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measures for personnel and property must be based upon this possibility.

16. Inert munitions will not be disposed of, or sold for scrap, until the internal fillers have been exposed and unconfined. Heat generated during a reclamation operation can cause the inert filler, moisture, or air to expand and burst the sealed casings. Venting or exposure may be accomplished in any way necessary to preclude rupture due to pressure from being confined. All requirements of the UXO Procedure for the Management and Disposition of Material Potentially Presenting an Explosive Hazard (MPPEH) will be met prior to releasing any inert munitions material.
17. Maintain minimum safe distances between electromagnetic-radiating sources and electro-explosive devices.
18. Do not conduct blasting or Demolition operations during an electrical, dust, sand, or snowstorm severe enough to produce atmospheric static electrical charges, or when such a storm is nearby (within 10 miles). Under such conditions, all operations will be suspended or terminated, cap and lead wires shunted, and personnel removed from the demolition area. Demolition operations will also be terminated if visibility becomes less than 600 feet.
19. Loose initiating explosives: lead azide, mercury fulminate, lead styphnate, and tetracene. These explosives manifest extreme sensitivity to friction, heat, and impact. Extra precautions are required when handling these types of explosives. Keep initiating explosives in a water-wet condition at all times until ready for final preparation for detonation. Sensitivity of these explosives is greatly increased when dry.
20. Exercise extreme care when handling and preparing high explosives for detonation. They are subject to detonation by heat, shock, or friction.
21. Do not pack bomb fuze wells with explosives unless it can be positively confirmed that the fuze well does not contain any fuze components.
22. Photo flash bombs must be handled with the same care as black powder-filled munitions.
23. MEC containing phosphorus will not be detonated into the ground. Phosphorus-filled munitions will be counter-charged on the bottom centerline (CCBC) when possible.
24. A search of the detonation site, after the demolition operation, will be conducted to assure complete disposal was accomplished.
25. Do not abandon any explosives.
26. Do not leave explosives, empty cartridges, boxes, liners, or other materials used in the packing of explosives lying around where children, unauthorized persons or livestock can get at them.
27. Do not allow any wood, paper or other materials used in packing explosives to be burned in a stove, fireplace, or other confined space, or be re-used for any other purpose. Such materials will be destroyed by burning at an isolated location out of doors, with no one allowed within 100 feet of the burning operation.
28. Do not fight fires involving explosive material. Evacuate all personnel to a safe location and secure the area.
29. Know and observe federal, state, and local laws/regulations that apply to the transportation, storage,

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- and use of explosives.
30. Do not permit metal, except approved metal truck bodies, to contact explosive containers.
 31. Do not transport metal, flammable, or corrosive substances with explosives.
 32. Do not allow smoking, or the presence of unauthorized personnel, in vehicles transporting explosives.
 33. Carefully load and unload explosives from vehicles. Never throw or drop explosives from the vehicle.
 34. Assure the load is blocked and braced to prevent it from movement and displacement.
 35. Do not drive vehicles containing explosives over public highways until all permits and certifications have been obtained from the state enforcement agencies, this includes specific driver licenses and certifications.
 36. All routes must be approved in writing prior to transporting explosive materials over public highways.
 37. Licensed commercial carriers will conduct the shipment of explosive materials over public highways unless HGL UXO personnel have been specifically licensed and certified to make the shipment.
 38. Never leave a vehicle that is loaded with explosives unattended.
 39. Do not store blasting caps, detonators, or other items containing initiating explosives in the same box, container, or magazine with other explosives.
 40. Store explosive materials in military or BATF-approved magazines only. Ensure the magazines used for the storage comply with quantity distance requirements, for the class of explosive material they contain. Reference documents include Explosives Law and Regulation, BATF P 5400.7, and 49 CFR.
 41. Do not store spark-producing metal/tools in an explosive magazine.
 42. Do not permit smoking, matches, or any source of fire or flame within 100 feet of an explosive magazine.
 43. Do not allow leaves, grass, brush, or debris to accumulate within 50 feet of an explosive magazine.
 44. Do not permit the discharge of firearms within 300 feet of an explosive magazine.
 45. Do not use any alkaline material such as lye, washing soda, or soap to remove TNT exudate. Alkaline materials will react with TNT to render it more sensitive.
 46. Do not permit smoking, matches, or other sources of fire or flame within 100 feet of an area in which explosives are being handled.
 47. Do not expose explosives or devices containing explosive to prolonged exposure to direct sun light. Such exposure can increase sensitivity and deterioration.
 48. Ensure all unused explosives are returned to their proper containers and the container closed after

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use.

49. Do not carry explosives or explosive components in pockets or on the body.
50. Do not insert anything but time fuse or detonating cord into the open end of a blasting cap.
51. Do not strike, tamper with, or attempt to remove or investigate the contents of an electric/non-electric blasting cap, detonator, or other explosive initiating device. A detonation may occur.
52. Do not pull on the electrical lead wires of electric blasting caps, detonators, or their electro-explosive devices. A detonation may occur.
53. Do not attempt to remove an unfired or misfired primer or blasting cap from a base coupling. There is a high risk of an explosion.
54. Do not allow unauthorized or unnecessary personnel to be present when explosives are being handled.
55. Always point the explosive end of blasting caps, detonators, and other explosive devices away from the body.
56. Do not use pull rings or safety pins to lift or handle explosive devices.

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EXPLOSIVE SYSTEMS CONFIGURATION

1.0 REMOTE FIRING DEVICE

1. The following guidance refers to the Rothenbuhler remote firing device. If alternative firing devices are used, follow the applicable manufacturer's guidance.
2. Perform system pre-operational test and set up using the Rothenbuhler Operator's Manual. Remove key from controller unit until ready to fire.
3. Place the remote near the detonation site with the antenna in the vertical position. If using electric caps, the remote should be within 100 feet of the shot. Use the unit blast shield, sandbags, or natural cover to protect the remote.
4. Ensure the remote indicates a READY condition for the selected initiation method (green READY LED on steady, red ARMED LED off).
5. If using Nonel®/shock tube, connect the shock tube to the igniter tip. The tube should be wrapped around through holes in the tip's molded casing to keep it from falling out. Prime the shot and return to the safe area.
6. If using electric caps, cut off a length of firing wire that will reach between the remote and the charges (100 feet or less).
7. Conduct a continuity check of the firing wire with a galvanometer. Shunt the free ends of the wire to prevent an electric charge from building up in the firing wire.
8. Test each electric blasting cap 50 feet downwind of other explosives with a galvanometer.
9. Place blasting caps in a hole, behind a barricade, or under a sandbag before removing the shunt and testing for continuity.
10. Fully extend the leg wires and ensure the cap is pointing away from the person conducting the continuity test.
11. Secure the leg wires to prevent the cap from moving during the test.
12. Use only a special silver-chloride dry cell battery in the testing galvanometer. Other type batteries may provide sufficient voltage to fire the blasting cap.
13. Upon completion of testing, re-shunt the leg wires. The wires will remain shunted until ready to connect to the firing circuit.
14. For dual priming connect blasting caps in a parallel circuit to the extension wires.
15. Test the circuit with the galvanometer, and then connect extension wires to the remote.
16. Retrieve caps from barricade, prime shot, and return to safe area.
17. Retrieve caps from barricade, prime shot, and return to safe area.

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2.0 FIRING THE REMOTE FIRING DEVICE

1. The SUXOS will verify that the exclusion zone is clear and barricades are in place.
2. The SUXOS will give a "five-minute warning" over the radio.
3. The SUXOS will give a "one-minute warning" over the radio.
4. Install the key and engage the "POWER" switch on the controller to the right until the BATTERY LED illuminates.
5. Momentarily depress the controller STATUS button. The yellow TRANSMIT LED will flash for approximately one second. At the end of this time a green READY LED will come on steady, indicating that the remote is on and in the standby mode. The steady green LED also indicates the remote is within range of the controller.
6. Push the ARM/DISARM switch to the left and hold for one second. The red ARMED LED will flash for approximately 18 seconds and then come on steady. The remote is now armed.
7. UXO Demolition Supervisor gives three loud "Fire-in-the-Hole" warnings.
8. SUXOS gives fire command on the radio.
9. SUXOS gives permission to fire the shot.
10. Lift the safety cover on the FIRE switch and push the FIRE switch forward.

3.0 PREPARATION OF THE SCORPION ELECTRONIC BLASTING MACHINE

1. The following guidance refers to the Scorpion Electronic Blasting Machine. If alternative blasting machines are used, follow the applicable manufacturer's guidance.
2. Perform pre-operational check as per instructions on blasting machine.
3. Lay out firing wire or Nonel®/shock tube.
4. Conduct a continuity check of the firing wire with a galvanometer. Shunt the free ends of the wire to prevent an electric charge from building up in the firing wire.
5. Test each blasting cap with a galvanometer 50 feet away from other explosives.
6. Place blasting caps in a hole, behind a barricade, or under a sandbag before removing the shunt and testing for continuity.
7. Fully extend the leg wires and ensure the cap is pointing away from the person conducting the continuity test.
8. Secure the leg wires to prevent the cap from moving during the test.
9. Use only a special silver-chloride dry cell battery in the testing galvanometer. Other type

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batteries may provide sufficient voltage to fire the blasting cap.

10. Upon completion of testing, re-shunt the leg wires. The wires will remain shunted until ready to connect to the firing circuit.
11. For dual priming, connect blasting caps in a parallel circuit to the firing wire.
12. Retrieve caps from barricade, prime shot, and return to safe area.

4.0 FIRING THE SCORPION ELECTRONIC BLASTING MACHINE

1. The SUXOS will verify that the exclusion zone is clear and barricades are in place.
2. The SUXOS will give a "five-minute warning" over the radio.
3. The SUXOS will give a "one-minute warning" over the radio.
4. If firing electric check firing wire with a galvanometer.
5. Connect the firing leads to the terminal posts of the blasting machine.
6. For Nonel®/shock tube, plug in the shock tube adapter and attach Nonel®/shock tube.
7. UXO Demolition Supervisor gives three loud "Fire-in-the-Hole!" warnings.
8. SUXOS gives fire command on the radio.
9. SUXOS gives permission to fire the shot.
10. Degrees and hold CHARGE button (keep depressed throughout sequence).
11. Press DETONATE button when green ready light comes on. For non-electric shots, hold DETONATE button down for one second and release.

5.0 MISFIRE PROCEDURES FOR THE REMOTE FIRING DEVICE

1. Make three successive attempts to fire.
2. Turn off the controller and remove the key.
3. Wait 60 minutes from the last initiation attempt.
4. After the wait time has elapsed, the Demolition Supervisor and a safety observer will proceed down range to inspect the firing system.
5. If Nonel®/shock tube was used, do not remove the caps from the charge. Disconnect Nonel®/shock tube from the igniter tip on the remote. Place a new, primed explosive charge next to the misfired charge.
6. If electric caps were used, remove the old blasting caps from charge and disconnect from extension wires. Shunt cap leg wires.
7. If detonating cord was used, cut detonating cord between cap and charge, and disconnect cap

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from extension wires. Shunt cap leg wires.

8. Set up new firing system.

6.0 MISFIRE PROCEDURES FOR THE SCORPION ELECTRONIC BLASTING MACHINE

1. Make three successive attempts to fire.
2. If using firing wire and still unsuccessful, disconnect wires and check continuity.
3. If continuity is good, reconnect to blasting machine and make three more attempts to fire.
4. If still unsuccessful, check connections of firing wires to terminals and make three more attempts to fire.
5. Change blasting machine after third unsuccessful attempt.
6. If unsuccessful with new blasting machine, disconnect and shunt firing leads.
7. If using Nonel®/shock tube, disconnect from blasting machine.
8. Wait 60 minutes from the last initiation attempt.
9. After the wait time has elapsed, the Demolition Supervisor and a safety observer will proceed down range to inspect the firing system.
10. If electric caps were used, remove old blasting caps from charge and disconnect from firing wire. Shunt cap leg wires.
11. If detonating cord was used, cut detonating cord between cap and charge and disconnect cap from fire wire. Shunt cap leg wires.
12. If Nonel®/shock tube was used, do not remove the caps from the charge. Place a new, primed explosive charge next to the misfired charge (FM-5-250).
13. Set up new firing system.

7.0 SHOCK TUBE FIRING SYSTEMS

Shock tube is a thin plastic tube of extruded polymer with a layer of special explosive dust deposited on its interior surface. The special explosive dust propagates a detonation wave, which is normally contained within the plastic tubing. Shock tube offers the instantaneous action of electric initiation without the risk of accidental initiation of the blasting cap by radio transmitters in the area or by static electricity discharge. The shock tube medium is extremely reliable.

Shock tube blasting is highly reliable of because all the components are sealed and, unlike standard non-electric priming components, cannot be easily degraded by moisture. Cutting the shock tube makes the open end vulnerable to moisture. Care should be taken to keep moisture from the cut end of the shock tube. Use the following procedures to cut and splice shock tube.

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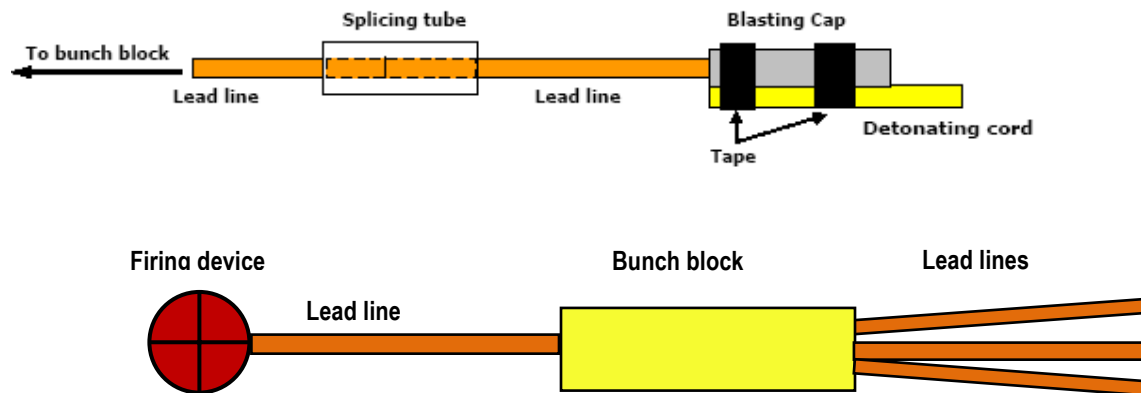
1. Use a sharp knife or razor blade to squarely cut (90-degree angle) approximately 18 inches from a new roll or the cut-off end of a partial roll.
2. Loosely tie the two shock tube ends to be spliced together in a SQUARE KNOT. Leave at least 2 inches free at the end of each shock tube beyond the knot.
3. Pull the shock tube lightly to tighten the knot, but not so tight as to significantly deform the shock tube in the knot.
4. Use only the splicing tubes provided to make splices. Taping the two cut ends of shock tube together does not make a reliable splice.
5. Push one of the free shock tubes, to be spliced, firmly into one of the pre-cut splicing tubes at last 1/4 inch.
6. Push the other shock tube end firmly into the other end of the splicing tube at least 1/4 inch. Attempt to push the two ends up against each other or get as close as possible.
7. Secure splice with electrician's tape.
8. Each additional splice in shock tube reduces the reliability of the priming system. Minimize the number of splices in a shock tube line to as few as possible.
9. Spool out the desired length of shock tube and cut off squarely with a sharp knife or razor blade.
10. Secure the shock tube remaining on the spool by tying a tight overhand knot in the loose end.
11. Protect the open end of the shock tube by sealing it with the end caps provided or with electrician's tape.
12. Attach an initiator to the free end of the shock tube that is spliced into the blasting cap. If a separate blasting cap or detonating cord is used to actuate the shock tube, tie a tight overhand knot in this end.

