF copy of the IAR documenting the appropriate signatures. requires the electronic or ink signature of each of the two individuals required to complete the form. The form should then be **immediately sent** either as a PDF or WORD file to the applicable Group HSE Manager and the Corporate HSE VP/Director upon completion.

1. The **signed original must reside at the office** where the employee involved in the incident is based.

Guidance on Ground Disturbance Root Causes

LOCATING PRACTICES NOT SUFFICIENT	ONE-CALL NOTIFICATION PRACTICES NOT SUFFICIENT
Facility could not be found or located - Type of facility or lack or records prevented locating of facility. Example: - Plastic pipelines installed without tracer wire.	**No notification made to the one-call Center** - Excavator did not call the one-call center.
Facility marking or location not sufficient - Includes all areas where marking was insufficient. Example: - Locator marked the work zone, but missed a service. - Locator misread the ticket and did not locate the entire work zone. Locator did not use records or interpreted the records incorrectly. - Locator did not tone correctly. - Facility was outside the tolerance zone.	**Notification to one-call center made, but not sufficient** -The excavator contacted the notification center, but did not provide sufficient information, or the excavator did not provide sufficient notification time according to requirements and guidelines. Example: - Excavator did not wait for the locate to be completed prior to digging.
Facility was not located or marked - No locating or marking was completed prior to excavation activities. Example: - The company received a valid ticket but did not mark, locate, or communicate with the excavator prior to start of work.	
Incorrect facility records/maps - Incorrect facility records or maps led to an incorrect locate. Example: - Records show the facility located on the wrong side of the street, and ticket was cleared. - Records do not accurately reflect current plant status.	

MISCELLANEOUS ROOT CAUSES
One-Call Center Error - Includes all issues related to the center such as incorrectly entered data, ticket transmission failures, et al. Example: - This would include damages that occurred because the center's database registry had not been updated to reflect correct location of underground facilities. - The one-call center system crashed and failed to deliver the ticket.
Abandoned Facility - Damage related to abandoned facilities. Select a more specific root cause. Example: - The abandoned facility may have been located, instead of the active facility. - This does NOT include when an abandoned facility is thought to have been located, but it is found to be active after the excavation exposed the facility or damaged it.
Deteriorated Facility - Those situations in which an excavation disrupts the soil around the facility resulting in damage, failure or interruption of service. However, the deterioration and not the excavation caused the facility damage.
Previous Damage - Damage occurred during previous excavation. Example: - Pipe coating was damaged during a previous excavation and was not reported. Subsequently, a corrosion leak occurred, or subsequent excavation at the site revealed the damage to the pipe.
Data Not Collected - Damage occurred, but Root Cause was not identified. Example: - Damage investigator did not indicate a Root Cause.

ATTACHMENT 5
Incident Potential Matrix

The below matrix provides a way of scoring an event based on what harm or property loss may have been experienced had the event realized its full potential. In order to determine the incident potential rating, it is necessary to look at what happened and give consideration to what could have happened. In the same way, it is necessary to look at the actual severity of the event and to consider how severe the incident could have been.

Example: A hammer fell from the belt of someone working at a height of 15 feet on a ladder and landed one foot from an AMEC employee not wearing a hard hat. Although this is a near miss, what would have happened if the hammer had hit the person on the head? Based on the provided information, this incident would be rated as a B4.

Often the worst probable outcome is not realized and the use of the word "probable" is important. The outcome must be credible in terms of potential circumstances and severity.

Consequences				Number of People				
	Injury/ Health	Environmental	Damage	0	1	1-2	2-10	10+
1	Minor injury/ health effect	Minimal reversible environmental impact	Minor loss/ damage/ business impact <1K	A1	B1	C1	D1	E1
2	Medical treatment/ restricted work case/ moderate health effect	Minor pollution with short term impact	Moderate loss/ damage/ business impact 1-10K	A2	B2	C2	D2	E2
3	Lost time injury/ significant health effect	Moderate pollution with medium term localised impact	Significant loss/ damage/ business 10-100K	A3	B3	C3	D3	E3
4	Serious injuriy/ severe health effect/ long term disability	Severe pollution with long term localised impact	Severe loss/ damage/ business impact 100K -1M	A4	B4	C4	D4	E4
5	Fatality	Major pollution with long term environmental change	Major loss/ damage/ business impact 1M+	A5	B5	C5	D5	E5
				A	B	C	D	E

Notes:
Care must be taken to avoid over estimation of the potential (there is an element of subjective judgement here). Rating should: 1) consider all safeguards and precautions that were in place at the time of the incident, 2) reflect a realistic outcome of an incident and not the worst possible case and 3) be determined when the incident is reported although it may be modified during or upon completion of the investigation based on the findings.

ATTACHMENT 6
Example – IRP Learning / Safety Flash

INCIDENT review panel LEARNING

amec

The Incident:	**Crushed Tip of Right Middle Finger**
Project:	**Port of Long Beach, Long Beach, California**
Classification:	**Restricted Duty Incident**
Potential:	**B3**

The Incident

- *The IP was exposed to unguarded point of operation on Dynamic Cone Penetrometer (DCP).*
- *The IP had tip of right middle finger crushed between anvil and hammer of DCP.*
- *IP received medial treatment to repair tip of finger and was placed on restricted duty.*

Investigation Findings

Investigation team found the following key findings:

- ***Immediate Cause***
  - *Exposure to unguarded point of operation.*
- ***Root Cause***
  - *Insufficient analysis of training needs by management on the use of equipment.*
  - *Inadequate promotion of systems for the identification and elimination of hazards.*
- ***Actions Taken***
  - Conduct safety meeting with affected field employees, including the IP, discuss incident reporting procedures, safe work procedures, and lessons learned.
  - *Job Hazard Analysis prepared for Dynamic Cone Penetrometer and will be sent with equipment moving forward.*

Incident Learning for the business

The key lessons learned from the incident:

- Employees can become complacent and lose concentration long enough for an injury to occur when working around unguarded pinch points even though the risks associated with hand placement are made clear.
- Managers should ensure a Job Hazard Analysis (JHA) is provided that specifically address equipment hazards and safe practices for operation.
- Safety training prior to the use of equipment in the field must not only identify hazards, but also demonstrate the safe operation procedures for the equipment.

Unguarded point of operation

The IP was exposed to point of operation when hammer was dropped while holding anvil. When raising the hammer with one hand the other hand should always be holding the handle.

Safety Essentials category

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APPENDIX D

MATERIAL SAFETY DATA SHEETS

ALCONOX MSDS

Section 1 : MANUFACTURER INFORMATION

Product name: Alconox

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0585 (outside of the United States).

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Supplier MSDS date: 2005/03/09

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE
497-19-8	7-13	SODIUM CARBONATE	NOT AVAILABLE	4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL	2300 MG/M3/2H RAT INHALATION 1200 MG/M3/2H MOUSE INHALATION
7722-88-5	10-30	TETRASODIUM PYROPHOSPHATE	5 MG/M3	4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL	NOT AVAILABLE
7758-29-4	10-30	SODIUM PHOSPHATE	NOT AVAILABLE	3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL >4640 MG/KG RABBIT DERMAL	NOT AVAILABLE

Section 2A : ADDITIONAL INGREDIENT INFORMATION

Note: (supplier).
CAS# 497-19-8: LD50 4020 mg/kg - rat oral.
CAS# 7758-29-4: LD50 3100 mg/kg - rat oral.

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Solid

Appearance & odor: Almost odourless.
White granular powder.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): Not applicable.

Vapour density (air=1): Not applicable.

By weight: Not available.

Evaporation rate (butyl acetate = 1): Not applicable.

Boiling point (°C): Not applicable.

Freezing point (°C): Not applicable.

pH: (1% aqueous solution).
9.5

Specific gravity @ 20 °C: (water = 1).
0.85 - 1.10

Solubility in water (%): 100 - > 10% w/w

Coefficient of water\oil dist.: Not available.

VOC: None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability: Not flammable.

Conditions of flammability: Surrounding fire.

Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.

Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.

Auto-ignition temperature: Not available.

Flash point (°C), method: None

Lower flammability limit (% vol): Not applicable.

Upper flammability limit (% vol): Not applicable.

Not available.

Sensitivity to mechanical impact: Not applicable.

Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.

Rate of burning: Not available.

Explosive power: None

Section 5 : REACTIVITY DATA

Chemical stability: Stable under normal conditions.

Conditions of instability: None known.

Hazardous polymerization: Will not occur.

Incompatible substances: Strong acids.
Strong oxidizers.

Hazardous decomposition products: See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of Acute Exposure

Eye contact: May cause irritation.

Skin contact: Prolonged contact may cause irritation.

Inhalation: Airborne particles may cause irritation.

Ingestion: May cause vomiting and diarrhea.
May cause abdominal pain.
May cause gastric distress.

Effects of chronic exposure: Contains an ingredient which may be corrosive.

LD50 of product, species & route: > 5000 mg/kg rat oral.

LC50 of product, species & route: Not available for mixture, see the ingredients section.

Exposure limit of material: Not available for mixture, see the ingredients section.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Medical conditions aggravated by exposure: Not available.

First Aid

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
Seek medical attention if symptoms persist.

Ingestion: Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.
Do not induce vomiting, seek immediate medical attention.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak / Spill: Contain the spill.
Recover uncontaminated material for re-use.
Wear appropriate protective equipment.
Contaminated material should be swept or shoveled into appropriate waste container for disposal.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Protect against physical damage.
Avoid breathing dust.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Launder contaminated clothing prior to reuse.

Storage requirements: Keep containers closed when not in use.
Store away from strong acids or oxidizers.
Store in a cool, dry and well ventilated area.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves / Type:

Neoprene or rubber gloves.