8.0 SHOCK TUBE SETUP

1. Lay out required length of shock tube (trunk line) from demo area back to the firing point.
2. Attach an EZTL 30 bunch block (or equivalent) using the supplied splicing tube to the lead line at demo site. Secure the bunch block or immobilize with sandbags. Run additional lead line(s) from bunch block to OE (See Figure 1).
3. Attach only a maximum of six additional leads per bunch block. Use additional bunch blocks, if necessary.

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FIGURE 1 – SHOCK TUBE SETUPS



9.0 DONOR EXPLOSIVES

The primary donor explosives used for MEC disposal will be the boosters, plastic explosives, jet perforators, or binary explosives.

9.1 Boosters

1. Insert appropriate grain detonating cord into the detonator well. Insert all the way through and back through other hole and tie an overhand knot to secure it.
2. When using more than one booster, insert detonating cord through each of the boosters' detonator wells and secure to keep them from sliding along the detonating cord.

9.2 Plastic Explosives

Set up with blasting cap(s) or detonating cord lead(s).

9.3 Jet Perforator

1. Use the detonating cord clip provided or tape to secure detonating cord to the Jet Perforator.
2. If safe, place the Jet Perforator on the MEC item using tape or other suitable methods to prevent it from moving.
3. For tamped shots, use a box or other suitable material to provide soil from getting between the perforator and MEC item.

9.4 Binary Explosives

Binary explosives are two-part explosives that are not classified as an explosive until mixed. These can be procured in various configurations to include plastic tube containers and pliable packs in varying sizes depending on the required application. The binary should not be mixed until ready for use. After mixing it can be primed as a cap sensitive explosive using Nonel®/shock tube, detonating cord, or electric or non-electric blasting caps. Use as any high explosive with a velocity of detonation around 20,000 feet per second.

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9.5 Post-Demolition Procedures

1. Wait the designated wait times specified by the SOP. A minimum 5 minutes after single shots or after a series of shot that can be counted. A minimum of 60 minutes after multiple shots that could not be counted.
2. The Demolition Supervisor and one other UXO technician will return to the detonation site and check the results of the shot. If the procedure was successful, the Demolition Supervisor will call in additional personnel to clean up the site. UXO personnel will conduct a visual sweep of the detonation site and the immediate area to gather fragments and explosive residue, if present.
3. Explosive residue will be collected and detonated.
4. MPPEH will be examined to ensure complete consumption of explosive material.
5. Intact MEC items that failed to detonate will be disposed of by detonation.
6. After area is swept and cleared the Demolition Supervisor will notify the SUXOS and the “all clear” will be given.

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ATTACHMENT 7
ROTHENBUHLER ENGINEERING 1670
REMOTE FIRING DEVICE (RFD)
PROCEDURES

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SAFETY WARNINGS

- 1) Always follow your local safety regulations. This manual and its procedures are secondary to governmental regulations, local regulations or company safety regulations and procedures. The operation procedures in this manual are only suggestions and should be checked against the above safety regulations and procedures. Company training should include the proper use of this machine and only trained personnel should use it.
- 2) Never rely on this equipment or any equipment totally for your safety. All mechanical and electronic equipment can fail. Always have a safety procedure that will protect you and minimize hazards of such failure.
- 3) High power radio transmissions can cause electric blasting caps to detonate. Keep the high powered Controller 25 or more feet (8 meters) from electric detonators.
- 4) The Shock Tube Initiator on the Remote Unit can develop up to 3,000 Volts. Do not touch this tip or tip jacks while arming or firing the unit.
- 5) Do not connect electric detonator wires or shock tube to the Remote Unit unless the green READY light is on, the red ARMED light is off, and the battery light is on steady.
- 6) Do not use the system if any of the units show damage to the point that failure is suspected. Thoroughly test the system prior to use.
- 7) Never approach the Remote Unit if it is attached to live explosives unless you have a confirmed READY status back to the Controller AND you have waited at least 2 minutes for the automatic disarm AND you have followed proper safety wait times.
- 8) It is MANDATORY that the Protective Cover is installed on the Charge Connector of the Remote unit at all times unless charging. There is the potential presence of voltage on some of the pins of the Charge Connector. For models produced after March 2009 (Serial Numbers 371+), the maximum current available from any pin is limited to 14.3 milliamperes.

3. PREOPERATIONAL PROCEDURES

3.1. PHYSICAL INSPECTION

3.1.1. Inspect all components for physical damage.

3.1.2. Remove the antenna dust caps and ensure the antenna jacks on the Controller Unit and Remote Unit are not damaged. Ensure they are clean and dry. Replace the antenna dust caps.

3.1.3. Ensure that the Remote and Controller Unit antennas are clean and free of damage. Ensure the electrical contacts are clean and dry.

3.1.4. Examine the shock tube igniter jacks on the left sides of the Remote Units. The jacks should be clean and dry.

3.1.5. Examine the Remote Unit's shock tube igniter tips. They should be clean and dry. If more than 200 shots have accumulated on either tip, replacement is recommended to ensure reliable shot initiation.

3.1.6. Press the two electric detonator binding posts located on the left sides of the Remote Units. Ensure they compress and return to their normal position (Dual Output Model only).

3.1.7. Ensure the key receptacles on the Controller Unit and Remote Units are clean and dry. Ensure they operate smoothly and show no signs of physical damage.

3.2. CHARGING THE BATTERIES

3.2.1. Ensure all units are turned off (The Remote Unit will not charge unless deactivated).

3.2.2. Ensure the ambient air temperature is between 32 and 86 °F (0 to 30 °C). When the ambient temperature is above 80 °F (27 °C), best results are obtained when the Remote lids are opened and air is allowed to circulate over the Remote display panels.

3.2.3. Remove the protective covers on the charge connectors. Line the key on the charger adapter plugs with the slot on the top of charge connectors mounted on each unit. Insert the plugs and turn clockwise until locked in place.

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WARNING It is MANDATORY that the Protective Cover is installed on the Charge Connector of the Remote unit at all times unless charging. There is the potential presence of voltage on some of the pins of the Charge Connector. For models produced after March 2009 (Serial Numbers 371+), the maximum current available from any pin is limited to 14.3 milliamperes.

3.2.4. Insert the supplied charger adapters into suitable power outlets (100-240 VAC, 50/60 Hz).

3.2.5. As the units begin charging, the green SLOW lights will come on briefly, then the red FAST lights will blink for about 5 seconds and come on steady. The red FAST lights indicate the units are fast charging. Table 3-1 shows the charge indicator modes.

3.2.6. When charging is complete, the FAST lights will turn off, and the green SLOW lights will come on steady. Typical recharge time is 3-4 hours. For maximum battery life, avoid leaving the charger connected for more than 24 hours when possible.

Light	Blink Mode	Indicates
FAST	On steady	Fast Charging
FAST	Blinks at startup	Pre-testing
FAST	Blinks continuous	Battery Error
SLOW	On steady	Charge Complete
SLOW	Blinks continuous	Pack Temperature Range Exceeded

Table 3-1 RFD Charge Indicator Modes

3.2.7. When charging is complete, disconnect the charge adapters and reinstall the covers on the charge connectors.

WARNING It is MANDATORY that the Protective Cover is installed on the Charge Connector of the Remote unit at all times unless charging. There is the potential presence of voltage on some of the pins of the Charge Connector. For models produced after March 2009 (Serial Numbers 371+), the maximum current available from any pin is limited to 14.3 milliamperes.

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3.3. BATTERY USAGE AND TESTING

3.3.1. To check the Controller's battery level, activate the unit by pressing the ON switch. The battery level will be shown as a percentage of full charge.



Figure 3-1 Controller Battery Level



Figure 3-2 Remote Battery Voltage

3.3.2. To test the Remote's battery voltage, turn the unit on and then hold the PRESS TO TEST switch for 10 seconds. A fully charged battery will stabilize with a reading of 13.5 V or more. The Remote Unit should be charged when the battery is less than 12.0 V. At 11.7 V, the yellow POWER light will flash to show the battery is too low.

3.3.3. When freshly charged, the Remote Units will run for up to 16 hours at an ambient temperature of 68 °F or 20 °C. Allow for reduced run times for hot or cold temperatures, or when the Safety Poll® mode of operation is used (Safety Poll® mode is explained in Section 5.1). Each unit can be fired approximately 100 times before recharging is required. Allow 15 minutes less run time, for each firing event.

3.3.4. When freshly charged, the Controller Unit will run in standby for up to 12 hours at an ambient temperature of 68 °F or 20°C. Allow for reduced run times for hot or cold temperatures, or when the Safety Poll® mode of operation is used (Safety Poll® mode is explained in Section 5.1).

3.3.5. The batteries will self-discharge at a rate of approximately 1% per day. This rate will increase as the temperature increases.

3.3.6. The RFD battery cells are reasonably resistant to developing a memory. For best results, allow the RFD to become mostly discharged before recharging, and allow the unit to fully charge without interruption.

3.3.7. The RFD's internal battery packs can be recharged up to 500 times before replacement is required. A decrease in run time may be noticed at the end of the battery pack's life cycle.

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Return the RFD to an authorized service shop for replacement when required, or change your packs during the recommended 2-year servicing. Do not attempt field replacement.

3.3.8. Always turn the units off when not in use to conserve the battery charge.

3.3.9. The battery meter test switch can be pushed to check the battery level even if the power switch is in the off position. If the accessories bag in the lid gets excessively stuffed with tips or other items the possibility exists that the battery test button could be held down and consequently drain the battery.

3.4. TESTING THE RFD

3.4.1. This test procedure must be conducted in an area that is at least 100 feet from the nearest electric detonators or wires connected to electric detonators.

3.4.2. All RFD system components are described in detail in Section 2.

3.4.3. Ensure all units are sufficiently charged according to procedures 3.2 and 3.3.

3.4.4. Position the Controller and Remote Units at least 5 feet (1.5 meters) apart, in a position where all units can be observed while testing.

3.4.5. Install the antennas on the Remote and Controller Units.

3.4.6. On the Remotes, insert the enable keys and turn the POWER switches to the ON positions. Observe that the READY, ARMED, and POWER lights blink briefly on power up. The yellow light next to the ENABLE KEY should blink continuously to show the key is installed. The POWER light should remain on steady.

3.4.7. On the Remote Units, place the SELECT switch to the SHOCK TUBE position (Dual Output Model only). Observe the green SHOCK TUBE READY lights are on, and the red ARMED lights are out. Install a shock tube tip into the jacks located on the side of each Remote Unit.

3.4.8. On the Controller Unit, insert the Controller's key and press the ON switch. Observe the yellow POWER and KEY lights are on steady.

3.4.9. On the Controller, press the STATUS switch. After a short time the green READY lights for the Remote Units that were previously prepared for use, will come on steady to show they are disarmed and communicating two-way. The select lights will automatically be turned on for Remote Units that answered back to the Status request if the Auto Select option is enabled.

3.4.10. If Auto Select option is not enabled, on the Controller, press the SELECT switches to select the Remote Units to be tested. The yellow SELECT lights for the selected units will turn on.

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- 3.4.11. On the Controller, press the ARM switch. The ARMED lights for the selected Remote Units will blink for up to 15 seconds and come on steady.
- 3.4.12. On the Remote Units, the red ARMED lights will come on steady. The system is armed.
- 3.4.13. On the Controller, before 2 minutes have elapsed, press the DISARM switch. All Remotes will disarm within 3 seconds.
- 3.4.14. Re-arm the Controller Unit and wait 2 minutes. After the 2 minutes, all Remotes will return to the disarmed state. The red ARMED lights will go out, and the green READY lights will come on steady.
- 3.4.15. Re-arm the Controller Unit, and before the two minutes have expired, press both FIRE switches together and hold for $\frac{1}{2}$ second. You should notice that all Remote Units developed sparks at the shock tube tip electrodes. All units subsequently return to the disarmed state.
- Note: 3.4.16 through 3.4.19 applies to the Dual Output Model only.*
- 3.4.16. On the Remote Units, place the SELECT switches to the ELECTRIC DETONATOR position and observe the green ELECTRIC DETONATOR READY lights are on, and the ARMED lights are out.
- 3.4.17. On the Remotes, depress the two spring loaded binding posts and insert the leads of the test lamps.
- 3.4.18. Repeat procedures 3.4.11 through 3.4.14. The test lamps should remain extinguished through out this portion of the procedure.
- 3.4.19. Re-arm the Controller Unit, and before the two minutes have expired, press both FIRE switches together and hold for $\frac{1}{2}$ second. You should notice that all test lamps light briefly. All units subsequently return to the disarmed state.
- 3.4.20. If any units did not work as described in this section, return to a service shop for repair. Never use a unit that is damaged or suspected of being damaged.
- 3.4.21. Turn off all units. Restore antennas, tips, and test lamps as required. The system is now operationally ready for use.

4. RFD OPERATIONAL PROCEDURES

4.1. SETTING UP THE RFD

WARNING It is MANDATORY that the Protective Cover is installed on the Charge Connector of the Remote unit at all times unless charging. There is the potential presence of voltage on some of the pins of the Charge Connector. For models produced after March 2009 (Serial Numbers 371+), the maximum current available from any pin is limited to 14.3 milliamperes."

4.1.1. Select the number of Remotes required for the operation. Ensure all units are sufficiently charged and tested according to Chapter 3.



Figure 4-1 Installing the Controller Antenna

4.1.2. Ensure the Controller Unit key is removed. Position the Controller Unit at the intended firing position and install the antenna.

4.1.3. To place the RFD in Safety Poll® mode, press and hold the STATUS switch while also pressing the ON switch (Details of Safety Poll® mode in Section 5.1).

4.1.4. Select a position for the first Remote Unit close to the blast area, but far enough to ensure the Remote is safe from direct air blasts and falling rocks.

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Figure 4-2 Remote Antenna Installation

- 4.1.5. Install the antenna on the Remote Unit. Ensure the antenna is free of obstruction.



Figure 4-3 Activating the Remote Unit

- 4.1.6. Turn the POWER switch to the ON position. Observe the yellow POWER light is on and not flashing. Ensure the battery voltage is above 12.0V.
- 4.1.7. For underground operation, ensure the green RECEIVE light is on steady to indicate the Remote is in receiving range of the leaky feeder radio signal.
- 4.1.8. For surface operation, the green RECEIVE light suggests there may be an interfering

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radio signal or noise present. The RECEIVE light is similar to breaking squelch on a handheld radio and does not necessarily indicate operation is degraded.



Figure 4-4 Select the Initiator

4.1.9. Place the SELECT switch to the desired initiation method (Dual Output Model only). Verify the green READY light is on, while the red ARMED light remains off.

4.1.10. If using non-electric shock tube, install the tube into the RFD Tip, and install the tip into the jacks on the left side of the Remote as described in Section 2.8.

4.1.11. If using electric detonators, install the two-wire firing cable into the spring loaded binding posts located on the left side of the Remote Unit (Dual Output Model only).

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4.1.12. Install the enable key into the Remote Unit and observe the yellow light next to the ENABLE KEY begins flashing. If the Controller is in Safety Poll® mode, this light will turn on steady within 15 seconds to show that full 2-way communications are working.

4.1.13. Close the lid on the Remote for protection. Repeat Sections 4.1.4 to 4.1.13 for the remaining Remote Units to be used in the operation.

4.2. FIRING THE RFD



Figure 4-5 Activating the Controller Unit

4.2.1. Activate the Controller Unit on pressing the ON switch. Observe the yellow POWER light is on. The Controller should be recharged when the BATTERY indicator reads 20% or less.