Respiratory / Type:

If exposure limit is exceeded, wear a NIOSH approved respirator.

Eye / Type:

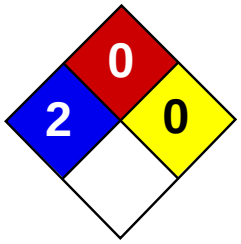
Safety glasses with side-shields.

Footwear / Type: Safety shoes per local regulations.

Clothing / Type: As required to prevent skin contact.

Other / Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.



Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Bentonite MSDS

Section 1: Chemical Product and Company Identification

Product Name: Bentonite

Catalog Codes: SLB1441, SLB2935, SLB4435

CAS#: 1302-78-9

RTECS: CT9450000

TSCA: TSCA 8(b) inventory: Bentonite

CI#: Not applicable.

Synonym: Montmorillonite;

Chemical Name: Not available.

Chemical Formula:
(Al,Fe1.67Mg.33)Si10(OH)2Na(+)Ca(++)/2.33

Contact Information:

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

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Bentonite	1302-78-9	100

Toxicological Data on Ingredients: Bentonite LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
Hazardous in case of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

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

Serious Skin Contact: Not available.

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

Serious Inhalation: Not available.

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not breathe dust. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible.

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

Section 8: Exposure Controls/Personal Protection

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

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

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

Exposure Limits:
TWA: 10 from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Odorless.

Taste: Not available.

Molecular Weight: Not available.

Color: Beige. (Light.)

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

Boiling Point: Not available.

Melting Point: Decomposes.

Critical Temperature: Not available.

Specific Gravity: 2.5 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Very slightly soluble in cold water, hot water. Insoluble in methanol, diethyl ether, n-octanol, acetone.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Causes damage to the following organs: lungs.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

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

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Bentonite

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

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

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

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

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:14 PM

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

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Material Safety Data Sheet

for

PORTLAND CEMENT

Section 1 - IDENTIFICATION

Product Names: Mountain Cement Portland Cement - Types I/II, V, Oilwell Class G

MSDS Information

This MSDS was produced in August 2003 and replaces any prior versions.

Product Code

Standard Industrial Classification: 3241

Chemical family

Calcium compounds. Calcium silicate compounds and other calcium compounds containing iron and aluminum make up the majority of this product. Major compounds:

$3CaO \cdot SiO_2$	Tricalcium silicate	CAS#12168-85-3
$2CaO \cdot SiO_2$	Dicalcium silicate	CAS#10034-77-2
$3CaOAl_2O_3$	Tricalcium aluminate	CAS#12042-78-3
$4Ca0 \cdot Ai2O_3 \cdot Fe_2O_3$	Tetracalcium aluminoferrite	CAS#12068-35-8
$CaSO_4 \cdot 2H_2O$	Calcium sulfate dihydrate or Gypsum	CAS#7778-18-9

Chemical name and synonyms

Portland cement. Also known as hydraulic cement.

Formula

This product consists of finely ground portland cement clinker mixed with a small amount of calcium sulfate.*

Supplier/Manufacturer

Mountain Cement Company

5 Sand Creek Road

Laramie, WY 82070

Emergency contact information

307-745-4879

*Trace Elements

Portland cement is made from materials mined from the earth and is processed using energy provided by fuels; and therefore may contain trace amounts of naturally occurring materials which might be detected during chemical analysis. For example: Portland cement may contain up to 0.75% insoluble residue, of which <0.1% may be free crystalline silica. Other trace constituents may include potassium and sodium sulfate compounds, chromium compounds, and nickel compounds.

Section 2 - COMPONENTS

	OSHA PEL	**ACGIF TLV-TWA**	**NIOSH REL**
Hazardous Substances	**(8-hour TWA)**	**(1995-1996)**	**(8-Hour TWA**
Portland Cement Clinker (CAS #65997-15-1)	50 million particles/ft^3	10mg total dust/m^3	
Nominal 95% by weight			
Calcium sulfate (CAS #7778-18-9)	5mg respirable dust/m^3	10mg total dust/m^3	
[Gypsum (CAS #13397-24-5)]	10mg total dust/m^3		
Nominal 5% weight			
Calcium oxide (CAS #1306-78-8)	5mg/m^3	2mg/m^3	
(Free Lime)			
< 4% by weight			
Magnesium Oxide (CAS #1309-48-4)	15mg total dust/ m^3	10mg total dust/m^3	
< 5% by weight			

Section 3 - HAZARDS IDENTIFICATION/TOXICOLOGICAL INFORMATION

Emergency Overview:

Portland cement is a light gray powder that poses little immediate hazard. A single short-term exposure to the dry powder is not likely to cause serious harm. However, exposure of sufficient duration to wet portland cement can cause serious, potentially irreversible tissue (including skin or eye) destruction in the form of chemical (caustic) burns, including third degree burns. The same type of tissue destruction can occur if wet or moist areas of the body are exposed for sufficient duration to dry portland cement.

Potential Health Effects:

Potential effects resulting from **eye contact:**

Exposure to airborne dust may cause immediate or delayed irritation or inflammation.

Eye contact by larger amounts of dry powder or splashes of wet portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness. Such exposures require immediate first aid (see Section 4) and medical attention to prevent significant damage to the eye.

Potential effects resulting from **skin contact:**

Discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing or avoiding skin contact, particularly contact with wet cement. Persons exposed to wet cement may not feel discomfort until hours after the exposure has ended and significant injury has occurred.

Exposure to dry portland cement may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other conditions. Dry portland cement contacting wet skin or exposure to moist or wet portland cement may cause more severe skin effects including thickening, cracking, or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of (caustic) chemical burns.

Some individuals may exhibit an allergic response upon exposure to portland cement, possibly due to trace amounts of chromium. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers. Persons already sensitized may react to their first contact with the product. Other persons may experience this effect after years of contact with hydraulic cement products.

Potential effects resulting from **inhalation:**

Portland cement may contain trace amounts (<0.1%) of free crystalline silica. Prolonged exposure to respirable free crystalline silica may aggravate other lung conditions. It may also cause delayed lung injury including silicosis, a disabling and potentially fatal lung disease.

Exposure to portland cement may cause irritation to the moist mucous membranes of the nose, throat, and upper respiratory system. It may also leave unpleasant deposits in the nose.

Potential effects resulting from **ingestion:**

Although small quantities of dust are not known to be harmful, ill effects are possible if larger quantities are consumed. Portland cement should not be eaten under any circumstances.

Carcinogenic Potential:

Portland cement is not listed as a carcinogen by IARC, NTP, or OSHA. It may, however, contain trace amounts (<0.1%) of substances listed as carcinogens by these organizations. Crystalline silica is now classified by IARC as a known human carcinogen (Group I). NTP had characterized respirable crystalline silica as "reasonably anticipated to be (a) carcinogen."

Medical Conditions Which May Be Aggravated By Inhalation or Dermal Exposure:

- Pre-existing upper respiratory and lung diseases.

- Unusual (hyper) sensitivity to hexavalent chromium (chromium +6) salts.

Section 4 - FIRST AID

Eyes

Immediately flush eyes thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

Skin

Wash skin with cool water and pH-neutral soap or a mild detergent intended for use on skin. Seek medical treatment in all cases of prolonged exposure to wet cement, cement mixtures, liquids from fresh cement products, or prolonged wet skin exposure to dry cement.

Inhalation of Airborne Dust

Remove to fresh air. Seek medical help if coughing and other symptoms do not subside. (Inhalation of gross amounts of portland cement requires immediate medical attention.)

Ingestion

Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

Section 5 - FIRE & EXPLOSION DATA

Flash Point	None
Lower Explosive Limit	None
Upper Explosive Limit	None
Auto Ignition Temperature	Not combustible
Extinguishing Media	Not combustible
Special Fire Fighting Procedures	None. (Although portland cement poses no fire-related hazards, a self-contained breathing apparatus is recommended to limit exposure to combustion products when fighting any fire.)
Hazardous Combustion Products	None
Unusual Fire and Explosion Hazards	None

Section 6 - ACCIDENTAL RELEASE MEASURES

Collect dry material using a scoop. Avoid actions that cause dust to become airborne. Avoid inhalation of dust and contact with skin. Wear appropriate personal protective equipment as described in Section 8.

Scrape up wet material and place in an appropriate container. Allow the material to "dry" before disposal. Do not attempt to wash portland cement down drains.

Dispose of waste material according to local, state, and federal regulations.

Section 7 - HANDLING AND STORAGE

Keep portland cement dry until used. Normal temperature and pressure do not affect the material.

Promptly remove dusty clothing or clothing which is wet with cement fluids and launder before reuse. Wash thoroughly after exposure to dust or wet cement mixtures or fluids.

Section 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Skin Protection

Prevention is essential to avoiding potentially severe skin injury. Avoid contact with unhardened (wet) portland cement products. If contact occurs, promptly wash affected area with soap and water. Where prolonged exposure to unhardened portland cement products might occur, wear impervious clothing and gloves to eliminate skin contact.

Respiratory Protection

Avoid actions that cause dust to become airborne. Use local or general ventilation to control exposures below applicable exposure limits. Use NIOSH/MSHA-approved respirators in poorly ventilated areas when dust causes discomfort or irritation, or where there is an applicable exposure limit (Advisory: Respirators and filters purchased after July 10, 1998 must be certified under 42 CFR 84).

Ventilation

Use local exhaust or general dilution ventilation to control exposure within applicable limits.

Eye Protection

When engaged in activities where cement dust or wet cement or concrete could contract the eye, wear safety glasses with side shields or goggles. In extremely dusty environments and unpredictable environments, wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with portland cement or fresh cement products.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Gray or White powder
Odor	No distinct odor
Physical state	Solid (powder)
pH (in water) (ASTM D 1293-95)	12 to 13
Solubility in water	Slightly soluble (0.1 to 1.0%)
Vapor pressure	Not applicable
Vapor density	Not applicable
Boiling point	Not applicable (i.e., > 1000° C)
Melting point	Not applicable
Specific gravity (H_2O = 1.0)	3.15
Evaporation rate	Not applicable

Section 10 - STABILITY AND REACTIVITY

Stability

Stable

Conditions To Avoid

Unintentional contact with water

Incompatibility

Wet portland cement is alkaline. As such, it is incompatible with acids, ammonium salts, and aluminum metal.

Hazardous Decomposition

Will not spontaneously occur. Adding water results in hydration and produces (caustic) calcium hydroxide.

Hazardous Polymerization

Will not occur.

Section 11 - TOXICOLOGICAL INFORMATION – See Section 3

Section 12 - ECOLOGICAL INFORMATION

Ecotoxicity

No recognized unusual toxicity to plants or animals.

Relevant Physical and Chemical Properties

(See Sections 9 and 10.)

Section 13 - DISPOSAL

Dispose of waste material, including bags, according to local, state and federal regulations.

Section 14 - TRANSPORTATION DATA

Hazardous Materials Description/Proper Shipping Name

Portland cement is not hazardous under U.S. Department of Transportation (DOT) regulations.

Section 15 - OTHER REGULATORY INFORMATION

Status Under USDOL-OSHA Hazard Communication Rule, 29 CFR 1910.1200

Portland cement is considered a "hazardous chemical" under this regulation, and should be part of any hazard communication program.

Status Under CERCLA/Superfund 40 CFR 117 and 302 (v)

Not listed.

Hazard Category Under SARA (Title III) Section 311 and 312

Portland cement qualifies as a "hazardous substance" with delayed health effects.

Status Under SARA (Title III) Section 313

Not subject to reporting requirements under Section 313.

Status Under TSCA (as of May 1997)

Some substances in portland cement are on the TSCA inventory list.

Status Under the Federal Hazardous Substances Act

Portland cement is a "hazardous substance" subject to the statutes promulgated under the subject act.

Status Under WHMIS

Portland cement is considered to be a hazardous material under the Hazardous Products Act as defined by the Controlled Products regulations (Class E - corrosive material) and is therefore subject to the labeling and MSDS requirements of the workplace hazardous information system (WHMIS).

Section 16 - OTHER INFORMATION

Prepared By

Mountain Cement Company

5 Sand Creek Rd.

Laramie, WY 82070

Revision Date

August 2003

Other Important Information

Portland cement should only be used by knowledgeable persons. Inexperienced product users must obtain proper training before using this product. A key to using the product safely requires the user to recognize that portland cement chemically reacts with water, and that some of the intermediate products of this reaction (that is, those present while a portland cement product is "setting") pose a far more severe hazard than does portland cement itself.

While the information provided in this material safety data sheet is believed to provide a useful summary of the hazards of portland cement as it is commonly used, the sheet cannot, and does not, anticipate and provide all of the information that might be needed in every situation. In particular, the data furnished in this sheet do not address hazards that may be posed by other materials mixed with portland cement products. Users, therefore, should review other applicable material safety data sheets before working with this portland cement or working on portland cement products, for example, portland cement concrete.

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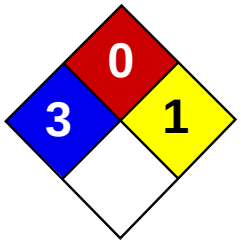

Health	3
Fire	0
Reactivity	1
Personal Protection	

Material Safety Data Sheet
Hydrochloric acid, 37% MSDS

Section 1: Chemical Product and Company Identification

Product Name: Hydrochloric acid, 37%

Catalog Codes: SLH1360, SLH2206, SLH3052

CAS#: Mixture.

RTECS: MW4025000

TSCA: TSCA 8(b) inventory: Hydrochloric acid

CI#: Not applicable.

Synonym: Hydrochloric Acid; Muriatic Acid; Hydrochloric Acid 37% N.F, F.C.C., Electronic/Cleanroom grades

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

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

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Hydrogen chloride	7647-01-0	37
Water	7732-18-5	63

Toxicological Data on Ingredients: Hydrogen chloride: GAS (LC50): Acute: 4701 ppm 0.5 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, . Slightly hazardous in case of inhalation (lung sensitizer). Non-corrosive for lungs. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Hydrochloric acid]. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, mucous membranes, upper

respiratory tract, skin, eyes, Circulatory System, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: of metals

Explosion Hazards in Presence of Various Substances: Non-explosive in presence of open flames and sparks, of shocks.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
Non combustible. Calcium carbide reacts with hydrogen chloride gas with incandescence. Uranium phosphide reacts with hydrochloric acid to release spontaneously flammable phosphine. Rubidium acetylene carbides burns with slightly warm hydrochloric acid. Lithium silicide in contact with hydrogen chloride becomes incandescent. When dilute hydrochloric acid is used, gas spontaneously flammable in air is evolved. Magnesium boride treated with concentrated hydrochloric acid produces spontaneously flammble gas. Cesium acetylene carbide burns hydrogen chloride gas. Cesium carbide ignites in contact with hydrochloric acid unless acid is dilute. Reacts with most metals to produce flammable Hydrodgen gas.

Special Remarks on Explosion Hazards:
Hydrogen chloride in contact with the following can cause an explosion, ignition on contact, or other violent/vigorous reaction: Acetic anhydride AgClO + CCl4 Alcohols + hydrogen cyanide, Aluminum Aluminum-titanium alloys (with HCl vapor), 2-Amino ethanol, Ammonium hydroxide, Calcium carbide Ca3P2 Chlorine + dinitroanilines (evolves gas), Chlorosulfonic acid Cesium carbide Cesium acetylene carbide, 1,1-Difluoroethylene Ethylene diamine Ethylene imine, Fluorine, HClO4 Hexalithium disilicide H2SO4 Metal acetylides or carbides, Magnesium boride, Mercuric sulfate, Oleum, Potassium permanganate, beta-Propiolactone Propylene oxide Rubidium carbide, Rubidium, acetylene carbide Sodium (with aqueous HCl), Sodium hydroxide Sodium tetraselenium, Sulfonic acid, Tetraselenium tetranitride, U3P4 , Vinyl acetate. Silver perchlorate with carbon tetrachloride in the presence of hydrochloric acid produces trichloromethyl perchlorate which detonates at 40 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, organic materials, metals, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

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

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
CEIL: 5 (ppm) from OSHA (PEL) [United States] CEIL: 7 (mg/m3) from OSHA (PEL) [United States] CEIL: 5 from NIOSH CEIL: 7 (mg/m3) from NIOSH TWA: 1 STEL: 5 (ppm) [United Kingdom (UK)] TWA: 2 STEL: 8 (mg/m3) [United Kingdom (UK)]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Pungent. Irritating (Strong.)

Taste: Not available.

Molecular Weight: Not applicable.

Color: Colorless to light yellow.

pH (1% soln/water): Acidic.

Boiling Point: 50.5°C (122.9°F)

Melting Point: -46.2°C (-51.2°F) to -25.4 C

Critical Temperature: Not available.

Specific Gravity: 1.19 (Water = 1)

Vapor Pressure: 16 kPa (@ 20°C) average

Vapor Density: 1.267 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.25 to 10 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility: Soluble in cold water, hot water, diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, water

Incompatibility with various substances:
Highly reactive with metals. Reactive with oxidizing agents, organic materials, alkalis, water.

Corrosivity:
Extremely corrosive in presence of aluminum, of copper, of stainless steel(304), of stainless steel(316). Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Reacts with water especially when water is added to the product. Absorption of gaseous hydrogen chloride on mercuric sulfate becomes violent @ 125 deg. C. Sodium reacts very violently with gaseous hydrogen chloride. Calcium phosphide and hydrochloric acid undergo very energetic reaction. It reacts with oxidizers releasing chlorine gas. Incompatible with, alkali metals, carbides, borides, metal oxides, vinyl acetate, acetylides, sulphides, phosphides, cyanides, carbonates. Reacts with most metals to produce flammable Hydrogen gas. Reacts violently (moderate reaction with heat of evolution) with water especially when water is added to the product. Isolate hydrogen chloride from heat, direct, alkalies (reacts vigorously), organic materials, and oxidizers (especially nitric acid and chlorates), amines, metals, copper and alloys (e.g. brass), hydroxides, zinc (galvanized materials), lithium silicide (incandescence), sulfuric acid(increase in temperature and pressure) Hydrogen chloride gas is emitted when this product is in contact with sulfuric acid. Adsorption of Hydrochloric Acid onto silicon dioxide results in exothmeric reaction. Hydrogen chloride causes aldehydes and epoxides to violently polymerize. Hydrogen chloride or Hydrochloric Acid in contact with the folloiwng can cause explosion or ignition on contact or other violent/vigorous reaction: Acetic anhydride, Alcohols + hydrogen cyanide, Aluminum, Aluminum phosphide, Aluminum-titanium alloys (with HCl vapor), 2-Amino ethanol, Ammonium, Ammonium hydroxide, 1,4-Benzoquinone diimine, Calcium acetylide (incandescence upon warming), Calcium carbide, Calcium phosphide, Carbon tetrachloride + silver perchlorate (produce trichlormethyl

perchlorate), Cesium acetylene carbide, Cesium carbide, Cesium telluroacylates, Chlorine + dinitroanilines (evolves gas), Chloroacetaldehyde oxime, Chlorosulfonic acid, Cyanogen chloride (when catalyzed by HCl), 1,1-Difluoroethylene, Dinitroanilines, Ethylene, Ethylene diamine, Ethyl 2-formylpropionate oxime (when generated by using HCl as a catalyst),

Special Remarks on Corrosivity:
Highly corrosive. Incompatible with copper and copper alloys. It attacks nearly all metals (mercury, gold, platinium, tantalum, silver, and certain alloys are exceptions). It is one of the most corrosive of the nonoxidizing acids in contact with copper alloys. No corrosivity data on zinc, steel. Severe Corrosive effect on brass and bronze

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
Acute oral toxicity (LD50): 900 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 1108 ppm, 1 hours [Mouse]. Acute toxicity of the vapor (LC50): 3124 ppm, 1 hours [Rat]. (Hydrochloric Acid)

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Hydrochloric acid]. May cause damage to the following organs: kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, Circulatory System, teeth.