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Figure 4-6 Inserting the Controller KEY

4.2.2. When the area is clear and all shots are prepared, insert the key into the Controller Unit as shown in Figure 4-6. The yellow KEY light will turn on.



Figure 4-7 Select the Remote Units

4.2.3. Press the SELECT switches to select the Remote Units to be fired. The yellow SELECT lights will illuminate as the corresponding Remotes are selected.

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Figure 4-8 Perform a STATUS check

4.2.4. Press the STATUS switch and observe the green READY lights will light for each selected Remote Unit that is operational and within range.



Figure 4-9 Observing the STATUS check results

4.2.5. Shown in Figure 4-9 are the results of our STATUS check for Unit #3. The steady green READY light indicates Unit #3 is disarmed. The steady yellow BATTERY light indicates Unit #3's battery is not low.

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Figure 4-10 Arm the SELECTED Remote Units

4.2.6. Wait for the appropriate warning sirens. About 30 seconds from firing, press and hold the ARM switch for ½ second. The red ARMED lights will blink for up to 15 seconds and come on steady.

4.2.7. For systems configured in 1-way mode: If any of the ARMED lights continue to blink, those units are not within 2-way range and confirmation cannot be received. The Remote(s) may or may not fire depending on range, local interference, and the Controller radio's power setting.

4.2.8. For systems configured for 2-way only mode, units that are not within 2-way range will not be armed.

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Figure 4-11 Firing the ARMED and SELECTED Remote Units

4.2.9. When ready to fire, press the two FIRE switches together at the same time and hold for ½ Second as shown in Figure 4-11. Shot initiation should be detected.



Figure 4-12 Verify the green READY Lights are on steady

4.2.10. After a short time, the green READY lights should be on steady to show that each Remote Unit has fired and is now disarmed as shown in Figure 4-12. Any lights that continue to blink indicate the Controller did not receive a confirming message and a manual STATUS check is required to ensure all units are disarmed.

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Figure 4-13 Manually checking STATUS

4.2.11. To manually check status, press the STATUS switch at any time. The updated status of the SELECTED Remotes will be reported on the faceplate enunciator panel. You may alternately press DISARM and STATUS until all Remotes have reported they are confirmed READY.



Figure 4-14 Turn the Controller Unit OFF

4.2.12. With all deployed Remote Units having reported steady READY status, deactivate the Controller by pressing the OFF switch.

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Figure 4-15 Remove the Controller's Key

- 4.2.13. Remove the Controller Unit's key.
- 4.2.14. Wait an additional 2 minutes, and following standard safety procedures, you may approach and retrieve the Remote Units.
- 4.2.15. Turn OFF the Remote Units. Remove and store the enable keys, antennas, and shock tube tips.
- 4.2.16. Inspect all units for physical damage. Close the lids and restore dust caps.

ATTACHMENT 8

	POST-DEMOLITION OPERATIONS CHECKLIST			
I. Project Information				
Site Name: _____		Date: _____		
Site Location: _____		Grid Number: _____		
Demolition Team Leader: _____				
II. Explosive and MEC/UXO Accountability (Donor explosives)			Yes	No
(a) All unused explosive materials returned to magazine and properly stored?			☐	☐
(b) Explosive Material Disposition Record = Bill of Lading completed and submitted to SUXOS?			☐	☐
(c) All destroyed/demiled MPPEH, MEC and UXO accounted for and verified by SUXOS?			☐	☐
(d) MEC/UXO Accountability Record completed and filed?			☐	☐
(e) Daily Summary of Magazine Transactions (Magazine Data Card) completed?			☐	☐
(f) Magazine locked and secured (two-locks)?			☐	☐
(g) Detonator box locked and secured (two-locks)?			☐	☐
(h) Magazine fence gate locked and secured?			☐	☐
(i) Magazine keys returned and properly secured?			☐	☐
III. Remarks				
IV. Approval (signature)				
Demolition Supervisor:			Senior UXO Supervisor:	

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ATTACHMENT 9

Three-Phase Quality Control Checklist Explosive Demolition Operations						
Team:		Location:			Date:	
Personnel Present:						
Phase of Inspection (Circle): <i>PREPARATORY (P); INITIAL (I); FOLLOW-UP (F)</i>						
CHECKLIST						
Item	Reference	Inspection Point	Yes	No	N/A	Comments
1.	DDESB TP 18	All demolition team members meet the UXO-qualified personnel requirements				(P)
2.	Work Plans, ESP or ESS	Have all demolition team members reviewed the current work plan, ESP or ESS? <i>Check Dates/Record of training.</i>				(P)
3.	SOP 501.02	Do the provisions of SOP 501.02 meet procedural and safety requirements for performing demolition operations for all personnel selected to participate in the procedures meet the requirements specified?				(P), (I), (F)
4.	SOP 501.02	Was the Safety Briefing held prior to commencing Demolition operations?				(P)
5.	SOP 501.02	Was a Public Meeting held prior to commencing Demolition operations? (if applicable)				(P)
6.	SOP 501.02	Has the SUXOS completed the mandatory notifications in advance of the conduct of Demolition operations (i.e., <i>Medical, Fire, Security</i>)				(P),(I),(F)
7.	SOP 501.02	Has the Explosive Safety Quantity Distance arc for the largest munition that will be detonated been used to calculate the EZ prior to the conduct of Demolition operations?				(P),(I),(F)
8.	SOP 501.02	Are proper visitor access and control procedures known and followed?				(P),(I),(F)
9.	SOP 501.02	Does the integrity of the EZ remain intact until Demolition operations are complete?				(P), (I), (F)
10.	SOP 501.02	Are appropriate personnel requirements met/achieved for the proper conduct of Demolition operations?				(P), (I), (F)
11.	SOP 501.02	Is the two-man rule concept religiously followed whenever explosives are transported or handled during explosive operations?				(P), (I), (F)
12.	SOP 501.02	Does a demolition procedures review occur prior to the conduct of Demolition operations in accordance with the requirements of SOP 501.02?				(P), (I), (F)
13.	SOP 501.02	Have sufficient communications been established to enable team/field personnel to communicate with the Site Field Office and emergency response agencies prior to the conduct of operations?				(P), (I), (F)
14.	SOP 501.02	Are there sufficient range vehicles available, with appropriate safety devices installed, to transport and support Explosive Demolition Operation Personnel?				(P), (I), (F)
15.	SOP 501.02	Are all vehicle safety requirements of SOP 501.02 known and strictly observed?				(P), (I), (F)
16.	SOP 501.02	Does the SUXOS obtain a weather report prior to the conduct of Demolition operations?				(P), (I), (F)
17.	SOP 501.02	Are Demolition operations denied or cancelled when electrical storms are within 5 miles of the disposal site or when other severe weather conditions exist that would have a negative impact on safety?				(P), (I), (F)

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18.	SOP 501.02	Are emergency medical support administrative, notification, training, and equipment requirements observed for Demolition operations in accordance with SOP 501.02?				(P), (I), (F)
19.	SOP 501.02	Are fire support administrative, notification, training, and equipment requirements observed for Demolition operations in accordance with SOP 501.02?				(P), (I), (F)
20.	SOP 501.02	Are the PPE items required for Demolition operations present and serviceable in accordance with SOP 501.02?				(P), (I), (F)
21.	SOP 501.02	Are engineering control specifications available and employed when it becomes necessary to reduce detonation effects? (if applicable)				(P), (I), (F)
22.	SOP 501.02	Does the SUXOS or Demolition Supervisor take the appropriate actions as specified in SOP 501.02 prior to initiating a demolition shot?				(I), (F)
23.	SOP 501.02	Are explosive initiation systems chosen in accordance with SOP 501.02 provisions?				(I), (F)
24.	SOPs 501.01 and 501.02	Are Disposal Operations Checklists and Explosive Disposal Logs prepared and completed in accordance with SOP 501.01 and SOP 501.02?				(I), (F)

PUNCH LIST ITEMS

No.	

Conducted by: _____ Acknowledged by: _____

	STANDARD OPERATING PROCEDURE	
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	SOP Category: MMRP and Geophysics	
	Revision No.: 2	
	Revision Date: December 29, 2021	
	Review Date: December 2022	

Approved By:

Theresa Rojas Digitally signed by Theresa Rojas
Date: 2021.12.30 09:59:02 -05'00'

Theresa Rojas
Corporate Quality Director

Date

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Date: 2021.12.30 11:18:33 -06'00'

Neil Feist
MMRP Operations Manager

Date

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1.0 PURPOSE

This standard operating procedure (SOP) describes the procedures for safely conducting vegetation removal operations on a munitions site.

2.0 SUMMARY OF METHOD

This SOP applies to HydroGeoLogic, Inc. (HGL) employees who are involved in vegetation removal activities by manual removal, mechanized removal, or controlled burning. All HGL employees tasked with performing munitions or explosives of concern (MEC) avoidance support during vegetation removal activities must be qualified in unexploded ordnance (UXO) in accordance with (IAW) U.S. Department of Defense Explosive Safety Board (DDESB) Technical Paper (TP) 18.

HGL staff must perform all work in a manner consistent with Occupational Safety and Health Administration (OSHA) standards and requirements. Staff should refer to the project site-specific health and safety plan for relevant health and safety requirements. All activities must be conducted in conformance with the approved project planning documents, including the Accident Prevention Plan (APP), the Site Safety and Health Plan (SSHP), task-specific Activity Hazard Analyses and when applicable the DDESB-approved Explosive Safety Submission or Explosive Site Plan.

Vegetation removal is usually required to facilitate follow-on activities such as analog removal actions or digital geophysical mapping.

3.0 DEFINITIONS AND ABBREVIATIONS/ACRONYMS

3.1 DEFINITIONS

Anomaly Avoidance: Techniques employed to allow entry into a specified area to perform required operations on property known to contain or suspected of containing MEC, other munitions in high enough concentrations to pose an explosive hazard regardless of configuration, or chemical agent (CA). Anomaly avoidance techniques focus on avoiding contact with potential surface or subsurface explosives or CA hazards.

Minimum Separation Distance (MSD): The distance at which personnel in the open must be from an intentional or unintentional detonation.

Munitions and Explosives of Concern (MEC): Specific categories of military munitions that may pose unique explosive risks, including the following:

- UXO, as defined in 10 United States Code (U.S.C.) §101(e)(5).
- Discarded military munitions, as defined in 10 U.S.C. § 2710(e)(2).

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- Munitions constituents (such as, TNT, RDX), as defined in 10 U.S.C. § 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

Unexploded Ordnance (UXO): As defined by 10 U.S.C. § 101(e)(5)(A) through (C), military munitions that

- have been primed, fuzed, armed, or otherwise prepared for action;
- have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and
- remain unexploded whether by malfunction, design, or any other cause.

3.2 ABBREVIATIONS/ACRONYMS

APP	Accident Prevention Plan
CA	chemical agent
CFR	Code of Federal Regulations
DDESB	(U.S.) Department of Defense Safety Board
HGL	HydroGeoLogic, Inc.
IAW	in accordance with
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
MSD	minimum separation distance
OSHA	Occupational Safety and Health Administration
PPE	personal protective equipment
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
SUXOS	Senior UXO Supervisor
TP	Technical Paper
U.S.C.	United States Code
UXO	unexploded ordnance
UXOSO	UXO Safety Officer

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4.0 PERSONNEL REQUIREMENTS

All HGL employees and subcontractor personnel performing vegetation removal activities must meet the training certification and qualification requirements specified by the project APP/SSHP, and possess the following:

- Site-specific MEC awareness training prior to field activities, and
- Requisite experience in the use and safety protocol for the hand-held vegetation clearance equipment and machinery used for each task.

The presence of a UXO Qualified Person who meets the requirements of DDESB TP 18 is required in the field during vegetation clearance activities to provide oversight and MEC avoidance. Field personnel must meet all requirements for the specific activity they perform as specified in 29 Code of Federal Regulations (CFR) 1910 including, but not limited to, vehicle operation, hazardous material handling, personal protective equipment (PPE), and documentation of training records related to safety and equipment operation.

5.0 TRAINING

Before beginning any vegetation removal operations, all employees and supervisors must be trained on the hazards and safety precautions associated with the vegetation removal methods as described in the APP/SSHP. Training may include the following:

- Initial use, operation, and maintenance of vegetation removal manual tools, machines, and vehicles IAW the manufacturers' directions, and acknowledgment of warnings and precautions for that equipment; and
- Recognition, prevention, and control of other safety and health hazards in the vegetation removal.

6.0 PROCEDURES AND PLANNING

Listed below are the procedures for vegetation removal.

- Disturb only the vegetation necessary and required for safe and effective access for follow-on activities.
 - In typical situations, remove vegetation to within 4 to 6 inches of the ground surface, and trim tree limbs from the ground surface to approximately 8 feet in height.
 - Remove larger deadfall that impedes the progress and safety of personnel and equipment during follow-on activities.

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- Typically, leave mature trees in place. Trees of 4 inches in diameter or greater as measured from chest height are typically considered mature. This criterion is site specific and based on agreements with the project client and specified in the project planning documents.
- Dispose of vegetation or leave it in place per agreement with the client. Stipulate site-specific disposal methods in the project planning document.
- Consider site topography, terrain and soil conditions, and drainage patterns.
- Adhere to the required level of environmental and natural resource protection identified in project planning documents.

6.1 MECHANICAL VEGETATION REMOVAL METHODS

Mechanized vegetation removal operations have several advantages in that they are usually more expedient, reduce personnel exposure and the likelihood of injuries, and may reduce project costs compared to manual methods.

6.2 ROBOTIC/REMOTE MECHANICAL VEGETATION REMOVAL METHODS

Remote/robotic-controlled mechanized operations have several advantages in that, because the operator is not on board, they can be used in dangerous, steep, or uncomfortable areas. Depending on site conditions, remote/robotic equipment production can be slower and more expensive.

6.3 MANUAL VEGETATION REMOVAL METHODS

Manual vegetation removal methods can be suitable when there is limited or low-density vegetation.

6.4 CONTROLLED BURN METHODS

Controlled burns may be used to remove dense brush or clear areas of vegetation. When controlled burn methods are used on a project site, keep all personnel beyond the MSD (from the border of the area that is being burned) for the munition with the greatest fragment distance until the UXO Safety Officer (UXOSO) and Senior UXO Supervisor (SUXOS) jointly deem the area safe to enter following the burn.

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– W A R N I N G –

Controlled burning of vegetation on ranges is not an approved method to clear MEC hazards.

When planning controlled burns, it is essential to coordinate with the client regarding local regulations, restrictions, and support requirements.

Controlled burns can only be conducted when authorized and approved by the appropriate agency per the project planning documents.

7.0 EQUIPMENT

Specific equipment requirements for each project are detailed in the approved project planning documents.

- The SUXOS or the UXOSO ensures that all equipment/instruments used by site personnel are working properly and that the functionality of vegetation removal equipment is verified and documented.
- Each UXO team leader/escort ensures that the team's safety equipment is inspected before beginning work each day and verifies that required equipment is available and operational.
- Staff must immediately remove from service any machinery or equipment found to be unsafe, or that exhibits a deficiency that affects the safe operation of equipment. The equipment should be properly tagged and removed from service until the unsafe conditions are corrected or the equipment is replaced.

7.1 VEGETATION REMOVAL EQUIPMENT

Consider current site conditions when deciding which equipment is needed. The following equipment is typically used for vegetation removal:

- Chainsaws,
- Weed cutters/trimmers,
- Hand saws,
- Machetes,
- Axes,
- Wood chipper,
- Brush hog (tractor or skid steer), and
- Masticating head/mulching head (skid steer or excavator).

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7.2 CHAINSAWS

7.2.1 Chainsaw Operations Requirements

Each chainsaw should be adjusted and operated IAW the manufacturer's instructions. Follow the manufacturer's recommendations for chainsaw use at all times.