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

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Doses (LDL/LCL) LDL [Man] -Route: Oral; 2857 ug/kg LCL [Human] - Route: Inhalation; Dose: 1300 ppm/30M LCL [Rabbit] - Route: Inhalation; Dose: 4413 ppm/30M

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (fetoxicity). May affect genetic material.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Corrosive. Causes severe skin irritation and burns. Eyes: Corrosive. Causes severe eye irritation/conjuntivitis, burns, corneal necrosis. Inhalation: May be fatal if inhaled. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract. Inhalation of hydrochloric acid fumes produces nose, throat, and larryngeal burning, and irritation, pain and inflammation, coughing, sneezing, choking sensation, hoarseness, laryngeal spasms, upper respiratory tract edema, chest pains, as well has headache, and palpitations. Inhalation of high concentrations can result in corrosive burns, necrosis of bronchial epithelium, constriction of the larynx and bronchi, nasospetal perforation, glottal closure, occur, particularly if exposure is prolonged. May affect the liver. Ingestion: May be fatal if swallowed. Causes irritation and burning, ulceration, or perforation of the gastrointestinal tract and resultant peritonitis, gastric hemorrhage and infection. Can also cause nausea, vomitting (with "coffee ground" emesis), diarrhea, thirst, difficulty swallowing, salivation, chills, fever, uneasiness, shock, strictures and stenosis (esophogeal, gastric, pyloric). May affect behavior (excitement), the cardiovascular system (weak rapid pulse, tachycardia), respiration (shallow respiration), and urinary system (kidneys-renal failure, nephritis). Acute exposure via inhalation or ingestion can also cause erosion of tooth enamel. Chronic Potential Health Effects: Prolonged or repeated inhalation and/or ingestion may affect liver, bleeding of nose and gums, nasal and oral mucosal ulceration, conjunctivitis, respiratory tract (changes in pulmonary function, chronic bronchitis, overt respiratory tract abnormalities), teeth (yellowing of teethand erosion of tooth enamel), kidneys, and behavior (muscle contraction or spasticity). Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated eye contact with vapor/mist can cause conjunctivitis dyspnea, bronchitis. Chemical pneumonitis and pulmonary edema can also

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

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

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

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

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Hydrochloric acid, solution UNNA: 1789 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Hydrochloric acid Illinois toxic substances disclosure to employee act: Hydrochloric acid Illinois chemical safety act: Hydrochloric acid New York release reporting list: Hydrochloric acid Rhode Island RTK hazardous substances: Hydrochloric acid Pennsylvania RTK: Hydrochloric acid Minnesota: Hydrochloric acid Massachusetts RTK: Hydrochloric acid Massachusetts spill list: Hydrochloric acid New Jersey: Hydrochloric acid New Jersey spill list: Hydrochloric acid Louisiana RTK reporting list: Hydrochloric acid Louisiana spill reporting: Hydrochloric acid California Director's List of Hazardous Substances: Hydrochloric acid TSCA 8(b) inventory: Hydrochloric acid TSCA 4(a) proposed test rules: Hydrochloric acid SARA 302/304/311/312 extremely hazardous substances: Hydrochloric acid SARA 313 toxic chemical notification and release reporting: Hydrochloric acid CERCLA: Hazardous substances.: Hydrochloric acid: 5000 lbs. (2268 kg)

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

Other Classifications:

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

DSCL (EEC):
R25- Toxic if swallowed. R26- Very toxic by inhalation. R34- Causes burns. S1/2- Keep locked up and out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S28- After contact with skin, wash immediately with plenty of [***] S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 1

Personal Protection:

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

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Methyl alcohol MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl alcohol

Catalog Codes: SLM3064, SLM3952

CAS#: 67-56-1

RTECS: PC1400000

TSCA: TSCA 8(b) inventory: Methyl alcohol

CI#: Not applicable.

Synonym: Wood alcohol, Methanol; Methylol; Wood Spirit; Carbinol

Chemical Name: Methanol

Chemical Formula: CH3OH

Contact Information:

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

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methyl alcohol	67-56-1	100

Toxicological Data on Ingredients: Methyl alcohol: ORAL (LD50): Acute: 5628 mg/kg [Rat]. DERMAL (LD50): Acute: 15800 mg/kg [Rabbit]. VAPOR (LC50): Acute: 64000 ppm 4 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer).
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Classified POSSIBLE for human.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to eyes.
The substance may be toxic to blood, kidneys, liver, brain, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), optic nerve.

Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 12°C (53.6°F). OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 6% UPPER: 36.5%

Products of Combustion: These products are carbon oxides (CO, CO2).

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

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Explosive in the form of vapor when exposed to heat or flame. Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition, it emits acrid smoke and irritating fumes. CAUTION: MAY BURN WITH NEAR INVISIBLE FLAME

Special Remarks on Explosion Hazards:
Forms an explosive mixture with air due to its low flash point.
Explosive when mixed with Choroform + sodium methoxide and diethyl zinc. It boils violently and explodes.

Section 6: Accidental Release Measures

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

Large Spill:
Flammable liquid. Poisonous liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals, acids.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 200 from OSHA (PEL) [United States]
TWA: 200 STEL: 250 (ppm) from ACGIH (TLV) [United States] [1999]
STEL: 250 from NIOSH [United States]

TWA: 200 STEL: 250 (ppm) from NIOSH SKIN
TWA: 200 STEL: 250 (ppm) [Canada]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Alcohol like. Pungent when crude.

Taste: Not available.

Molecular Weight: 32.04 g/mole

Color: Colorless.

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

Boiling Point: 64.5°C (148.1°F)

Melting Point: -97.8°C (-144°F)

Critical Temperature: 240°C (464°F)

Specific Gravity: 0.7915 (Water = 1)

Vapor Pressure: 12.3 kPa (@ 20°C)

Vapor Density: 1.11 (Air = 1)

Volatility: Not available.

Odor Threshold: 100 ppm

Water/Oil Dist. Coeff.: The product is more soluble in water; log(oil/water) = -0.8

Ionicity (in Water): Non-ionic.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources, incompatible materials

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

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizers. Violent reaction with alkyl aluminum salts, acetyl bromide, chloroform + sodium methoxide, chromic anhydride, cyanuirc chlorite, lead perchlorate, phosphorous trioxide, nitric acid.
Exothermic reaction with sodium hydroxide + chloroform.
Incompatible with beryllium dihydride, metals (potassium and magnesium), oxidants (barium perchlorate, bromine, sodium hypochlorite, chlorine, hydrogen peroxide), potassium tert-butoxide, carbon tetrachloride, alkali metals,

metals (aluminum, potassium magnesium, zinc), and dichlormethane.
Rapid autocatalytic dissolution of aluminum, magnesium or zinc in 9:1 methanol + carbon tetrachloride - sufficiently vigorous to be rated as potentially hazardous.
May attack some plastics, rubber, and coatings.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 5628 mg/kg [Rat].
Acute dermal toxicity (LD50): 15800 mg/kg [Rabbit].
Acute toxicity of the vapor (LC50): 64000 4 hours [Rat].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Classified POSSIBLE for human.
Causes damage to the following organs: eyes.
May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), optic nerve.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
Passes through the placental barrier.
May affect genetic material.
May cause birth defects and adverse reproductive effects(paternal and maternal effects and fetotoxicity) based on animal studies.

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 29400 mg/l 96 hours [Fathead Minnow].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation:
Methanol in water is rapidly biodegraded and volatilized. Aquatic hydrolysis, oxidation, photolysis, adsorption to sediment, and bioconcentration are not significant fate processes. The half-life of methanol in surfact water ranges from 24 hrs. to 168 hrs.
Based on its vapor pressure, methanol exists almost entirely in the vapor phase in the ambient atmosphere. It is degraded by reaction with photochemically produced hydroxyl radicals and has an estimated half-life of 17.8 days.
Methanol is physically removed from air by rain due to its solubility. Methanol can react with NO2 in pollulted to

form methyl nitrate.
The half-life of methanol in air ranges from 71 hrs. (3 days) to 713 hrs. (29.7 days) based on photooxidation half-life in air.

Section 13: Disposal Considerations

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Methyl alcohol UNNA: 1230 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Methyl alcohol
Illinois toxic substances disclosure to employee act: Methyl alcohol
Illinois chemical safety act: Methyl alcohol
New York release reporting list: Methyl alcohol
Rhode Island RTK hazardous substances: Methyl alcohol
Pennsylvania RTK: Methyl alcohol
Minnesota: Methyl alcohol
Massachusetts RTK: Methyl alcohol
Massachusetts spill list: Methyl alcohol
New Jersey: Methyl alcohol
New Jersey spill list: Methyl alcohol
Louisiana spill reporting: Methyl alcohol
California Directors List of Hazardous Substances (8CCR 339): Methyl alcohol
Tennesse Hazardous Right to Know : Methyl alcohol
TSCA 8(b) inventory: Methyl alcohol
SARA 313 toxic chemical notification and release reporting: Methyl alcohol
CERCLA: Hazardous substances.: Methyl alcohol: 5000 lbs. (2268 kg)

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

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).
Class D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable.
R23/24/25- Toxic by inhalation, in contact with skin and if swallowed.
R39- Danger of very serious irreversible effects. R39/23/24/25- Toxic: danger of very serious

irreversible effects through inhalation,
in contact with skin and if swallowed.
S7- Keep container tightly closed.
S16- Keep away from sources of ignition - No smoking.
S36/37- Wear suitable protective clothing and gloves.
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References:
-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-Material safety data sheet emitted by: la Commission de la SantÃ© et de la SÃ©curitÃ© du Travail du QuÃ©bec.
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
LOLI, HSDB, RTECS, HAZARDTEXT, REPROTOX databases

Other Special Considerations: Not available.

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Last Updated: 10/10/2005 08:23 PM

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Material Data Safety Sheet (MSDS):

NITRIC ACID

Note: This information sheet has been re-formatted for better clarity by the Department of Earth Sciences. Some of the data such as information on shipping and weapons treaties were intentionally left out. If you want to look at the complete MSDS, you can either check one of the hardcopy versions in the Department, contact the manufacturer, or check one of the various Web-based databases such as those compiled by BU's Office of Environmental Health & Safety

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1. Product Identification

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

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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

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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.

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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.

---

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/m3; 4 ppm STEL; 10 mg/m3 STEL	2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH	2 ppm TWA; 5 mg/m3 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.

---

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:
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.

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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.

-----MATERIAL SAFETY DATA SHEET-----

pH 4 Calibrating Buffer

Compliance Technology Inc. 118 Starlite St. So. San Francisco, CA 94080-6310	Prepared: February 20, 1996 Revised: February 14, 2000

----- NOTICE-----

This information is believed to be accurate and represents the best information currently available to us. however, we make no warranty of merchantability, or fitness for any particular use, or any other warranty, express or implied, with respect to this information, and we assume no liability resulting from the use of this information. Users should make their own investigations to determine the suitability of the information for their particular needs and purposes. Compliance Technology Inc. will assist in this regard.

-----SUBSTANCE IDENTIFICATION-----

SUBSTANCE: pH 4 Calibrating Buffer Solution
Trade names/synonyms: This material is also known by various catalog numbers.
Cercla ratings (scale 0-3): health=0 fire=0 reactivity=0 persistence=0
Nfpa ratings (scale 0-4): health=0 fire=0 reactivity=0

-----COMPONENTS AND CONTAMINANTS---

Component: potassium hydrogen phthalate CAS# 877-24-7 Percent: <2.0
Component: water CAS# 7732-18-5 percent: >98
Other contaminants: none

----- EXPOSURE LIMITS-----

No occupational exposure limits established by osha, acgih or niosh.

-----PHYSICAL DATA-----

Description:
Clear, colorless liquid. May be colored red for identification.
Approx. boiling point: 212°F (100°C). Approx. melting point: 32°F (0°C)
Vapor pressure: 14 torr @20°C Evap. Rate: (ether=1) < 1
pH: 4.0 Solubility in water: complete Vapor density: 0.7 (H2O)

-----FIRE AND EXPLOSION DATA-----

Fire and explosion hazard: No fire hazard when exposed to heat or flame.
Flash point: not applicable
Fire fighting media: dry chemical, carbon dioxide, water spray or regular foam. (1990 emergency response guidebook, dot p-5800.5) For larger fires, use water spray, fog or regular foam. (1990 emergency response guidebook, dot p-5800.5)
Fire fighting: Move container from fire area if it can be done without risk. Do not scatter spilled material with high-pressure water streams. Dike fire-control water for later disposal . (1990 emergency response guidebook, dot p-5800.5 Pg. 31) Use agents suitable for the type

of surrounding fire. Avoid breathing hazardous vapors, stay upwind of the fire.

-----TOXICITY-----

potassium hydrogen phthalate:
Carcinogen status: none.
Local effects: irritant - inhalation, skin, eye.
Acute toxicity level: no data available.
Target effects: no data available.
medical conditions aggravated by exposure: no data available.

-----HEALTH EFFECTS AND FIRST AID-----

INHALATION

POTASSIUM HYDROGEN PHTHALATE: IRRITANT.
ACUTE EXPOSURE - MAY CAUSE IRRITATION.
CHRONIC EXPOSURE - REPEATED OR PROLONGED EXPOSURE MAY CAUSE IRRITATION.
FIRST AID - REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

POTASSIUM HYDROGEN PHTHALATE: IRRITANT.
ACUTE EXPOSURE - MAY CAUSE IRRITATION.
CHRONIC EXPOSURE - REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
FIRST AID - REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY, WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

POTASSIUM HYDROGEN PHTHALATE: IRRITANT.
ACUTE EXPOSURE-DIRECT CONTACT MAY CAUSE IRRITATION, REDNESS AND PAIN.
CHRONIC EXPOSURE-REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS
FIRST AID - WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION

POTASSIUM HYDROGEN PHTHALATE: IRRITANT.
ACUTE EXPOSURE - MAY CAUSE NAUSEA, VOMITING AND DIARRHEA.
CHRONIC EXPOSURE - NOT REPORTED TO OCCUR IN HUMANS

FIRST AID - IF VICTIM IS CONSCIOUS, IMMEDIATELY GIVE 2-4 GLASSES OF WATER, AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT, GET MEDICAL ATTENTION IMMEDIATELY.

-----REACTIVITY-----

Reactivity: stable under normal temperatures and pressures.
Incompatibilities: AFFECTED BY STRONG OXIDIZERS WHEN DRY.
Decomposition: NONE KNOWN WHILE IN SOLUTION.
Polymerization: NONE KNOWN WHILE IN SOLUTION.

-----STORAGE AND DISPOSAL-----

Observe all federal, state and local regulations when storing or disposing of this substance. for assistance, contact the district director of the environmental protection agency.

-----PROTECTIVE EQUIPMENT-----

When using, wear eye protection to prevent contact.

-----MATERIAL SAFETY DATA SHEET-----

pH 7 Calibrating Buffer

Compliance Technology Inc. 118 Starlite St. So. San Francisco, CA 94080-6310	Prepared: May 11, 1992 Revised: February 14, 2000

----- NOTICE-----

This information is believed to be accurate and represents the best information currently available to us. however, we make no warranty of merchantability, or fitness for any particular use, or any other warranty, express or implied, with respect to this information, and we assume no liability resulting from the use of this information. Users should make their own investigations to determine the suitability of the information for their particular needs and purposes. Compliance Technology Inc. will assist in this regard.

-----SUBSTANCE IDENTIFICATION-----

SUBSTANCE: ---pH 7.000 Calibrating Buffer---
Trade names/synonyms: This material is also known by various catalog numbers.
Cercla ratings (scale 0-3): health=0 fire=0 reactivity=0 persistence=0
Nfpa ratings (scale 0-4): health=0 fire=0 reactivity=0
SARA Title III (§ 313) Not Available.

-----COMPONENTS AND CONTAMINANTS---

Component: potassium phosphate, monobasic CAS# 7778-77-0 percent: <1.0
Component: sodium phosphate, dibasic CAS# 7558-79-4 percent: <0.2
Component: water CAS# 7732-18-5 percent: >98.
Other contaminants: none

----- EXPOSURE LIMITS-----

No occupational exposure limits established by osha, acgih or niosh.

-----PHYSICAL DATA-----

Description:
Clear, colorless liquid which may be color coded for user convenience according to pH.
Approx. boiling point: 212°F (100°C). Approx. melting point: 32°F (0°C)
Vapor pressure: 14 torr @20°C Evap. Rate: (ether=1) >1
pH: 7.0 Solubility in water: complete Vapor density: 0.7 (H2O)

-----FIRE AND EXPLOSION DATA-----

Fire and explosion hazard: negligible fire hazard when exposed to heat or flame.
Flash point: not applicable
A media: dry chemical, carbon dioxide, water spray or regular foam. (1990 emergency response guidebook, dot p-5800.5) For larger fires, use water spray, fog or regular foam. (1990 emergency response guidebook, dot p-5800.5)
A: Move container from fire area if it can be done without risk. Do not scatter spilled

material with high-pressure water streams. Dike fire-control water for later disposal. (1990 emergency response guidebook, dot p-5800.5 Pg. 31) Use agents suitable for the type of surrounding fire. Avoid breathing hazardous vapors, stay upwind of the fire.

-----TOXICITY-----

potassium phosphate, monobasic; sodium phosphate, dibasic:
Carcinogen status: none.
Local effects: irritant - inhalation, skin, eye.
Acute toxicity level: no data available.
Target effects: no data available.
medical conditions aggravated by exposure: no data available.

-----HEALTH EFFECTS AND FIRST AID-----

INHALATION

SODIUM & POTASSIUM PHOSPHATE: IRRITANT.
ACUTE EXPOSURE - MAY CAUSE IRRITATION.
CHRONIC EXPOSURE - REPEATED OR PROLONGED EXPOSURE MAY CAUSE IRRITATION.
FIRST AID - REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

SODIUM & POTASSIUM PHOSPHATE: IRRITANT.
ACUTE EXPOSURE - MAY CAUSE IRRITATION.
CHRONIC EXPOSURE - REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
FIRST AID - REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY, WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

SODIUM & POTASSIUM PHOSPHATE: IRRITANT.
ACUTE EXPOSURE-DIRECT CONTACT MAY CAUSE IRRITATION, REDNESS AND PAIN.
CHRONIC EXPOSURE-REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS
FIRST AID - WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION

SODIUM & POTASSIUM PHOSPHATE: IRRITANT.
ACUTE EXPOSURE - MAY CAUSE NAUSEA, VOMITING AND DIARRHEA.