- Ensure that each chainsaw used on site is equipped with a functional chain brake and a protective device that minimizes chainsaw kickback. Do not remove or disable chainsaw kickback devices.
- Ensure that each gasoline or fuel-powered chainsaw is equipped with a continuous pressure throttle control system that will stop the chain when pressure on the throttle is released.
- DO NOT fuel a chainsaw if the engine is hot. Allow the engine to cool before refueling.
- Place chainsaws on the ground or in a firmly supported position before starting the machine. If necessary, use plywood or other protective measures to ensure that the chain does not contact the ground.
 - Drop starting a chainsaw is prohibited.
 - Start with the chain brake engaged.
- Control the saw with two hands during saw operations. Exceptions to this policy include adjusting the throttle or reaching for and activating the kill switch.
- Establish secure, stable footing before starting to cut. Do not use the chainsaw in a position or at a distance that could cause insecure footing, loss of balance, or an insecure grip on the saw.
- DO NOT cut directly overhead or above shoulder height.
- Carry chainsaws in a manner that prevents operator contact with the chainsaw bar or chain.
- Shut down the saw whenever it is carried farther than 50 feet or when terrain conditions, such as obstructed ground, slippery surfaces, or dense underbrush, could cause the operator to stumble, slip, or fall.

7.2.2 Chainsaw Personal Protective Equipment

Chainsaw operators must wear the following PPE or PPE detailed in the APP/SSHP:

- Leg protection constructed with cut-resistant material, such as ballistic nylon. Leg protection must cover the full length of the thigh to the top of the boot on each leg to protect against contact with a moving chainsaw blade.

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- Foot protection that covers and provides support to the ankle. Each employee who operates a chainsaw must wear foot protection constructed with cut-resistant material that will protect the employee against contact with a running chainsaw (safety toe).
- Safety glasses or goggles.
- Leather gloves.
- Ear plugs.
- Hard hat with attached hearing protection and mesh face shield.

7.2.3 Chainsaw “Kickback”

Kickback is the leading cause of injury among chainsaw users. It occurs when the teeth on the chain catch on an object as they rotate around the tip of the blade. The teeth may have enough force to cause the blade to kick back violently toward the operator. The actions prone to cause kickbacks include the following:

- Striking another object with the nose of the blade,
- Starting a bore cut improperly,
- Catching the bottom or side of a saw cut during reinsertion of the blade nose or tip, and
- Cutting objects above shoulder height.

Some defenses against kickback are as follows:

- Keep the tip guard on the chainsaw.
- Keep a firm hold on the saw.
- Use a saw that has a chain-brake or kickback guard.
- Keep the saw teeth sharp since dull teeth are more likely to cause kickback.
- Never cut anything above shoulder height. At that height, the saw is difficult to control and could potentially kickback toward the head and face.

7.2.4 Chainsaw Pinching

A pinched chainsaw can cause kickback and result in injury. Chainsaw operators should always watch for potential blade pinching situations and plan accordingly. Use the base of the blade to cut branches rather than the tip of the blade and use a high chain speed when reinserting the blade in a cut or removing it from a cut.

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7.2.5 Chainsaw Inspection and Maintenance

Check the following elements regularly during each day, but no less than before starting work and at the end of the workday:

- Controls: ensure proper function.
- Chains: ensure proper adjustment.
- Mufflers: ensure that they are in place and operational.
- Chain brakes and nose shielding devices: ensure that they are in place and operational.
- Cutting edges: ensure that they are properly shaped and sharp.
- Ensure that all other safety devices are in place and function properly.

If any chainsaw needs repair, remove it from service and properly tag the equipment. Repair and reinspect it before use.

7.3 BRUSH CUTTER PROCEDURES

7.3.1 Brush Cutter Safety and Operation

The following procedures must be followed to ensure safe operation of brush cutters.

- Space individuals conducting brush cutting and removal with fuel-powered brush cutters at least 50 feet apart while the brush cutters are in use.
- Greater distances than those listed above may be required if specified by the manufacturer in the manufacturer's operating manual or other applicable documents.
- Ensure that operators are wearing proper PPE per the APP/SSHP.
 - For Nylon Line – foot protection with high traction soles and ankle protection, leather gloves, safety glasses or goggles, hard hat with mesh face shield and ear muffs, and hearing protection.
 - For Metal Cutting Blades – prescribed PPE for chainsaw operations.
- Use gas-powered brush cutters/trimmers IAW the manufacturer's operating manual. Ensure that the cutters/trimmers return to idle speed or shut off when the trigger is released.
- Start the cutter/trimmer on the ground or position the unit where it is firmly supported in an open area.
- Control equipment with both hands during operations (exceptions to this policy include the minimal time needed to adjust the throttle or reach for and activate the kill switch).
- Establish stable footing with feet firmly planted.
- Keep the trimmer head below waist level.

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7.3.2 Brush Cutter Inspection and Maintenance

At a minimum, include the following in brush cutter inspections:

- Inspect the brush cutter prior to use for potential hazards, such as loose belts and missing or damaged guards.
- Examine the equipment for accumulations of grass, leaves, or excessive grease to reduce fire hazard.
- Conduct routine maintenance and inspections IAW the manufacturer's operating manual.
- If any brush cutter/trimmer needs repair, remove it from service and properly tag the equipment. Repair and reinspect it before use.

7.4 WOOD CHIPPER PROCEDURES

7.4.1 Wood Chipper Operations

During wood chipping operations, it is necessary to provide a safe work environment and to comply with the appropriate safeguarding of machinery standards. In addition to adhering to manufacturer-specific safety precautions or procedures, adhere to the following requirements:

- DO NOT open chipper access covers or doors until the drum or disc is completely stopped.
- Ensure that guards are fitted and secure on the feed chute and discharge chute to prevent contact with the disc, knives, or blower blades.
- Shut down the chipper when an employee performs any service or maintenance.
- Properly chock chippers to prevent rolling or sliding.
- Verify that operators are properly trained and supervised when operating machinery.
- DO NOT wear loose items or clothing that may catch or snag on the chipper.
- Feed the chipper from the side position away from the front of the in-feed chute. Once the in-feed rollers catch the wood, move away from the feed line of the chipper.
- Feed the butt end of branches into the chipper in-feed rollers first.
- Completely stop the in-feed rollers before correcting an action or cleaning up small pieces of wood or leaves on the machine.
- Maintain in place all guarding and emergency control mechanisms and keep them operational at all times when the machine is running.

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7.4.2 Wood Chipper Inspection

Inspect and maintain wood chippers IAW manufacturers' instructions, conducting at least one inspection prior to use each day. Never operate the chipper if the required controls and guards are not in place. If chipper needs repair, remove it from service and properly tag the equipment. Repair and reinspect before use.

7.5 BRUSH HOG AND MULCHING HEAD PROCEDURES

7.5.1 Brush Hog and Mulching Head Attachment Operations

Brush hogs (mechanized mower deck attachment) and masticating/mulching heads can be an effective, efficient, and safe method for clearing vegetation. Hazard control and accident prevention depend on the awareness, concern, prudence, and proper training of personnel in the operation, transport, maintenance, and storage of equipment, in addition to the design and configuration of equipment. Use the following precautions as a general guide to safe operations when using brush hogs and masticating/mulching heads:

- Keep all guards in place while when the machine is in operation.
- Permit no riders on the attachment.
- Stop the engine, disconnect the power source, and wait for all machine movement to stop before servicing, adjusting, cleaning, or unclogging the equipment. The exception is when the machinery must be kept running for proper servicing or maintenance. In this case, follow the manufacturer's guidelines on all steps and procedures necessary to safely service or maintain the equipment.
- Make sure all personnel are clear of machinery before starting the engine, engaging power, or operating the machine.
- Become familiar with all of the machine's controls and the caution, warning, and danger decals affixed to the machine before attempting to start or operate.
- Complete a walk-around inspection to check for obvious defects, such as loose mounting bolts and damaged components, before starting or operating the machine. Correct deficiencies before starting.
- Lower the implement to ground, stop the machine engine, apply the parking brake, and allow the blades to stop completely before leaving the tractor/skid steer.
- DO NOT operate the equipment near any area where people may be present unless all safety chains or other factory-approved safety shields are in good repair.
- Establish the safe personnel working distance (depending on the size and type of attachment, the ejection hazard can be upwards of several hundred feet).

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- Securely fasten the seat belt and ensure that the equipment has a rollover protection system.
- Where possible, avoid operating near ditches, embankments, and holes.
- Reduce speed when turning, crossing slopes, and operating on rough, slick, or muddy surfaces.
- Stay off slopes too steep for safe operation.
- Wear PPE such as, but not limited to, protection for eyes, ears, feet, hands, and head when operating or repairing the equipment.
- Stand clear of brush hog wing(s) and attachments when raising or lowering.

7.5.2 Brush Hog and Masticating/Mulching Head Inspection and Maintenance

Inspect and maintain the attachments IAW the manufacturer's instructions with at least one inspection before use each day. The following are the guidelines for inspection and maintenance:

- Grease and lubricate machine prior to each use and at required intervals following the manufacturer's operating manual.
- Verify that driveline shields are in place and in good repair to minimize entanglement injuries caused by rotating drivelines.
- Verify that deflector shields (chains, bands, and similar items) are in good repair to minimize injuries caused by the discharge of high-speed objects.
- Inspect blades for wear (replace if necessary).
- Check blade bolts for tightness.
- Check blades and spindles to verify that no foreign objects, such as wire or steel strapping bands, are wrapped around them.
- Inspect hydraulic lines and fittings for wear or leaks (repair or replace if needed).
- Inspect wheel(s) for wear, damage, or foreign objects (repair or replace if necessary).
- Check tractor tire air pressure (refer to manufacturer operating manual).
- During operation, listen for abnormal sounds that might indicate loose parts, worn bearings, or other damage.
- Remove vegetative debris from the engine compartment often enough to prevent fires.
- Conduct the following after each use:
 - Clean all debris from the machine, especially the underside of the deck and affixed safety decals.

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- Inspect cutter for worn or damaged components (repair or replace if necessary).

7.6 TREE FELLING PROCEDURES

Refer to OSHA guidelines for tree felling operations:

<https://www.osha.gov/SLTC/etools/logging/manual/felling.html>.

Safety must be of utmost concern when approaching a tree to cut. According to OSHA, “More people are killed while felling trees than during any other logging activity.” Cutting trees with a chainsaw is particularly hard on the eyes and ears. OSHA Regulation 29 CFR 1910.266 requires that chainsaw operators wear the following:

- Head protection,
- Hearing protection (a combination head and ear protection may be used),
- Eye and face protection,
- Protective chaps or pants, and
- Protective footwear.

7.6.1 General Tree Felling Safety and Operation

7.6.1.1 Personnel Separation Distance

Designate work areas so trees cannot fall into an adjacent occupied work area.

- The distance between occupied work areas must be at least two lengths of the trees being felled.
- Calculate the distance between adjacent occupied work areas considering the degree of slope, the density of the growth, the height of the trees, the soil structure, and other hazards reasonably anticipated at that work site.

7.6.1.2 Overhead Hazards

To the greatest extent practicable, no tree felling should be conducted near overhead electric lines, but if necessary, conduct tree felling operations near overhead electric lines IAW the requirements of Title 29 CFR § 1910.333(c)(3). The site safety officer must notify the power company immediately if a felled tree contacts a power line. Each employee must remain clear of the area until the power company advises that there are no electrical hazards.

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7.6.2 Tree Felling Operations

Follow these general requirements during all tree felling operations:

- Fell or remove each tree posing a danger using mechanical or other techniques that minimize employee exposure before beginning work in the area of the danger tree.
 - Lodged trees and snags are particularly dangerous. If not removed, flag and avoid the tree.
 - DO NOT work within two tree lengths of the flagged tree unless the Site Safety and Health Officer indicates that a shorter distance will not create a hazard for an employee.
- Carefully check each tree for signs of loose bark, broken branches and limbs, or other damage before felling or removing the tree.
- Remove or hold in place accessible loose bark and other damage that may create a hazard for an employee before felling or removing the tree.
- Felling on any slope where rolling or sliding of trees or logs is reasonably foreseeable must be done uphill from, or on the same level as, previously felled trees.

Before felling each tree, the feller evaluates conditions and takes precautions to avoid creating a hazard for the feller or other site personnel. Conditions evaluated include snow and ice accumulation, the wind, the lean of the tree, dead limbs, and the location of other trees. During manual tree felling, the chainsaw operator takes the following steps:

- Establish secure footing before starting to cut. Do not use the chainsaw in a position or at a distance that could cause off balance stance, insecure footing, or loss of firm grip on the saw.
- Clear away brush or other potential obstacles that might interfere with cutting the tree or using the retreat path.
- Plan and clear a retreat path:
 - The retreat path extends diagonally away from the expected felling line at an angle of approximately 45 degrees.
 - After making the back cut, immediately shut down the saw, place the saw on the ground, and move a safe distance away from the tree on the retreat path.
- Keep employees other than the feller at least two tree lengths away when cutting a spring pole or other tree under stress. Injury is possible when the cut releases stress.

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Highlights of Manual Felling Techniques

- See the following for information about tree cutting:
<https://www.osha.gov/SLTC/etools/logging/manual/felling/cuts.html>
- An undercut must be made in each tree being felled. The undercut must be of a size so that the tree will not split and will fall in the intended direction.
- A backcut must be made in each tree being felled. The backcut must leave sufficient hinge wood to hold the tree to the stump during most of its fall so that the hinge is able to guide the tree's fall in the intended direction. Except in open face felling, the backcut must be above the level of the horizontal facecut to provide an adequate platform to prevent kickback.
- The backcut may be at or below the horizontal facecut in tree pulling operations.
- Domino felling is prohibited.

8.0 GENERAL SAFETY

8.1 ENVIRONMENTAL CONDITIONS

When environmental conditions create a hazard for employees in the performance of the job, cease all vegetation and tree removal work and move each employee to a place of safety. Potentially dangerous conditions include, electrical storms, strong winds that may affect the fall of a tree, heavy rain or snow, extreme cold, dense fog, fires, mudslides, and darkness.

8.2 MUNITIONS AND EXPLOSIVES OF CONCERN SAFETY

Maximum safety in conducting any MEC operations can be achieved through adherence to applicable safety precautions, a planned approach, intensive supervision, and MEC avoidance. UXO-qualified personnel lead a site safety briefing before operational activities begin each workday. General safety considerations applicable to all essential and nonessential personnel at project sites where MEC may be encountered include the following:

- DO NOT become complacent because of familiarity with MEC or the reported probability level of MEC.
- DO NOT conduct operations during inclement weather.
- Avoid contact with MEC.

9.0 QUALITY CONTROL

The MQOs for vegetation clearance are presented in the project planning documents. Performance relative to the MQOs is assessed during the activity by designated personnel. The

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SUXOS or UXOQCS uses the three-phase inspection process during vegetation clearance operations.

This SOP will be reviewed at least every 2 years IAW HGL procedures for review of controlled documents.

10.0 REFERENCES

CFR, Title 29, Section 1910.266, Logging.

CFR, Title 29, Section 1910.333(c)(3), Selection and Use of Work Practices.

HydroGeoLogic, Inc. (HGL), HGL Standard Operating Procedure 510.01, MEC Anomaly Avoidance Support.

U.S. Army Corps of Engineers (USACE), Engineer Manual 385-1-1, Safety and Health Requirements Manual.