CHRONIC EXPOSURE - NOT REPORTED TO OCCUR IN HUMANS
FIRST AID - IF VICTIM IS CONSCIOUS, IMMEDIATELY GIVE 2-4 GLASSES OF WATER, AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT, GET MEDICAL ATTENTION IMMEDIATELY.

-----REACTIVITY-----

Reactivity: stable under normal temperatures and pressures.
Incompatibilities: none known. Decomposition: none known. Polymerization: none known.

-----STORAGE AND DISPOSAL-----

Observe all federal, state and local regulations when storing or disposing of this substance.
For assistance, contact the district director of the environmental protection agency.
Storage conditions to avoid: store away from incompatible substances.
Water spills: The California safe drinking water and toxic enforcement act of 1986 (prop 65) prohibits contaminating any known source of drinking water with substances known to cause cancer and/or reproductive toxicity.
Occupational spill: Stop leak if you can do it without risk. For small spills, take up with sand or other absorbent materials and place into clean, dry containers for later disposal.

-----PROTECTIVE EQUIPMENT-----

When using, wear eye protection to prevent contact.

APPENDIX E

SITE SAFETY ORIENTATION FORM

SITE SAFETY ORIENTATION

Project:_____ Site:_____

Project Number:_____ Date:_____

All applicable items listed below are to be reviewed on the first day of site activities and when new workers arrive on site. Training provider, please initial each item covered in the training, or note "NA" as applicable.

General Supervisor: ..... _____

Site Health and Safety Supervisor (SHSS): ..... _____

Employees' direct supervisor:..... _____

Location of HASP and MSDS on site:..... _____

Review of Contents of HASP: ..... _____

HAZCOM labeling system if different from Local Operation: ..... _____

Site-specific medical surveillance requirements:..... _____

Site control measures (location of exclusion zone, etc.):..... _____

Safety and health hazards on site: ..... _____

The Level of Protection and specific PPE to be used: ..... _____

Work practices to be used on site to minimize exposure:..... _____

Decontamination procedures: ..... _____

How to effectively use site/task engineering controls: ..... _____

Applicable elements of the site emergency response plan:..... _____

Any other site-specific health and safety related requirements: ..... _____

Verify that workers have provided documentation of training and medical monitoring as identified Table 3-1.

Participating employees must print and sign their name in the spaces provided below:

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

APPENDIX F

DAILY TAILGATE SAFETY MEETING CHECKLIST

AMEC ENVIRONMENT & INFRASTRUCTURE

DAILY TAILGATE SAFETY MEETING CHECKLIST

Project: _____ Site: _____

Date: Location:

To be reviewed on the first day of site activities and when new workers arrive on site:

Alternate for Health & Safety: _____

Location of on-site HASP: _____

Site training requirements: See HASP

Specific medical surveillance requirements: See HASP

Agenda:

During the project, one or more of the agenda items could be selected for the required daily site training.

		Date						
		___	___	___	___	___	___	___
		Check-off:						
1.	Planned work for this day (discuss – include review of applicable JHAs)	☐	☐	☐	☐	☐	☐	☐
2.	Physical hazards and controls (discuss/review)	☐	☐	☐	☐	☐	☐	☐
3.	Chemical hazards and controls (discuss/review)	☐	☐	☐	☐	☐	☐	☐
4.	Biological hazards and controls (discuss/review)	☐	☐	☐	☐	☐	☐	☐
5.	Personal protective equipment Modified D	☐	☐	☐	☐	☐	☐	☐
6.	Personal protective equipment required per the hazard assessment in JHA:	☐	☐	☐	☐	☐	☐	☐

SPECIFY TYPE	
Protective coveralls	
Safety glasses/goggles	ANSI approved
Hard hat	ANSI approved
Foot protection	Safety toe boots & overboots
Work gloves	
Chemical gloves	Neoproene outer, nitrile inner
Hearing protection	
Other	

7.	Review inspection, decon, and maintenance procedures and the limitations of the above stated PPE.	☐	☐	☐	☐	☐	☐	☐
8.	Decontamination procedure (discuss/review)	☐	☐	☐	☐	☐	☐	☐
9.	Exclusion zone maintained	☐	☐	☐	☐	☐	☐	☐
10.	Site emergency response plan (discuss/review)	☐	☐	☐	☐	☐	☐	☐
11.	Signs and symptoms of overexposure to chemicals anticipated on site	☐	☐	☐	☐	☐	☐	☐
12.	General health and safety rules	☐	☐	☐	☐	☐	☐	☐
13.	Specific health and safety requirements relating to site activities including: (discuss/review)	☐	☐	☐	☐	☐	☐	☐
14.	Drilling/boring	☐	☐	☐	☐	☐	☐	☐
15.	UST	☐	☐	☐	☐	☐	☐	☐
16.	Excavations (including UG utility locations)	☐	☐	☐	☐	☐	☐	☐
17.	Heavy equipment	☐	☐	☐	☐	☐	☐	☐
18.	Slips, trips, and falls	☐	☐	☐	☐	☐	☐	☐
19.	Lockout/tagout	☐	☐	☐	☐	☐	☐	☐
20.	Working in temperature extremes	☐	☐	☐	☐	☐	☐	☐
21.	Rain or other weather advisories	☐	☐	☐	☐	☐	☐	☐
22.	Other health & safety issues (discuss/note)	☐	☐	☐	☐	☐	☐	☐
23.	Issued Daily Work Permit	☐	☐	☐	☐	☐	☐	☐

AMEC ENVIRONMENT & INFRASTRUCTURE

DAILY TAILGATE SAFETY MEETING CHECKLIST

I have participated in the daily safety meeting discussing the topics indicated on the reverse and fully understand my responsibility for complying with all health and safety requirements. I have had the opportunity to have my questions on site health and safety issues and procedures answered.

Employee Name	Employee Signature	Date

_____ _____

Name and Signature of person conducting training Date

APPENDIX G

WEEKLY HEALTH AND SAFETY CHECKLIST

WEEKLY SITE SAFETY AND HEALTH CHECKLIST

Site: _____ **Date:** _____

Project Number: _____ **Project Manager:** _____

Conducted by: _____

Names of AMEC employee's onsite: _____

	Y	N	NA
HASP, Training and Documentation:			
1. Are emergency phone numbers posted?	☐	☐	☐
2. Are directions to the nearest emergency medical care posted?	☐	☐	☐
3. Is the OSHA Poster posted?	☐	☐	☐
4. Is there a SSHP at the site?	☐	☐	☐
a. Is it current and address all tasks?	☐	☐	☐
b. Does it address all know/suspected hazards?	☐	☐	☐
c. Are JHAs included for all tasks?	☐	☐	☐
d. Are employees following the procedures as outlined in the JHAs?	☐	☐	☐
e. Is it approved?	☐	☐	☐
f. Have all field members signed off that they have read it?	☐	☐	☐
5. Are there MSDSs for required materials/chemicals brought to the site?	☐	☐	☐
6. Are all containers properly labeled, as to content, hazard?	☐	☐	☐
7. Is there list of chemicals brought to the site? Do the names on the list match the name on the label and MSDS?	☐	☐	☐
8. Do applicable workers have their 40-hour initial training and are current in their refreshers?	☐	☐	☐
9. Do the Field Lead and Health and Safety Officer have Supervisory training?	☐	☐	☐
10. Are all applicable workers current in their physicals?	☐	☐	☐
11. Are Tailgate Safety Meetings taking place and documented?	☐	☐	☐
12. Are there means to minimize heat or cold stress on-site?	☐	☐	☐
13. Is eating, drinking, smoking, etc. only done in areas free from toxic materials?	☐	☐	☐
14. Are two people used to lift equipment or materials weighting more than 50 lbs.?	☐	☐	☐
15. Are the locations of electrical power lines and other utilities identified prior to digging or drilling?	☐	☐	☐
PPE and Monitoring Instruments:			
16. Does the PPE being worn match what is required in the HASP and JHAs?	☐	☐	☐
17. Is hearing protection worn when noise makes conversation difficult at a distance of 2 feet?	☐	☐	☐
18. Are approved respirators and cartridges worn when needed?	☐	☐	☐
a. Are cartridges changed daily, unless specified otherwise in the HASP?	☐	☐	☐
b. Are cartridges appropriate for the contaminants at the site?	☐	☐	☐
19. Are all air monitoring instruments identified in the HASP being used and calibrated daily, as required?	☐	☐	☐
a. Do employees know upgrade/downgrade action levels?	☐	☐	☐
First Aid:			
20. Are there eyewash bottles on-site? Solution not expired?	☐	☐	☐
21. Are first aid kits on-site and adequately stocked (including bloodborne pathogen equipment)?	☐	☐	☐
22. Is there always at least one person on site current in their first aid/CPR training?	☐	☐	☐
Fire Safety:			
23. Is there a charged fire extinguisher on-site?	☐	☐	☐
a. Have AMEC workers, who would use extinguishers, received fire extinguisher training in past year?	☐	☐	☐
b. Are fire extinguishers visually inspected monthly and are the inspections documented?	☐	☐	☐
c. Have fire extinguishers been professionally inspected within the past year?	☐	☐	☐
24. Are flammable liquids (e.g., gasoline) being stored safety (e.g., in safety cans and 20 feet from combustibles)?	☐	☐	☐
25. Are flammable liquid dispensing systems bonded (metal to metal)?	☐	☐	☐
Compressed Gas:			
26. Are cylinders stored in a secure manner, with caps on, upright and protected from damage?	☐	☐	☐
27. Are cylinders protected from snow, rain, etc.?	☐	☐	☐
28. Are cylinder caps in place before cylinders are moved?	☐	☐	☐
29. Are fuel gas and oxygen cylinders stored a minimum of 20 feet apart?	☐	☐	☐
30. Are propane cylinders stored and used only outside of buildings?	☐	☐	☐
Vehicles:			
31. Are employees wearing their seat belts and not talking on cell phones while car is in motion?	☐	☐	☐
32. Do Company vehicles have the "How's my Driving" decals?	☐	☐	☐
33. Are vehicles parked in a safe manner? Are traffic cones used, if required?	☐	☐	☐

	Y	N	NA
34. Are company vehicle inspected weekly and the inspections documented?	☐	☐	☐
35. Are materials stored in vehicles in a neat, orderly and secure manner so that they won't become a distraction to the driver, become a projectile hazard in the event of a sudden stop or crash or fall from the vehicle when in transport?	☐	☐	☐
Electrical:			
36. Is at least a 10 foot clearance maintained between equipment and power lines?	☐	☐	☐
37. Are all electrically operated tools grounded?	☐	☐	☐
38. Are GFCI's used?	☐	☐	☐
39. Are exposed wiring and cords in good condition (not frayed or deteriorated)?	☐	☐	☐
40. Do extension cords have a grounding conductor?	☐	☐	☐
41. Are extension cords only used in one continuous length (not daisy chained)?	☐	☐	☐
42. Are extension cords kept out of wet areas?	☐	☐	☐
43. Has a lockout/tagout system been established, if required?	☐	☐	☐
Hand and Power Tools:			
44. Are tools and equipment used by employees in good condition or tagged out of service?	☐	☐	☐
45. Are guards and safety devices in place on power tools?	☐	☐	☐
Walking and Working Surfaces:			
46. Do stairways into trailers/buildings that have 4 steps or more, have hand rails?	☐	☐	☐
47. Is good housekeeping being maintained at the site?	☐	☐	☐
48. Are all ladders in good condition, stored against damage and properly secured when in use?	☐	☐	☐
49. Are approved manlifts provided for the lifting of personnel (e.g., cherry pickers, scissor lifts, etc.)?	☐	☐	☐
50. Are personnel in manlifts wearing approved fall protection devices when required?	☐	☐	☐
51. Is fall protection used when working at elevations greater than 6 feet?	☐	☐	☐
52. Are ladders inspected prior to use?	☐	☐	☐
53. Are all ladders in good condition and defective ladders tagged out of service?	☐	☐	☐
Scaffolding:			
54. Is scaffolding placed on a flat, firm surface?	☐	☐	☐
55. Are scaffold planks free of mud, ice, grease, etc.?	☐	☐	☐
56. On scaffolds where platforms are overlapped, is planking overlapped a minimum of 12 inches?	☐	☐	☐
57. Does scaffold planking extend over end supports between 6 to 18 inches (dependent upon platform length)?	☐	☐	☐
58. Are employees restricted from working on scaffolds during storms and high winds?	☐	☐	☐
59. Is required perimeter guarding (top rail, mid rail, and toe board) present?	☐	☐	☐
60. Has a competent person been designated to oversee scaffold construction and inspect daily?	☐	☐	☐
Excavations:			
61. Has entrance into excavations greater than 4 feet deep prohibited unless the following precautions are taken?	☐	☐	☐
a. The sides of excavations sloped or shored to prevent cave ins if over 5 feet deep?	☐	☐	☐
b. Excavations greater than 4 feet deep been monitored for hazardous atmospheres (i.e., LEL/O2)?	☐	☐	☐
c. Ladders or ramps used in excavations over 4 feet deep?	☐	☐	☐
d. Means of egress available so as to require no more than 25 feet of lateral travel?	☐	☐	☐
e. Excavation inspected daily by competent persons and documented?	☐	☐	☐
62. Is excavated material placed a minimum of 24 inches from the excavation?	☐	☐	☐
Heavy Equipment:			
63. Is heavy equipment shut down for fueling and maintenance?	☐	☐	☐
64. Are backup alarms installed and working on mobile equipment?	☐	☐	☐
65. Are riders prohibited on heavy equipment?	☐	☐	☐
66. Are guards and safety appliances in place and used?	☐	☐	☐
67. Are operators using the "three point" system when mounting/dismounting equipment?	☐	☐	☐
Confined Space Entry:			
68. Are there confined spaces at the site that AMEC will be entering? If yes:	☐	☐	☐
a. Is the permit completely filled out and approved prior to entry?	☐	☐	☐
b. Are confined spaces thoroughly emptied of the hazardous substances prior to entry?	☐	☐	☐
c. Is ventilation provided prior to entry?	☐	☐	☐
d. Is air within the confined space tested for oxygen deficiency, LEL and toxic substances in that order?	☐	☐	☐
e. Is there an assigned safety standby outside the space who is adequately trained?	☐	☐	☐
f. Has a rescue plan been established?	☐	☐	☐
g. Is an entry supervisor present at each permit-required entry?	☐	☐	☐
h. Are required extraction/fall protection devices being used?	☐	☐	☐

WEEKLY SITE SAFETY AND HEALTH CHECKLIST

	Y	N	NA
Decontamination:			
69. Are decontamination stations set up on site?	☐	☐	☐
70. Is decontamination water properly contained and disposed of?	☐	☐	☐
71. Are all pieces of equipment inspected for proper decontamination before leaving the site?	☐	☐	☐
Working on or Near Water:			
72. Has a float plan been filed if working from a boat?	☐	☐	☐
73. Are personal floatation devices available and being used?	☐	☐	☐
74. Are Coast Guard requirements being followed when boating on navigable waters?	☐	☐	☐

Notes

Findings	Corrected on
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

APPENDIX H

SPILL CONTAINMENT PLAN

Spill Control Plan

Project activities will occur on or within close proximity to the Kalamazoo River, Michigan. Typical construction chemicals are supplied in small quantities such as paints, solvents, glue etc. Gasoline will be stored in 5 gallon safety cans. Contractors may have above ground Diesel Fuel tanks for equipment.

Responsibility

- The Superintendent and the SSHO will be responsible for implementing and supervising the containment and cleanup and will follow up with complete documentation.

Detecting a Chemical Discharge

All chemical spills regardless of size shall be reported to the Superintendent, the SSHO

- There are many indicators that a chemical discharge might have occurred. These indicators include visible leaks, drips and stains, odors, eye / nose / throat irritations, dizziness, blurred vision, observation of spilled liquids.

- When a chemical discharge is detected, follow this Emergency Plan.

Response to the Event of a Chemical Discharge

- Care for the injured and evacuate personnel

- Call the Fire Department 911 if any employees are injured

- Call the State of Michigan Pollution Emergency Alerting System (PEAS) if impact to the environment is possible (800-292-4706) and federal authorities 800-424-8802 (National Response Center)

The local Fire and Police departments will coordinate with the local emergency medical service (EMS) to provide emergency medical treatment and transportation.

Evacuation

Evacuate all non essential workers from the immediate area of the chemical release. The immediate area of the release where adverse health effects may exist should only be entered by trained personnel who are wearing the required personal protection equipment, using approved cleanup equipment and possessing specific knowledge of the problem or situation.

If it becomes necessary to evacuate the jobsite due to imminent danger, the employees and all visitors are to proceed to an area deemed to be safe. At which time all employees and visitors will be accounted for by Project Staff and Subcontractor Foremen. All employees and visitors will remain in the area until directed by the team coordinators

Evaluate the situation

Under the direction of the Emergency Coordinators the situation should be assessed and evaluated. The following are some of the concerns that should be considered in the assessment and evaluation

- What is the source of the release?
- What is the size and nature of the release?
- What are the chemicals that were spilled?
- Use the Material Safety Data Sheets (MSDS) to identify the hazards associated with that chemical.
- Use the MSDS to identify Proper Personal Protection Equipment
- What is the extent of the effected area?
- Is there danger of flammability hazard?
- Is there danger of an explosion hazard?
- Are there hazards to human health?
- Are there hazards to the environment?
- What are the wind velocity and direction?
- What are the surrounding topography and adjacent exposures?
- Have the conditions that caused the discharge stopped? If not can the source be stopped?
- Does the runoff pose a danger to response team or existing building
- Are the employees and equipment available and sufficient to control the discharge?

If the incident appears to have the potential to cause minimum danger to life and property or the incident can be resolved by the contractor, the incident will be reported to the client.

If the incident appears to cause moderate danger to life or property and the problem is currently limited to the project property, but does have potential for migration off site and effecting employee or public health. The incident will be reported to the local fire department hazardous materials team, and client.

If the incident appears to have the potential to cause extreme danger to life, property and the environment and the problem goes beyond the project property and may directly impact the public/ employee health, safety and the environment or a large geographic area for an extended period of time. The incident will be reported to the local fire department hazardous materials team, client, and any pertinent government agencies.

All Incidents will be reported to the client immediately, by a member of the Contractor Team.

Call for Assistance

- Do not delay in requesting additional assistance if conditions appear to be deteriorating.

    1. **Contact the Emergency Coordinator.** For petroleum bases spills or other low hazardous chemicals the EC will be the SSHO. For more dangerous spills such as natural gas leaks, acid, etc an EC will be appointed/assigned by the responding organization. The Emergency Coordinator is a management level person with the authority to assemble a response team who is trained to respond to chemical spills, make notifications, initiate cleanup activities, commit the necessary resources during an emergency and ensure the proper disposal of wastes.