	CORPORATE TECHNICAL PROCEDURE	
	Approved for issue by:	
	Process Owner	 Digitally signed by Neil Feist Date: 2022.09.26 12:20:18 -05'00'
	Corporate Quality Director	Theresa Rojas Digitally signed by Theresa Rojas Date: 2022.09.26 13:15:25 -04'00'
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1.0 PURPOSE AND APPLICABILITY

This standard operating procedure (SOP) describes the procedures for all HydroGeoLogic, Inc. (HGL) and subcontractor personnel providing munitions and explosives of concern (MEC) anomaly avoidance support during field operations where there is a potential for encountering MEC hazards.

Personnel who use this procedure must complete the SOP Acknowledgement Form (HGL SOP 408.501.F01) and submit it to the Senior Unexploded Ordnance Supervisor (SUXOS) and Unexploded Ordnance Quality Control Specialist (UXOQCS) as evidence that they have read and understand this procedure. Project leaders retain this documentation in the project file.

2.0 SUMMARY OF METHOD

All HGL employees tasked with performing MEC-related activities must qualify in accordance with (IAW) the Department of Defense Explosive Safety Board (DDESB) Technical Paper (TP) 18. Perform all work in a manner consistent with Occupational Safety and Health Administration-established standards and requirements. Conduct all activities in conformance with the project-specific Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP).

This MEC SOP discusses surface and subsurface anomaly avoidance procedures and techniques to be used while conducting munitions response and hazardous, toxic, and radioactive waste (HTRW)-related activities during investigative, design, and remedial actions. Anomaly avoidance techniques must be employed on properties known or suspected to contain MEC or chemical agent to avoid surface and subsurface explosive and chemical hazards. Anomaly avoidance techniques are implemented for activities that include the following:

- Surveying and mapping,
- Environmental and natural resource assessments,
- Surface and subsurface sampling,
- Boring and drilling,
- Groundwater monitoring, and
- Sign and fence installation.

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3.0 DEFINITIONS

3.1 DEFINITIONS

Anomaly Avoidance: Techniques employed on property known or suspected to contain MEC or chemical agent, regardless of configuration, to avoid contact with potential surface or subsurface hazards, to allow entry into the area for the performance of required operations.

Hazardous, Toxic, and Radioactive Waste (HTRW) Activities: Activities undertaken for the following:

- The U.S. Environmental Protection Agency’s Superfund program,
- The Defense Environmental Restoration Program, including Formerly Used Defense Sites (FUDS),
- Installation Restoration Program sites at active U.S. Department of Defense (DoD) facilities,
- HTRW actions associated with civil works projects, and
- Any other mission or non-mission work performed for others at HTRW sites.

HTRW actions during the investigative/design phase of an HTRW project on a site with known MEC or unknown fillers require anomaly avoidance procedures. MEC removal actions may be required in advance of HTRW activities (construction) on a HTRW project site with known MEC hazards.

Munitions and Explosives of Concern (MEC): Specific categories of military munitions that may pose unique explosives safety risks, including the following:

- Unexploded ordnance (UXO), as defined in 10 United States Code (U.S.C.) § 101(e)(5)(A) through (C);
- Discarded military munitions (DMM), as defined in 10 U.S.C. § 2710(e)(2); or
- Munitions constituents (such as TNT or RDX), as defined in 10 U.S.C. § 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

Munitions Constituents: Any materials originating from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions Debris: Remnants of munitions remaining after munitions use, demilitarization, or final disposition. Examples of munitions remnants include fragments, penetrators, projectiles, shell

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casings, links, and fins. Munitions debris also includes inert munitions-related material recovered during an MEC removal.

Recovered Chemical Warfare Materiel (CWM): Non-stockpiled CWM previously discarded, buried, or fired and discovered either unexpectedly or during planned environmental restoration operations that DoD has either secured in place or placed under DoD control pending final disposition. CWM is normally secured in a DDESB-approved storage location or interim holding facility, pending final disposition.

Unexploded Ordnance (UXO): As defined by 10 U.S.C. § 101(e)(5)(A) through (C), military munitions that

- Have been primed, fuzed, armed, or otherwise prepared for action;
- Have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material; and
- Remain unexploded whether by malfunction, design, or any other cause.

UXO-Qualified Personnel: Personnel who have performed successfully in military explosive ordnance disposal positions or are qualified to perform in the following contractor positions as listed in the Department of Labor's Service Contract Act Directory of Occupations: UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, or Senior UXO Supervisor.

3.2 ABBREVIATIONS/ACRONYMS

APP	Accident Prevention Plan
bgs	below ground surface
CWM	chemical warfare materiel
DDESB	Department of Defense Explosive Safety Board
DMM	discarded military munition
DoD	U.S. Department of Defense
DPT	direct push technology
FUDS	Formerly Used Defense Site
GPS	global positioning system
HGL	HydroGeoLogic, Inc.
HTRW	hazardous, toxic, and radioactive waste

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IAW	in accordance with
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
PA/SI	Preliminary Assessment/Site Inspection
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine (also known as Royal Demolition Explosive)
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
SUXOS	Senior Unexploded Ordnance Supervisor
TNT	trinitrotoluene
TP	Technical Paper
U.S.C.	United States Code
UXO	unexploded ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist

4.0 HEALTH AND SAFETY WARNINGS

Before entering an area requiring MEC anomaly avoidance, the UXO Technician must conduct a safety brief covering emergency procedures, operations, MEC hazards, and anomaly avoidance procedures. If MEC is encountered during any phase of work, follow the procedures in the project planning documents. In general, adhere to the following MEC safety precautions and protocols:

- Observe this cardinal principle when work may involve ordnance, explosives, ammunition, severe fire hazards, or toxic materials: limit the exposure to a minimum number of personnel, for the minimum amount of time, to a minimum amount of hazardous material consistent with a safe and efficient operation.
- DO NOT touch, move, or jar any ordnance items regardless of their markings or apparent condition.
- **Under no circumstances handle any MEC during avoidance activities or move MEC in an attempt to make a positive identification.**
- DO NOT touch, pick up, kick, or move anything that is unfamiliar or unknown.
- DO NOT roll the item over or scrape the item to identify markings.
- DO NOT approach or enter a munitions site if an electrical storm is occurring or approaching. If a storm approaches during site operations, leave the site immediately and seek shelter.

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- DO NOT transmit radios or cellular phones in the vicinity of suspect MEC hazards.
- DO NOT walk across an area where the ground surface cannot be seen or that has not been cleared of MEC hazards by the UXO Technician.
- DO NOT rely on color codes for positive identification of ordnance items nor their contents.
- DO NOT drive vehicles into a suspected MEC area until anomaly avoidance techniques have been implemented.
- DO NOT be misled by markings on the MEC item stating “practice” or “dummy.” Practice ordnance can have explosive charges used to mark and/or spot the point of impact, or the item could be marked incorrectly.
- Clearly mark the location of any ordnance item found during anomaly avoidance activities so that it can be easily located and avoided.

— WARNING —
Removing or taking any munitions, explosive, or UXO or munitions-related debris from the site by any employee is strictly prohibited.

5.0 CAUTIONS

5.1 MEC ENCOUNTERED

If MEC is encountered, the UXO Technician performs the following:

- Stops the team, draws attention to the hazard, and marks the hazard with a high-visibility pin flag, paint, or surveyors tape.
- If safe to do so, attempts to identify the MEC hazard via markings and other external features such as shape, size, and external features.
- Records the locations of any MEC hazard items in a Global positioning system (GPS), if possible.
- Photographs the hazard.
- Makes notifications required in the project planning documents.

5.2 MEC DISPOSITION

The UXO escort is not authorized or equipped to perform MEC disposition. MEC discoveries must be reported to the designated personnel/agencies identified in project planning documents. If staff encounter a MEC item that cannot be avoided or that, based on its fuzing or current condition,

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presents an imminent hazard, the UXO escort must immediately notify the personnel/agencies designated in project planning documents.

6.0 INTERFERENCES

Not applicable.

7.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

For anomaly avoidance on a site with potential MEC, HGL provides a UXO team consisting of a minimum of two personnel, one of whom must be a UXO Technician II or above (see exception in following paragraph). The UXO Technician serves as the UXO Team Leader and has ultimate responsibility for ensuring that all MEC anomaly avoidance support activities are performed IAW this SOP, project planning documents, and/or the APP/SSHP. The UXO Technician directs all MEC anomaly avoidance support during field operations.

A UXO Technician I can provide escort duties if under the supervision of UXO-qualified personnel. (Note: Although escort by a UXO Technician I is typically performed under the supervision of UXO-qualified personnel, the responsible commander or authority may approve UXO Technician I personnel to perform escort duties without supervision. Such approval must be based on an approved risk assessment and implementation of methods to mitigate potential exposures). Escorts will help ensure that MEC on the surface and subsurface anomalies are avoided.

7.1 UXO PERSONNEL

UXO personnel perform the following:

- Provide MEC recognition, location, and explosive safety functions.
- Conduct explosive safety briefing for all site personnel and visitors.
- Conduct a surface and subsurface anomaly avoidance.
- Work closely with U.S. Army Corps of Engineers/client personnel on all MEC-related matters.
- Coordinate and report MEC discoveries IAW project planning documents.

7.2 NON-UXO PERSONNEL

Non-UXO personnel perform the following:

- Obtain training in recognizing the potential hazards associated with MEC.

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- Remain with the UXO Technician at all times unless otherwise cleared to work without a UXO escort.
- Follow the instructions given by the UXO Technician if an accident occurs.

Exercise caution when walking on site and follow UXO Technician directions

8.0 EQUIPMENT AND SUPPLIES

8.1 GENERAL EQUIPMENT AND SUPPLIES

The following geophysical equipment is typically used during MEC anomaly avoidance operations:

- Magnetometers such as the Schonstedt GA 52-CX,
- Frequency-domain electromagnetic induction metal detectors such as the White's All Metals Detector, and
- Downhole monitors.

The following supplies are typically used during MEC anomaly avoidance operations:

- Flagging ribbon,
- Pin flags,
- GPS units, and
- High visibility, biodegradable spray paint.

8.2 EQUIPMENT INSPECTIONS

Staff must perform the following equipment inspections:

- Perform a daily equipment function check on all geophysical instruments and GPS equipment. Describe the performance results of the equipment check in the logbook or in an instrument maintenance and calibration log following each functionality test.
- If an equipment function check indicates that any piece of equipment is not operating correctly, and it cannot be field repaired immediately, remove the equipment from service until it can be repaired.

9.0 ANOMALY AVOIDANCE PROCEDURES

Conduct anomaly avoidance procedures during field investigation activities whenever there is a potential for encountering MEC. The purpose of the procedures is to avoid any potential surface

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and subsurface MEC hazards during these activities. Anomaly avoidance procedures including the following are outlined in the subsections below:

- Establishing site access routes and site boundaries, and conducting MEC avoidance surveys;
- Conducting land surveying and mapping;
- Conducting Preliminary Assessments/Site Inspections (PAs/SIs) on FUDS and Base Realignment and Closure sites;
- Conducting geophysical surveying; and
- Assessing environmental and natural resources:
 - Surface soil sampling,
 - Subsurface soil sampling,
 - Boring and drilling,
 - Groundwater monitoring, and
 - Test pits and trenches excavations.

9.1 ACCESS SURVEY AND MEC AVOIDANCE PROCEDURES

The UXO escort must conduct an access path survey for surface hazards and subsurface anomalies before any type of activities commence, including foot and vehicular traffic. The UXO escort is responsible for conducting the access survey using the following steps:

- Conduct an access survey of the footpath and/or vehicular lanes approaching and leaving work areas with known or suspected MEC. Typically, the access route will be twice as wide as the widest vehicle that will use the route.
- Conduct an access survey around the proposed work site that is large enough to support all planned operations. The size of the area will consider the maneuverability of the equipment and the space required to stage support vehicles or equipment.
- Use geophysical instrumentation capable of detecting the smallest known or anticipated MEC to locate anomalies just below the ground surface that may be encountered because of erosion from rain or because of continual foot or vehicular traffic. If the emplacement depth is greater than the detection capabilities, then the escort must complete the geophysical survey in intervals until the required depth is reached (for example, every 6 inches, 1 foot, 2 feet, and so forth).
- Clearly mark the route(s) for future entry control.
- If anomalies or surface MEC are encountered, mark the items and relocate the work area to an anomaly free area to avoid contact.
- Prohibit personnel from working outside of the surveyed areas.

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9.2 CLEARING AND GRUBBING

Initial clearing and grubbing operations may be required before field activities. The objective of clearing and grubbing is to create unhindered access for the field teams. In areas with potential MEC hazards, the UXO Team must perform the following:

- Survey the proposed clearing and grubbing area with a geophysical instrument. Mark hazards with survey flagging or pin flags.
- Begin clearing and grubbing within the area established by the survey.
- Use qualified UXO Technicians to escort grubbing teams at all times.
- Exercise caution when using mechanical grubbing equipment.
- Keep the lowest part of the cutting deck of mechanized equipment at least 6 inches above ground level to avoid potential contact with any MEC hazards remaining after the initial survey.

9.3 LAND SURVEYING AND MAPPING PROCEDURES

The UXO Technician performs the following during land surveying and mapping activities:

- Conducts an access survey of the routes to and from the proposed survey site and an area around the site.
- Visually inspects the surface of each proposed survey point for any indication of MEC or MEC-related contamination.
- Uses a handheld geophysical instrument to assess the presence or absence of subsurface anomalies at the locations where survey points/stakes installation is planned. If responses indicate an anomaly, the UXO Technician disallows survey point/stake installation at that specific location and assists in selecting an alternate location.

9.4 SAMPLING AND DRILLING PROCEDURES

9.4.1 Surface Soil Sampling (Zero to 6 Inches)

The following paragraphs describe anomaly avoidance procedures for surface soil sampling between 0 and 6 inches below ground surface (bgs) in areas with potential MEC.

- Conduct a surface access survey of the routes to and from the proposed investigation site as well as of a support area around the investigation site.
- Visually inspect the surface of each proposed surface soil sampling site for any indication of MEC or MEC-related contamination.

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- Survey the proposed sample locations using handheld geophysical instruments.
- Select an alternate location to collect surface soil samples if anomalies are detected at a proposed sampling location or too many anomalies are detected in a general area of interest.

9.4.2 Subsurface Soil Sampling (Below 6 Inches) and Monitoring Well Installation

The following paragraphs describe anomaly avoidance procedures for subsurface soil sampling and monitoring well installations in an area with potential MEC. Subsurface soil sampling is defined as the collection of samples below a nominal depth of approximately 6 inches with a split-spoon, Shelby tube, direct push sampler, or bucket auger (hand auger) soil sampler using drilling techniques. Drilling techniques are also used to install groundwater monitoring wells for HTRW investigations. The UXO team adheres to the following procedures:

- Conduct a surface access survey of the routes to and from the proposed investigation site as well as an area around the investigation site.
- Conduct a subsurface survey of the proposed drill hole location(s) with a handheld, geophysical instrument to detect subsurface MEC anomalies.
- Prominently mark the locations of any anomalies detected with survey flagging or non-metallic pin flags for avoidance.
- Select a new sampling or borehole location if an anomaly is detected.
- Incrementally complete the downhole geophysical survey (for example, every 2 feet) if the subsurface sampling depth is greater than the geophysical detection capabilities.

9.4.3 Incremental Geophysical Survey for Conventional MEC Avoidance

For intrusive sampling (subsurface sampling and well drilling) in areas with suspected MEC, the team completes follows this procedure:

1. Begin the installation:

- Complete the access survey of the area.
- Complete the geophysical survey and install a pilot hole at the sample or drill location if no anomalies are detected.
- As long as no anomalies are detected, advance the pilot hole to the maximum reach of the auger or to the maximum depth of the proposed drill hole.
- During installation, incrementally complete the downhole geophysical survey (for example, every 2 feet) if the subsurface sampling depth is greater than the geophysical detection capabilities.