    2. **Contact the fire department and police department as appropriate:** The fire department is knowledgeable of the types of chemicals and wastes on-site and the potential hazards. The fire department, who will be the on-scene coordinator in an emergency, is staffed with properly trained members to handle chemical disasters (i.e., Hazardous Material Team).

3. **Make all proper and prompt notifications to State and Federal regulatory Authorities as appropriate**. Call the State of Michigan Pollution Emergency Alerting System (PEAS) if impact to the environment is possible (800-292-4706) and federal authorities 800-424-8802 (National Response Center)

Methods and Procedures for Expeditious Containment Cleanup

- Implement immediate control or countermeasures. Employees who have received appropriate training may respond for the purpose of protecting nearby persons, property or the environment from the effects of the release. Their only response will be defensive in nature without actually attempting to approach the point of discharge to stop it.

- Utilize emergency collection devices and diking materials to preclude movement of the hazardous materials from one area to the next. Contain and isolate the spill.

- Prevent all spilled material from reaching a surface water body, ditch and any storm or sanitary drains or the ground.
    - Cover nearby storm drains.
    - Erect berms to prevent potential run off from reaching drains.

- Coordinate activities with the fire department and regulatory agencies. Employees should not engage in any activity that would present an actual or potential inhalation hazard from the discharged material, which would require the use of respiratory protection.

Prevent fires, explosions and releases from spreading to other areas of the facility by stopping processes and operations, collecting and containing released product, removing or isolating containers and treating, storing and disposing of a product incompatible with the released material away from the released material.

Summary of Material Safety Data Sheet Information

- Each contractor shall maintain a chemical inventory on site.

- Material Safety Data Sheets for all chemicals stored, handled, and used at the facility should be maintained in the workplace. This information should be available to all employees.

- Chemical Inventory and MSDS for all onsite chemicals will be updated as construction and subcontractors progress. The Chemical Inventory list can be found in Contractor's HAZCOM Manual located in the construction trailer.

Monitoring Procedures

- Daily safety inspections will include inspection of chemical storage areas

Training

- All contractor and subcontractor employees should be HAZWOPER trained personnel.

- Subcontractor personnel will be trained during preconstruction meetings. Task specific spill containment training will be performed at toolbox talks.

List of Materials/Equipment To Be Maintained Onsite by Contractor Supervisor Available for Hazardous Material Containment (Located with Supervisor)

- Spill Containment Kit (SPC Attack Pack)
- Backhoe
- Polyurethane Plastic Sheeting

Description of Chemical Storage Areas

- All fuel
    - Will be store in a double wall tank
    - Will be bermed to contain a possible spill
        - Each tank berm shall be calculated to be able to catch the possible release of all its contents.
    - Lined with polyurethane to prevent soil contamination
    - A 20 LB fire extinguisher located not closer than 25 feet nor more than 75 feet from the tank
    - The tank shall be labeled with no smoking signs

- Paint Products
    - Will be stored in a designated paint room.
    - A 10 LB Fire extinguisher shall be available.

- All other chemicals
    - Will be stored in designated areas determined by the Superintendent.

Small Spill Cleanup Procedures

- Contractor will maintain a chemical spill kit in the construction trailer for minor chemical spills less than 3 feet. For larger spills, a private Environmental Services contractor should be utilized for clean up operations.

- Contaminated soil will be removed by equipment and placed on and covered with heavy duty polyurethane and removed from the site to an approved contaminated soil landfill or incineration facility.

    - Workers need to be trained
    - Workers need to use PPE suitable for the chemical

Discharge Report

Project Name:_____

Project Address:_____

Date of the discharge:_____

Names of chemicals discharged:_____

Quantities of chemicals discharged:_____

Location of the release:_____

Extent of the affected area:_____

Description of the incident that caused the release or discovery:_____
_____
_____
_____

Description of the actions taken to stabilize the situation:_____
_____
_____
_____
_____

Were you successful in controlling the source of the incident?
_____ yes _____ no

Did any of the spilled material reach any storm or sanitary drains or the ground? _____ yes _____ no

Have the conditions that caused the discharge ceased? _____ yes _____ no

Did the chemical containment work effectively? _____ yes _____ no

Name the contact personal and organizations who responded to the incident (e.g., fire department hazmat team)
_____
_____
_____

Coordinator Signature Date of Report

APPENDIX I

BOATING SAFETY

ATTACHMENT A

SAFE BOATING CHECKLIST

ATTACHMENT A
AMEC SAFE BOATING CHECKLIST

Personal Flotation Devices (PFDS)

- ☐ Is there at least one personal flotation device available per person (minimum of two) on board - USCG approved Type I, II, or III (wearable and properly sized)?
- ☐ Are additional throwable devices available if the vessel is more than 16 feet long?
- ☐ Has the location and use of all PFDs been explained to passengers and crew that may be new to the vessel?

Sound Producing Devices (Whistle)

- ☐ Is a horn, capable of producing a four-second blast audible for at least 1/2 mile, available?
- ☐ If a portable air horn is used, is a spare can of air or an alternate device available?

Lights and Shapes

- ☐ Are all navigation lights, as required, in working order?
- ☐ Are Instrumental lights working?
- ☐ If crew will engage in an activity that requires a day shape, are the required shapes available?
- ☐ Is there a flashlight (floating and watertight with spare batteries and bulbs) onboard?

Distress Signals

- ☐ Are accessible flares, day signals, etc., stored in a dry location?
- ☐ Are signals carried at all times, even if not required by the Coast Guard?
- ☐ Do you have a waterproof lighter?
- ☐ Have the crew and passengers been informed of their location and their use?

Tools and Spares

- ☐ Is there a basic tool box onboard?
- ☐ Is there a bucket onboard for bailing?
- ☐ Is there a box of spares aboard, e.g. fuel filter, light bulbs, head parts, through-hull plugs, etc.?

Ventilation

- ☐ On a powered vessel or auxiliary powered sailboat, or vessels using LPG for cooking or heat, are all interior spaces are well ventilated before departure?
- ☐ If fuel smells are detected before ventilating, did you check the area after running the blowers for several minutes before starting? If odor persists, did you look for the source?

Fire Extinguishers

- ☐ Are there fire extinguishers, approved for Marine use, onboard and accessible?
- ☐ Are mounts secure and functional?

Fuel and Oil

- ☐ Is there sufficient fuel for the trip and to provide a reasonable margin of safety for your return?
- ☐ Are engine oil and coolant levels OK?

Oars or Paddles

- ☐ Are oars or paddles available? In some states it is a requirement.

Bilges

- ☐ Are bilges reasonably dry and pumps not running excessively? (Clean up any spilled oil or waste in bilges to prevent overboard discharge.)

Battery Care

- ☐ If dual charging system, is the selector switch in the proper position? Is the power on to the entire vessel?
- ☐ Are there spare batteries for accessories such as a hand-held radio, flashlight, portable navigational aid, etc.?
- ☐ If they are rechargeable, are they charged?

Weather Forecast

- ☐ Did you check the weather forecast?
- ☐ Is the boat seaworthy and capable of handling the water conditions?
- ☐ Is there a radio onboard to receive weather updates?

Docking and Anchoring

- ☐ Is there at least one anchor and at least 100 ft. of line?
- ☐ Are there two or three extra docklines in case of unusual conditions dockside?
- ☐ Are the lines free of excessive chafe or wear?
- ☐ Are there at least two fenders onboard for docking or towing?

Documentation

- ☐ Is required paperwork available (e.g., ship's papers, registration, radio license, license or boating safety course I.D., fishing permit, etc.)?
- ☐ Are there chart(s) for the area you intend to cruise in, regardless of your level of local knowledge?

Boating Offshore –

- ☐ Is there an Emergency Position Indicating Radio Beacon (EPIRB) onboard?
- ☐ Is there a Life raft onboard?

Trailer Boating

- ☐ Is the plug in the boat?
- ☐ Is the tire pressure OK?
- ☐ Is the hitch secure and safety chains attached?
- ☐ Is the boat is tied down properly?
- ☐ LOOK BEFORE BACKING UP!

Sailing Vessels

- ☐ Are sails, lines, sheets, rigging, tiller and centerboard in good condition?
- ☐ When raising the mast, is the sailboat well away from overhead power lines?

Passengers

- ☐ Have all passengers been acquainted with use and location of safety equipment, radio, docking & undocking plans, etc.?

Float Plan

- ☐ Have you developed filed your float plan with your Supervisor?

ATTACHMENT B

FLOAT PLAN

ATTACHMENT B
FLOAT PLAN

Name of vessel's operator: _____

Telephone Number: _____

Name of Vessel: _____

Registration No.: _____

Description of Vessel:

Type: _____ Make: _____

Color of Trim: _____ Color of Hull: _____

Most distinguishing identifiable feature: _____

Rafts/Dinghies:

Number: _____ Size: _____ Color: _____

Radio:

Type: _____ Frequencies Monitored: _____

Number of persons onboard: (List additional passengers on back)

Name	Age	Address & Telephone

Engine Type:

H.P.: _____ Normal Fuel Supply (days): _____

Survival equipment on board: (check as appropriate)

- ☐ **Life Jacket**
- ☐ **Medical Kit**
- ☐ **Anchor**
- ☐ **Flares**
- ☐ **EPIRB**
- ☐ **Loran/Gps**
- ☐ **Smoke Signals**
- ☐ **Paddles**
- ☐ _____

Food for: _____ days Water for: _____ days

Trip:

Date & Time of Departure: _____

Departure From: _____

Departure To: _____

Expected to arrive by: _____ In no case later than: _____