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- When working in impact areas, the UXO team may discontinue incremental screening once a depth of 30 feet bgs is reached or the depth of MEC penetration has been exceeded, whichever is less.
- For all other areas, incremental geophysical screening will be determined based on an assessment of the site's characteristics and history.

2. If anomalies are detected:

- Stop installation immediately and backfill the pilot hole IAW project-specific procedures.
- Direct HTRW sampling personnel to select a new location.

9.4.4 Test Pits and Trench Excavations

Test pits and trench excavations are used to identify and characterize large subsurface HTRW areas of concern. Adhere to the following procedures:

- Conduct an access survey of the routes to and from the proposed excavation locations.
- If an anomaly is detected, select a new excavation location.
- If the proposed excavation depth is greater than the geophysical instrument detection capabilities, the UXO team proceeds as follows:
 - HTRW personnel can begin excavation in 1-foot increments.
 - At the end of each 1-foot increment, the UXO team screens for anomalies. If an anomaly is detected, the HTRW team must modify the excavation to avoid the anomaly.
 - If MEC is encountered, all operations must cease. The UXO team accesses the item and follows MEC procedures detailed in the project planning documents.
 - After the MEC hazard has been removed, excavation using anomaly avoidance can continue.
- If potentially hazardous waste, debris, or drums are encountered during test pit or trenching operations, stop all excavation activities. The Site Safety Officer adheres to the following procedure:
 - Assess the situation and direct a change to the personal protective equipment for site workers, if necessary.
 - Notify the appropriate personnel IAW the project planning documents.
 - Handle wastes IAW the project planning documents.

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9.4.5 Soil Sampling with Direct Push Technology

The following paragraphs describe anomaly avoidance procedures for soil sampling and use of direct push technology (DPT) in areas with potential MEC. Soil sampling with DPT typically involves manual or mechanical penetration at the desired location, followed by withdrawal and collection of a soil sample. The UXO Team adheres to the following procedure:

- Conduct a surface access survey of the routes to and from the proposed investigation site as well as an area around the investigation site.
- Follow the anomaly-avoidance procedures described above for subsurface soil sampling and monitoring well installations as follows:
 - Conduct an incremental down-hole geophysical survey for metallic anomalies.
 - Conduct actual sampling and geophysical instrument screening through the DPT borehole.
 - Backfill the sampling location IAW project-specific procedures after collection of the soil samples.

9.4.6 Groundwater Monitoring

Groundwater monitoring activities include measuring groundwater elevations, measuring free product thickness, and collecting analytical samples. Unless a path is clearly marked, HTRW sampling personnel must be escorted by UXO-qualified personnel when conducting groundwater monitoring/aquifer characterization activities in areas with potential MEC.

9.5 PRELIMINARY ASSESSMENT AND SITE INSPECTION

On sites where MEC hazards may be present, UXO Technicians perform anomaly avoidance measures to prevent non-UXO personnel conducting PA/SI work on the site from contacting MEC hazards.

10.0 DATA AND RECORDS MANAGEMENT

Personnel performing MEC anomaly avoidance activities should maintain copies of daily safety and tailgate briefings. A logbook should be maintained to record information such as daily weather events, performance results of equipment checks, visitors to the site, and instructions from government personnel.

11.0 QUALITY CONTROL AND QUALITY ASSURANCE

The Military Munitions Response Program (MMRP) Operations Manager ensures that this SOP is reviewed at least every two years for completeness, accuracy, and safety. Project Managers and

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supervisors ensure that all site personnel read, understand, and follow this SOP, and they must bring any discrepancies with procedural steps or safety issues pertaining to this SOP to the attention of the responsible supervisor for corrective action.

The senior UXO-qualified person on site has final on-site authority on all munitions and MEC procedures and safety issues. This individual has direct reporting and communications responsibility with all responsible authorities as directed by the HGL Project Manager.

12.0 REFERENCES

U.S. Department of Defense (DoD), Defense Explosives Safety Regulation 6055.09, Edition 1.

DoD Explosives Safety Board, Technical Paper 18, Minimum Qualifications for Personnel Conducting Munitions and Explosives of Concern-Related Activities.

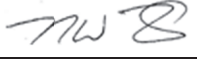
U.S. Army Corps of Engineers (USACE), Engineer Manual 385-1-97, Explosives Safety and Health Requirements Manual.

13.0 REVISION HISTORY

Revision Number	Revision Date	Reasons for Revision
3	September	Initial CMS Library Version

ATTACHMENTS

None.

	CORPORATE TECHNICAL PROCEDURE	
	Approved for issue by:	
	Process Owner	 Digitally signed by Feist, Neil Date: 2023.08.08 15:06:58 -05'00'
	Corporate Quality Director	Theresa Rojas Digitally signed by Theresa Rojas Date: 2023.08.07 17:17:42 -04'00'
	AGC Technical Manager	 Digitally signed by West, Meghan K Date: 2023.08.09 08:12:21 -06'00'
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1.0 PURPOSE AND APPLICABILITY

This standard operating procedure (SOP) describes activities associated with digital geophysical mapping (DGM) including civil surveying (grid or transect construction), geophysical system verification (GSV), geophysical data collection, data processing and analysis, and anomaly resolution as well as the geophysical quality control (QC) program.

DGM data can be collected with a variety of sensor technologies and positioning systems/methods. Most applications at munitions response (MR) sites involve use of the EM61-MK2 and global positioning system (GPS), robotic total station (RTS), or relative coordinate method of positioning (line and fiducial).

This SOP is specific to the use of the Geonics EM61-MK2, but it is applicable to all terrestrial DGM surveys and can be adapted for use with other digital geophysical instruments such as a frequency-domain electromagnetic (EM) system or magnetometer.

This SOP provides information on the general theory, equipment, methodology, personnel requirements, and data handling and processing steps for performing DGM surveys using the Geonics EM61-MK2 coupled with a positioning system such as a real-time kinematic (RTK) GPS or an RTS such that a digital record of geophysical responses and coincident positions is recorded simultaneously. The project-specific implementation of the DGM program is outlined in the project-specific planning documents. Project documents such as the Quality Assurance Project Plan (QAPP) or Work Plan supersede the information in this SOP.

2.0 SUMMARY OF METHOD

EM techniques can detect both ferrous and nonferrous metals. Geophysical methods require sufficient contrast between the item or feature sought and local background to detect targets of interest. The detection capability also is limited by the size, orientation, and depth of the item or feature. In general, the larger an item is, the deeper it can be detected.

The time-domain electromagnetic (TDEM) method is a nonintrusive geophysical method commonly used in environmental and MR investigations to detect buried ferrous and nonferrous metal objects. Typical objects that can be detected include burial pits containing metal, 55-gallon drums and underground storage tanks, metal utility lines, and munitions. For the EM61-MK2, the

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Naval Research Laboratory (NRL) has generated detection curves for many munitions items of interest; these detection curves can be used as a general guide for system performance. The TDEM method generates a primary magnetic field by pulsing an electrical current through a transmitter coil. The illuminating field causes eddy currents to flow in the ground and nearby metallic objects, resulting in a secondary current and associated magnetic field.

The time decay of the geophysical response is measured when the transmitter is off and is a function of the material properties of the source (type of metal and its electrical properties, size, shape, thickness, and orientation), its depth of burial, and the conductive properties of the soil (background) in which the field is measured. The system response is the cumulative voltage derived from all materials within the area illuminated by the primary signal. Consequently, the measured response may be caused by individual or multiple objects within the influence of the primary field. The geophysical response is measured by a receiver coil, typically at three or four time gates, and recorded in units of millivolts (mV) by a data logger.

In the absence of metallic materials, background noise levels are typically a few mV, and the measured response from a metal object can vary from several mV to several thousand mV.

3.0 DEFINITIONS AND ACRONYMS

3.1 DEFINITIONS

NMEA String: A type of data string that supplies geospatial information. The *GGK* or *GGA* National Marine Electronics Association (NMEA) message is a commonly used GPS data string that provides positional information (X, Y, and Z), time, number of satellites visible, and relative position accuracy. It is usually input into the data recorder using a serial data or universal serial bus (USB) cable, or Bluetooth, at regular intervals (e.g., every second). Many different types of NMEA data strings that supply geospatial information are currently in use.

Hertz (Hz): A measure of the frequency of repetition of a signal. A sampling rate of 10 Hz corresponds to the collection of 10 samples per second.

Line-and-Fiducial: A method of collecting digital geophysical data that relates the positions of the geophysical measurements to a relative coordinate system established using survey tapes and flags placed at known coordinates (X and Y). Data is collected at a regular recording interval between the flagged locations and a marker (fiducial), and it is entered into the data file when the sensor is coincident with each flag. The coordinates of the known locations are used to interpolate the geophysical measurements.

3.2 ACRONYMS

cm	centimeters
DGM	digital geophysical mapping
EM	electromagnetic
EM	Engineer Manual

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ESTCP	Environmental Security Technology Certification Program
FTP	File Transfer Protocol
GIS	geographic information system
GPS	global positioning system
GSV	geophysical system verification
HGL	HydroGeoLogic, Inc.
Hz	Hertz
ID	identifier
ISO	industry standard object
IVS	instrument verification strip
MR	munitions response
MS	Microsoft
mV	millivolts
NMEA	National Marine Electronics Association
NRL	Naval Research Laboratory
PCMCIA	personal computer memory card international
PDA	personal digital assistant
PDT	Project Delivery Team
PM	Project Manager
QAPP	Quality Assurance Project Plan
QC	quality control
RTK	real-time kinematic
RTS	robotic total station
SNR	signal to noise ratio
SOP	standard operating procedure
SUXOS	Senior UXO Supervisor
TDEM	time-domain electromagnetic
TPP	Technical Project Planning
TSR	task-specific review
USACE	U.S. Army Corps of Engineers
USB	universal serial bus
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Specialist
VTA	vehicle towed array
WAAS	wide area augmentation system

4.0 HEALTH AND SAFETY WARNINGS

The personnel who perform data collection must consult the project Health and Safety Plan and be aware of any site-specific hazards during performance of the task. Proper personal protective equipment is necessary and is covered in the activity hazard analysis for the task.

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5.0 CAUTIONS

Manuals and guidance provided by the manufacturers of any equipment used should be referenced to minimize the potential for equipment damage during assembly and use.

6.0 INTERFERENCES

Dynamic events such as rain, lightning, and solar flares may affect geophysical data collection. Procedures for geophysical survey operations when these events occur are the following:

- **Rain** – The effect of rain on geophysical operations is primarily dependent on the instrument being used and the physical site conditions (terrain and vegetation). Most of the instruments commercially available are relatively water resistant. Under conditions of light rain (drizzle), survey teams should take additional measures, such as covering electronics with plastic and using electrical tape to secure connections to reduce the possibility of moisture impacting the instrument's electronics. If the rain persists and the survey team leader determines that the quality of the data could be affected, cease field operations, and notify the site manager and Project Geophysicist. Continue operations after conditions are deemed safe by the survey team leader.
- **Lightning** – Aside from the obvious safety hazard discussed elsewhere in this SOP, lightning may cause a phenomenon known as “atmospherics” or electromagnetic noise, which may impede the performance of EM sensors. Halt data collection and monitor lightning activity in the area visually, and resume operation only when the lightning ceases.
- **Solar Flares** – Solar flares, a sun-generated phenomenon typically occurring in the afternoon, can temporarily generate high-magnitude magnetic noise sufficient to occasionally render EM sensors unusable for the duration of the event. Instrument operators throughout the area can readily observe solar flares as rapidly fluctuating signal readings with no apparent cultural or survey source. The Site Geophysicist logs the time intervals when solar flare activity is observed to help determine whether any data (for digital geophysics) may have been affected. The National Oceanic and Atmospheric Administration maintains a helpful website at <http://spaceweather.com>. The Site Geophysicist should monitor solar flare activity weekly, or more often as necessary, during the project.

If applicable, discuss in the project-specific planning documents any geology/soils with increased magnetism and rugged terrain, vegetation, or water that might affect the subsurface detection capabilities of the proposed DGM sensors used for a project.

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7.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

7.1 QUALIFICATIONS AND RESPONSIBILITIES

The personnel who perform DGM activities at sites where munitions are present must have a combination of education, training, and requisite experience to ensure that the data collected are of sufficient quantity and quality to meet the project objectives. The responsibilities discussed are the general requirements for a large-scale project (e.g., removal action over several hundred acres, significant Remedial Investigation). For smaller projects, it may be justified for one individual to perform multiple roles. For example, if only one DGM team system is deployed for a survey of 5 acres, it may be possible to combine the roles of the Project Geophysicist and Data Processor/Analyst, depending on the project requirements.

- Personnel who collect DGM data must be trained and familiar with the specific instruments and their operation and understand the specific data acquisition methodology for the project.
- Personnel who process and analyze data must have an in-depth understanding of the software, practices and procedures, and specific project objectives.

Required project personnel include the following:

- The Project Geophysicist of Record, who must meet the basic requirements of the MR industry, as described in several U.S. Army Corps of Engineers (USACE) publications;
- The QC Geophysicist, who is responsible for directing the DGM QC program in conjunction with the Project and Site Geophysicists and the HydroGeoLogic, Inc. (HGL) Project Manager (PM);
- The Site Geophysicist, who is usually required on larger-scale geophysical surveys performed for the MR industry to direct the survey efforts;
- A Geophysical Equipment Operator to guide each DGM team (at least two persons are required for safety purposes to deploy the instrumentation for each DGM team); and
- The Data Processor/Analyst, who is responsible for assessing the DGM data and reporting the results to the client.

For some projects, a professional civil surveyor is necessary to meet the requirements of the project. Project personnel should meet the following general qualifications:

Project Geophysicist of Record – This person serves as the technical team leader and is charged with ensuring that the geophysical survey is designed and performed to meet the project objectives. Specific responsibilities include the following:

- Planning and reviewing the Geophysical Investigation Plan or QAPP, field scheduling and execution, and oversight of the data processing and interpretation;

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- Designing the quality program for the geophysical investigation; and
- Serving as the primary point of contact for the HGL PM and the technical representatives of the client and regulatory agencies.

QC Geophysicist – The QC Geophysicist reports to the HGL corporate quality department to keep the lines of reporting and responsibility for quality management outside of the chain of command for project operations. Position responsibilities include the following:

- Managing the DGM QC program, and
- Reporting blind seed results to the Project Delivery Team (PDT).

Site Geophysicist – Position requirements include the following:

- A minimum of 3 to 5 years of direct experience in the field collecting, processing, and reporting geophysical survey data and results;
- An extensive background in conducting geophysical surveys or a degree in geophysics, geology, physics, engineering, or another related field;
- Experience using the geophysical and positioning systems to be deployed and used; and
- All the experience and qualifications of the Geophysical Equipment Operator.

Geophysical Equipment Operator (Lead) – Position requirements include the following:

- A minimum of 1 year of experience with geophysical and positioning instruments, or as required by the project;
- Experience with multiple data acquisition platforms and modes of acquisition;
- Experience with QC tests; and
- Experience with field documentation.

Geophysical Data Processor/Analyst (Lead) – The Geophysical Data Processor/Analyst must have requisite experience with the software and methods used for data processing and analysis. The Geophysical Data Processor/Analyst also must have knowledge and experience with information management, including management of the DGM and intrusive data streams using Microsoft (MS) Access or other appropriate geographic information system (GIS) software. Position requirements include the following:

- Experience with applicable modules in Geosoft Oasis Montaj, MS Access, DAT61-MK2, and other software such as Visual Sample Plan; and
- The same general experience and qualifications as the Site Geophysicist.

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Professional Land Surveyor or Registered Land Surveyor – The Professional Land Surveyor or Registered Land Surveyor must be registered in the state or region where the MR project is performed. The surveyor reports to the HGL PM and Project Geophysicist.

7.2 TASK-SPECIFIC REVIEW

Before each major activity associated with the DGM effort, the Project or QC Geophysicist (or their designee) may perform a task-specific review (TSR) for the technical leads of each activity to explain in detail the methods and requirements specific to each activity, QC and documentation requirements, and lines of reporting. The TSR is equivalent to a readiness review or a Preparatory Phase Inspection (for projects conducted under USACE's three-phase QC system).

In general, the TSR includes the following elements:

- Activity (e.g., civil survey, instrument verification strip [IVS], production DGM, data processing and analysis, anomaly reacquire, and acceptance sampling [hole checks]);
- Detailed approach and protocol for the activity and associated quality metrics;
- Lines of communication; and
- Documentation.

8.0 EQUIPMENT AND SUPPLIES

The equipment and supplies typically needed for DGM activities that use the EM61-MK2 include the following:

- EM61-MK2 high-sensitivity metal detector(s);
- Appropriate platform specified in project-specific planning documents (e.g., wheeled cart, tethered carry, stretcher carry, vehicle towed array [VTA]);
- Positioning system (as applicable for the activity) - GPS, RTK GPS, RTS, or tapes and pin flags (or ropes) for line and fiducial;
- Standardization jig (for static spike test);
- Standard item (for static spike test);
- Traffic cones, pin flags, or other markers for navigation during data collection;
- Field notebook;
- Miscellaneous supplies (e.g., flash drive, tool kit, voltmeter, flagging, stakes, permanent markers, indelible ink pens, electrical tape); and
- Higher-end laptop or desktop computer with licensed software for Geosoft Oasis Montaj, DAT61-MK2, and MS Access.

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The general components necessary for a single-sensor, person-portable EM61-MK2 survey include the following:

- Upper and/or lower coils;
- Wheeled cart with wheel counter (optional);
- Tripod for positioning system component (e.g., GPS antenna, RTS prism);
- Console containing system electronics;
- Power supply (battery and battery chargers);
- Data logger with battery charger (e.g., Allegro or Archer);
- Extra batteries for the EM61 and data logger;
- Cables to connect electronic console to lower coil and electronic console to data logger;
- Cable to connect data logger to GPS receiver (if appropriate);
- Cable to connect lower and upper coil, or shorting plug if only using lower coil;
- Extra set of all cables; and
- Applicable positioning system and all system components (cables, batteries, etc.).

The general components necessary for a towed array (multiple EM61 sensors) EM61-MK2 survey include those listed above plus the following components:

- Tow vehicle (diesel engine preferred);
- Sensor platform for mounting EM61 coils and positioning system components; for RTK GPS, two antennas are recommended, one for the platform and one mounted on the tow vehicle for navigation;
- Materials and hitch to connect tow vehicle to platform (Determine minimum distance between EM61 coils and tow vehicle based on a noise test at the start of the project.);
- Battery setup to power all EM61s from the same power source;
- EM61 synchronization cable;
- Ruggedized laptop computer with appropriate personal computer memory card international (PCMCIA) or USB interface;
- PCMCIA or USB octopus setup;
- Swath guidance system for navigation; and
- Software to log EM61 and positioning system data simultaneously (e.g., Multi61MK2xpn, Maglog).

Some of the components listed above for single sensor or array methodologies may not be necessary depending on the specific activity and project. Address in detail in the project-specific planning documents the specific equipment and protocol necessary for each DGM activity.

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9.0 PROCEDURAL STEPS

9.1 CIVIL SURVEY

Civil survey for each project includes the construction of DGM grids and/or transects using a licensed land surveyor or other experienced project personnel approved by the PDT during the Technical Project Planning (TPP) process.

The responsible person for the civil survey works with the GIS department, HGL PM, and Project Geophysicist to ensure that the following elements are performed in accordance with the project-specific planning documents:

- Verify the location of all transects and grids on the site base map.
- Ensure unique identification attributes for all grids, transects, and points.
- Transfer digital location data for each point to be staked in the field to the appropriate positioning system.
- Create control points or verify the accuracy of existing control points.
- Stake out each required point using industry accepted survey methods and digitally record the actual location occupied (x, y, z unique identifier [ID]).
- Physically mark the stakeout point using appropriate materials (lathe, flagging, survey nail, temporary monument, etc.).
- Verify that the unique ID of the stakeout point is inscribed on the appropriate material(s).
- Work in conjunction with the unexploded ordnance (UXO) technician performing anomaly avoidance to prevent placing stakes, nails, or other markers on top of significant anomalies.
- Ensure that flagging along transects is placed at appropriate intervals based on the vegetation characteristics and follow-on activity.
- Mark safety hazards that may affect follow-on activities such as DGM data collection.
- Create a backup copy of the digital survey data at least once per day.
- Transfer civil survey data to an MS Access table or MS Excel spreadsheet.
- Confirm that actual points occupied in the field achieve the project metric for accuracy and precision.

The responsible person who manages or performs the civil survey activity keeps detailed field notes. Field notes must be recorded in accordance with HGL SOP 401.501: *Field Logbook Use and Maintenance*, and they must include the following information:

- Date and field crew members;

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- Weather;
- Type of survey instrument, survey methodology, and approved monuments and control points used;
- Description and location information for temporary control points generated;
- Drawings or sketches, as necessary;
- Number of points surveyed; and
- Safety hazards noted and potential mitigation.

Include in the project-specific planning documents the surveying methodology and equipment (RTK GPS, GPS, RTS, etc.) and the accuracy requirements for grid corners, transect end points and intermediate waypoints along each transect, project boundaries, survey monuments, and other control points.

9.2 GEOPHYSICAL SYSTEM VERIFICATION

GSV is a process that combines appropriate instrument testing daily over an IVS and a blind seeding program to ensure that the data collected are of sufficient quantity and quality to meet project objectives. EM61-MK2 physics-based models are used to verify that the instrument's responses are within specifications. For a general discussion regarding the GSV process, refer to the Environmental Security Technology Certification Program (ESTCP) document titled *Geophysical System Verification (GSV): A Physics-Based Alternative to Geophysical Prove-Outs for Munitions Response* (ESTCP, 2009).

Use the IVS to verify the DGM sensors and equipment, acquisition methodology, and data processing and analysis strategies for the project as follows:

- Perform a background survey over the IVS area with the EM61-MK2 or appropriate analog sensor prior to the construction of the IVS.
- Once the background has been recorded and mapped, construct the IVS using the general procedures specified in the project-specific planning documents and in (1) USACE's *Ordnance and Explosives Digital Geophysical Mapping Guidance-Operational Procedures and Quality Control Manual* (USACE, 2003) and (2) USACE Engineer Manual (EM) 200-1-15.
- Determine the coordinates for the center of each item with an RTK GPS or RTS to an accuracy of 3 centimeters (cm), or as specified in the project-specific planning documents.
- For IVS sites located in heavily wooded areas, measure the lateral location of each item along the IVS centerline to an accuracy of 5 cm (or as specified in the project-specific planning documents) using a measuring tape.
- Record the location, depth, and orientation for each industry standard object (ISO).

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Because of the sizes of some project sites, it may be necessary to install several local “satellite” IVS plots. Satellite IVSs may be designed differently than the main IVS.

The IVS typically has a centerline approximately 15 to 20 meters in length and a “noise” line established nearby. Items placed in an IVS usually consist of ISOs buried at representative depths along the IVS centerline separated by horizontal distances of approximately 5 meters. Place the ISOs at horizontal (long axis transverse and parallel to centerline) and vertical orientations, or as specified by the project-specific planning documents. As necessary, include inert munitions items not referenced in the NRL document titled *EM61-MK2 Response of Standard Munitions Items* (NRL, October 2008) in the IVS to verify that the anomaly selection criteria meet the project objectives.

Use the main IVS performed at the start of the project to verify the DGM system(s) and to generate the IVS report, which summarizes the results of the initial IVS and includes the minimum following information:

- As-built of the IVS;
- Digital photographs of each IVS item;
- Map(s) of DGM data;
- Detailed summary table of geophysical sensor results for required channels and appropriate sum channel combinations (if warranted), including results of multiple passes along the centerline and noise line, static-spike values, and comparison to the NRL detection curve data;
- Initial anomaly selection criteria and rationale;
- Proposed geophysical equipment, platform, and acquisition methodology;
- QC metrics for each geophysical platform/system; and
- Raw, processed, and final processed DGM data and corresponding MS Access database, including test files for static and static-spike, personnel (if applicable), cable shake and personnel (if warranted), known position check, and pull-away and engine revolutions per minute tests for vehicle-towed systems.

Each team is required to perform daily QC tests (a.m. and p.m.) at the IVS and collect data over the IVS centerline and noise line during production DGM. For most projects, it is assumed that a PDT representative is available and present in the field to approve the initial IVS results in real-time. Satellite IVSs may be used for specific projects to document the results for the daily instrument tests.

The GSV includes a blind seed program. The blind seed program verifies that data collection, processing, and anomaly resolution meet the project requirements. In general, place blind seed items to ensure that each data acquisition team encounters a minimum of one blind seed item per day (HGL SOP 410.503: *Seed Production Areas*). During production DGM activities, the HGL

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QC Geophysicist reviews the interpretation and subsequent dig results to verify that the dynamic position and signal response achieve the quality metrics defined in the project-specific planning documents.

The QC Geophysicist maintains the locations of the blind seed items in a secure database or spreadsheet during project execution. Project personnel associated with data acquisition and data processing/analysis do not have knowledge of the locations of the blind seed items unless the project planning documents specify otherwise.

9.3 DATA COLLECTION

DGM data is routinely collected along one-dimensional transects and/or two-dimensional full coverage grids (or over large contiguous areas) using a variety of sensors, data acquisition platforms, and positioning systems. For most applications on MR projects, positioning for the geophysical measurements is obtained using a combination of wide area augmentation system (WAAS) GPS, RTK GPS, RTS, and line-and-fiducial or wheel-mode methods. The positioning systems applicable to most MR projects are the following:

- **AUTONOMOUS GPS:** Autonomous GPS is usually used for the DGM transect application (i.e., density transects) and other applications where survey-grade positioning is not required to meet the project objectives. For example, a WAAS correction is capable of approximately 10-meter accuracy (or less) and works well under canopy cover. One of the advantages of a WAAS correction over other GPS systems is that it does not require the use of a local GPS base station. Mount the GPS antenna on the appropriate sensor platform or personnel in a position where it does not adversely affect the sensor measurements. Stream the position data directly into the data logger used to capture the geophysical data.
- **RTK GPS:** RTK GPS is used in “open” areas void of canopy for both transect and full coverage modes of DGM acquisition when it is necessary to accurately determine the position of anomalies. An RTK GPS system (e.g., a Trimble R8 or Leica Viva base station and rover) consists of two dual-frequency geodetic quality receivers (base station and rover) in radio communication with each other. Mount the rover GPS antenna directly over the EM61-MK2 coils at a height where it does not adversely affect the sensor measurements. Stream the position data directly into the data logger used to capture the EM61-MK2 data.
- **RTS:** An RTS is typically used to support the DGM full coverage mode of acquisition in areas where canopy or tall obstructions, such as buildings, prevent the use of RTK GPS. In certain cases, the RTS may be used with a relative coordinate system if the relative distances and elevations between at least two control points are known. A motorized total station survey instrument tracks the prism during data collection. Center the RTS prism above the EM61 coils at a height where it does not adversely affect the sensor measurements. Stream the position data via radio modem directly into the data logger used to capture the EM61-MK2 data.

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- Line-and-Fiducial Positioning and Wheel Mode:** Line-and-fiducial positioning is used to support DGM full coverage acquisition in wooded and “open” areas. This method uses a relative Cartesian coordinate system that is delineated and marked with pin flags or other markers at regular intervals using calibrated survey tapes. The operator emplaces marks (fiducials) into the geophysical data as the sensor passes each pin flag, and the measurements are interpolated between the known points to georeference the sensor data. If the ground surface within the full coverage grids is sufficiently smooth and flat, an encoder incorporated into the EM61 wheel may be used to trigger geophysical measurements at regular intervals along each line, in which case fiducial marks are optional.

Two of the most common data acquisition platforms used for MR projects are reviewed in the following sections. The specific methodology and protocol used for data acquisition must be designed in concert with the PDT and detailed in the project-specific planning documents.

9.3.1 Person-Portable

The EM61-MK2 wheeled cart consists of two wheels and a handle mounted directly to the bottom coil. The wheels position the coil 42 cm above the ground surface. A specialized platform and/or wheels can be used to maintain the lower coil 10 to 42 cm above the ground surface. The power source and electronics console are mounted on a backpack (or within the lower coil and on the handle, respectively) and transported by the instrument operator. When used with a GPS, the GPS antenna often is centered over the coils at a standoff height determined during the initial IVS activities.

The single-sensor, person-portable system can be integrated with a WAAS GPS for transect DGM and used with RTK GPS, RTS, or line-and-fiducial/wheel-mode positioning for full coverage DGM grids.

EM61-MK2 measurements are acquired at a minimum rate of 10 Hz, and the position information from the NMEA GPS message is streamed into the data logger at a minimum rate of 1 Hz. GPS fix quality and the number of satellites are monitored during data collection.

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EM61-MK2 wheeled cart configured with WAAS GPS

Document significant obstacles such as trees, fences, and debris piles on a hard copy data acquisition form (or digitally on the data logger) so that these features can be placed on the site maps and be accounted for during the analysis of the geophysical data.

General procedures for performing DGM over full coverage grids or transects with a single sensor person portable EM61-MK2 are as follows:

- a. Conduct safety meeting and perform metal check of acquisition personnel (if required).
- b. Set up the appropriate positioning system or method per the requirements in the project-specific planning documents.
 - Examine data collection area to assess for proper vegetation removal and potential safety hazards.
 - Set up visual navigation aids (ropes, traffic cones, measuring tapes, spray paint, etc.) as necessary to assist the team in acquiring data at regular intervals over the full coverage grid.
 - If surveying transects in wooded areas, use the virtual path on the GPS or data logger for navigation and/or flagging tape placed by the vegetation clearance team.
 - If collecting data over transects in “open” areas, the virtual path on the GPS or data logger can be used for navigation.
- c. Turn EM61 on using master/slave switch and warm up for a period of 10 to 15 minutes, or as designated in the project-specific planning documents.
- d. Null instrument at designated background location, perform a.m. instrument functional tests, and collect data over IVS centerline and noise line. Use project-specific file naming protocol and specific test identifiers as outlined in the TSR.

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- e. Begin data collection and traverse intended survey area in a systematic fashion at a consistent pace as prescribed in the project-specific planning documents. Use the project-specific file naming protocol for production DGM files.
 - During data collection activities, monitor the battery voltage and EM61 measurements every 15 minutes in static mode, more often as the battery level approaches 12 volts. Replace the battery if it falls below 11.85 mV or below a project-specific minimum voltage.
 - To ensure that the spatial coverage necessary is achieved for full coverage grids, navigate using pin flags, spray paint, ropes, or other marks at regular intervals along each acquisition line.
- f. At end of day, null the instrument at the designated background location, perform p.m. instrument functional tests, and collect data over IVS centerline and noise line. Use project-specific file naming protocol and specific test identifiers for QC files.
- g. Ensure that field documentation is complete and accurate (e.g., grid sheets when using line-and-fiducial positioning).
- h. Transfer DGM data from the data logger to the dedicated geophysics field computer and immediately back up to the hard drive or USB media.
- i. Document activities for the day for each DGM team.
- j. Transfer DGM data and documentation of daily activities to the HGL processing center via email or upload to the secure HGL File Transfer Protocol (FTP) or SharePoint site.
- k. Notify data processor/analyst of the data transfer by email or phone.
- l. Place all batteries on charge and visually inspect EM61, positioning system, and all cables.

9.3.2 Vehicle Towed Array

A VTA system consists of a non-metallic fiberglass trailer platform towed by an all-terrain or other vehicle. Two (or more) EM61-MK2 coils are mounted on a trailer platform 10 to 42 cm above the ground surface with the long or short axis of each coil perpendicular to the direction of travel, resulting in a variable swath of data. An RTK or autonomous GPS antenna is mounted at a known offset from the center of the array to provide accurate positions for the EM61-MK2 measurements, and a second GPS antenna may be placed on the roof of the vehicle and linked to a swath guidance system to provide navigation assistance for the vehicle operator.

EM61-MK2 data for all sensors are recorded at a minimum rate of 10 Hz with a Panasonic Toughbook CF-31 field computer (or equivalent) using the Geomar *ML61MK2xpn* software (or equivalent). The position information from the



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NMEA GPS message is streamed into the Panasonic Toughbook serial port and integrated with the EM61-MK2 measurements in real time.

Prior to using the array at the initial IVS or for production DGM activities, perform a noise test to determine the minimum allowable offset between the tow vehicle and EM61 coils that comprise the array. The test consists of collecting static EM61-MK2 data with the engine off and at variable revolutions per minute when the engine is turned on.

General procedures for performing DGM over full coverage areas or transects with a VTA are the following:

- a. Conduct safety meeting and perform metal check of acquisition personnel.
- b. Set up the RTK GPS base station for full coverage surveys over contiguous areas. If VTA is used for transect data collection and anomalies will not be intrusively investigated, then have available the option to use a single GPS mounted on an array platform. Provide specific details in the project-specific planning documents.
- c. Assess data collection area for proper vegetation removal and potential safety hazards.
- d. Turn EM61 array on using master/slave switch on primary EM61 and warm up for a period of 10 to 15 minutes, or as designated in the project-specific planning documents.
- e. Null instrument at designated background location, perform a.m. instrument functional tests, and collect data over IVS centerline(s) and noise line. Use project-specific file naming protocol and specific test identifiers as outlined in the TSR.
- f. When collecting full coverage data over a contiguous area, ensure that the swath guidance system is configured correctly based on the area that needs to be covered with the VTA. If collecting data over transects in “open” areas, the GPS or RTK GPS should be used for navigation and positioning.
- g. Begin data collection and traverse intended survey area in a systematic fashion at a consistent speed as prescribed in the project-specific planning documents. Use the project-specific file naming protocol for production DGM files.
 - During data collection activities, monitor the battery voltage and EM61 measurements every 15 minutes in static mode and more often as the battery level approaches 12 volts.
 - Use the swath guidance system to navigate each predetermined swath to ensure that the spatial coverage necessary is achieved for a contiguous survey area.
- h. At end of day, null instrument at designated background location, perform p.m. instrument functional tests, and collect data over IVS centerline(s) and noise line. Use project-specific file naming protocol and specific test identifiers for QC files.
- i. Back up each acquisition or QC file to the USB drive or other suitable media immediately after the file is collected.

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- j. Verify that field documentation is complete and accurate.
- k. Transfer DGM data from the ruggedized laptop to the dedicated geophysics field computer and immediately back up to the hard drive or USB media.
- l. Document activities for the day for each VTA system.
- m. Transfer DGM data and documentation of daily activities to the HGL processing center via email or upload it to the secure HGL FTP or SharePoint site.
- n. Notify data processor/analyst of the data transfer by email or phone.
- o. Place all batteries on charge and visually inspect VTA components and tow vehicle.

9.4 DATA PROCESSING AND ANALYSIS

The Data Processor/Analyst is responsible for processing, analyzing, and interpreting the DGM data and uses a combination of the following software to accomplish the data processing:

- Geonics DAT61-MK2 or Trackmaker61MK2 (single sensor);
- Geomar ML61MK2xpn or Geometrics Maglog (VTA);
- Geosoft Oasis Montaj;
- MS Excel, Word, and Access programs; and
- Text editors (Notepad ++, WordPad, TextPad).

The primary software used to process and analyze the geophysical data is the Geosoft Oasis Montaj software.

The Site Geophysicist (or their designee) is responsible for backing up the DGM data to a field laptop and portable hard drive (or USB stick) at the end of each day. Additional tasks include the following:

- Checking field notes and sketches for completeness.
- Generating a comprehensive README file (readme.txt) or a list of activities that documents the following information:
 - Field team(s) responsible for data collection;
 - Transects or grids where data were collected;
 - File names;
 - QC tests; and
 - Potential data issues.
- Transmitting the DGM data, field notes, sketches, and README or activity list files for each day using email or the secure HGL FTP or SharePoint site for retrieval by the HGL Data Processor/Analyst.

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The Data Processor/Analyst organizes the DGM data received from the field team on the HGL server in a structured format to ensure that the raw data is never compromised. The Data Processor/Analyst initially reviews and processes the data as follows:

- Convert binary DGM data files into an ASCII “XYZ” format using appropriate vendor software.
- Create a geophysical workspace in Oasis Montaj.
- Import each XYZ file into a separate Oasis Montaj geophysical database using the standard HGL naming convention.
- Perform initial visual checks of the daily instrument functional tests for each test file and immediately alert the Site Geophysicist and/or field team of any significant issues that may require immediate corrective action.

After the initial data review, the Data Processor/Analyst processes the daily instrument functional tests and production DGM data as follows:

- Remove time or distance errors (latency or lag).
- Correct channels for instrument drift.
- Review data in background areas (areas free from metal) to verify the leveling for each data channel (ensures data representativeness).
- Identify potential errors associated with navigation or positioning.
- Review survey coverage and data quality to identify any data gaps that may require additional data collection.
- Document processing methods and parameters, file tracking information, results of the instrument functional tests, and information related to spatial sample density using the MS Access database.

After processing data for each production DGM session, the Data Processor/Analyst appends the data to a “master” Oasis Montaj geophysical database to document the up-to-date status of the DGM survey, or as required in the project-specific planning documents.

The Data Processor/Analyst delivers the raw and final processed DGM data, including the master geophysical database, packed Oasis map(s), and results of the instrument functional tests documented in the MS Access database, to the client at regular intervals during project execution using a secure HGL FTP server, SharePoint site, or a Department of Defense Secure Access File Exchange link provided by the client. The delivery schedule for the data is documented in the project-specific planning documents.

The Data Processor/Analyst also is responsible for data analysis, interpretation, and information management for the production DGM data. The primary goal of the DGM analysis and

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interpretation is to identify subsurface metal related to munitions use to provide relevant information that can be used for site characterization. Use the Oasis Montaj “pick peaks along profiles” algorithm for target selection along transects; use the Blakely algorithm for target selection within full coverage DGM grids. Specific parameters for anomaly selection are documented in the project-specific planning documents and/or IVS report.

The Data Processor/Analyst proposes the anomaly selection criteria in the IVS report to consist primarily of signal intensity and signal to noise ratio (SNR) components. Interpolate DGM data from full coverage grids using the minimum curvature or nearest neighbor gridding routine in Oasis Montaj at an appropriate cell size to create color-coded data images used for analysis and target selection. Interpretation for full coverage grids also uses the signal intensity and SNR components to initially screen anomalies for inclusion on the dig list. Evaluate the one-dimensional anomaly shape from the data profiles for each EM61-MK2 channel and two-dimensional anomaly shape.

The anomaly selection criteria presented below are typical based on project experience and may be modified for different MR projects:

- Signal intensity (approximately 4 to 5 mV [Channel 2], or equivalent channel sum or weighted channel sum intensity);
- SNR (minimum of 3:1, 3 times the standard deviation of the “noise” estimate, and use that value multiplied by a value of approximately 3 to 5 as the signal intensity threshold);
- More than five sample points width on data profile for each channel;
- Signal decay progression: Channel 1 > Channel 2 > Channel 3 > Channel 4; and
- Anomaly footprint present on at least two adjacent acquisition lanes on color-coded image at an appropriate color scale.

The target selection process is usually conservative. Anomalies that initially do not meet the anomaly selection criteria are candidates for the intrusive investigation if their footprint, shape, and decay parameters indicate a relatively deeper anomaly source. When required, add to the dig sheet a percentage of the anomalies that do not meet all attributes of the anomaly selection criteria that are not related to man-made features or significant noise sources (e.g., above- or below-ground power line).

The site “noise” as derived from the initial IVS may not be representative of the “noise” encountered over all areas of the site. If environmental factors such as terrain and geology/soils or man-made features are present in a specific area, revise the anomaly selection criteria in concert with the PDT.

Use an iterative approach for MR projects in terms of the anomaly selection criteria. The Project Geophysicist (or their designee) continually assesses intrusive investigation results. The anomaly

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selection criteria may be modified in concert with the PDT, if necessary (e.g., excessive “no finds,” unknown munitions items identified, etc.).

After targets have been selected, submit hard copy and/or digital dig sheets and color-coded images to the HGL GIS Department for upload to the project GIS and distribution to the intrusive teams. A color-coded image of each full coverage DGM grid is generated with an appropriate color scale and symbols identifying each target to be investigated.

The Data Processor/Analyst or GIS Specialist manages the dig sheet information and verifies that the following information is included in the database for each target:

- Unique target ID;
- Easting and northing coordinates in State Plane, Universal Transverse Mercator, or local coordinates;
- Sensor response for appropriate EM61 channels or sum or weighted sum channel;
- Signal decay (optional);
- Dig priority based on correlation to target attributes; and
- Interpreter comments.

9.5 ANOMALY RESOLUTION

For the purposes of this SOP, anomaly resolution includes anomaly reacquisition, the geophysical feedback process, and acceptance sampling (post-intrusive hole checks). The geophysical feedback and acceptance sampling tasks are considered QC tasks and are discussed in Section 11.0.

Depending on the project objectives, site characteristics, and how the DGM data was collected, anomaly reacquisition may be performed with a positioning system only (RTK GPS or RTS). When necessary, analog or digital geophysical sensor(s) may be used in conjunction with the positioning system or method. Document the specific protocol for anomaly reacquisition in the project-specific planning documents.

9.5.1 Anomaly Reacquisition

The Project or QC Geophysicist (or their designee) performs a TSR for anomaly reacquisition, when required. Before beginning intrusive activities, field teams use the appropriate methodology (e.g., RTK GPS, RTS, measuring tapes) and geophysical sensor(s) specified in the approved project-specific planning documents to navigate to the location of each target on the dig sheet. Once the target location on the dig sheet has been reacquired and flagged to the tolerance specified in the project-specific planning documents, field team members may perform a localized survey with the EM61 near the flagged location (searching a 1-meter radius around the flag is common in the industry).

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During search activities, the team monitors the signal intensity in real time on the EM61 data logger and moves the flag (if necessary) to the location with the peak signal intensity. The signal intensity, offset, and direction from the dig sheet location are documented using a hard copy sheet or ruggedized personal digital assistant (PDA).

The general procedure for anomaly reacquisition with an RTK GPS and EM61-MK2 is as follows:

- Upload points for reacquisition (dig sheet coordinates and Target_IDs) to the rover RTK GPS unit and configure the unit for stakeout operations.
- Set up the RTK GPS base station at an approved control point or monument.
- Perform a.m. QC tests with the EM61-MK2 and RTK GPS at an approved location (equipment warmup, static and static spike, known position check) using the methodology and tolerances specified in the project-specific planning documents.
- Navigate to each Target_ID using the “next closest point” option on the RTK GPS rover unit and place a PVC pin flag with the unique Target_ID within 0.15 meter (or project-specific distance) of the dig sheet coordinates (or place a boot mark at the location of the dig sheet coordinates).
- Check a 1-meter (or project-specific distance) radius around the flag with the EM61-MK2 and locate the peak signal intensity.
- Move the PVC pin flag to the location of the peak signal intensity and document the intensity, offset, and direction from the dig sheet coordinates (as appropriate, use comments to note information that might be useful to the intrusive team).
- Repeat previous three steps for each target.
- Perform p.m. QC tests with EM61-MK2 and RTK GPS at an approved location (static and static spike, known position check) using the methodology and tolerances specified in the project-specific planning documents.
- Upload anomaly reacquisition information using email or the secure HGL FTP or SharePoint site.

9.5.2 General Intrusive Activities

Excavation teams usually are required to search a 1-meter radius (or as specified in the project-specific planning documents) around the flagged location until the source(s) of the anomaly is identified. The excavation teams remove the source(s) from the excavation and document the characteristics of the anomaly source(s) on a hard copy sheet (or digital PDA) for upload to the intrusive database.

After clearing the localized areas within the designated search radius with handheld analog detector(s) (e.g., Schonstedt, White’s, Minelab F3), the intrusive team rechecks the location with an EM61-MK2 to confirm that the anomaly has been adequately resolved (i.e., the response is

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below the anomaly selection threshold for the project). The preferred practice is to use a bucket and remove the metal from the grid. If spoils are placed back in the hole, they must be moved far enough away to ensure that they do not interfere with the EM61-MK2 during the hole check. If there is still a response above the threshold, additional excavation and/or further explanation may be required.

9.5.3 Feedback Process

The Project Geophysicist (or their designee) is responsible for comparing the intrusive results to the geophysical anomaly characteristics and documenting the findings in the MS Access database. Intrusive investigation results that are not well understood also are reviewed by the QC Geophysicist, UXO Quality Control Specialist (UXOQCS), and intrusive investigation team leader to ascertain the credibility of the reported source(s). Anomalies that are not resolved to the satisfaction of the Project or QC Geophysicists, or PDT, may be reinvestigated by the intrusive investigation team.

9.5.4 Acceptance Sampling (Post-Intrusive Hole Checks)

The Project Geophysicist (or their designee) performs a TSR for the acceptance sampling element of the project. After each grid has been intrusively investigated, a qualified EM61 operator completes an independent check of a percentage of the excavations within the full coverage DGM grids (the EM61 operator may not be involved in other elements of anomaly resolution for the specific work product being checked). The operator documents residual signal intensity for each anomaly location using a hard copy sheet or ruggedized PDA. Residual signal intensity that exceeds the anomaly selection threshold proposed in the IVS report requires further validation of anomalies within the grid and possible intrusive investigation.

10.0 DATA AND RECORDS MANAGEMENT

The Data Processor/Analyst documents the information generated from the DGM program in the MS Access database in predefined tables. The Data Processor/Analyst works closely with the geophysical team, UXOQCS, Senior UXO Supervisor (SUXOS), and HGL PM to produce accurate, complete information. For a typical MR project, the information from the DGM program is delivered to the client in accordance with the table below.

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DGM Submittals

Submittal	With Each Submittal	24 Hours After Collection	24 Hours After Request by Government Representative	By the Following Friday	7 Days After Completed Excavations of Each Grid	CD/DVD with Final Report
README File	X					
Index Map	X					
Updated DID Tables from MS Access Database	X					
First Week's Mapping and QC Data		X				
Special Request Draft Data			X			
Analog and DGM Data Package for Each Week's Data Collection (raw and final mapping and QC data, maps, field data sheets, and updated associated database tables)				X		
Intrusive Results Tables					X	
All Raw and Final Digital Data, Maps, Final Access Database, Final QC Documentation						X

11.0 QUALITY CONTROL AND QUALITY ASSURANCE

11.1 INSTRUMENT FUNCTIONAL CHECKS

Instrument functional checks (also known as QC tests) are performed daily during DGM activities and are designed to achieve the performance metrics in Chapter 11 of the USACE document titled *Technical Guidance for Military Munitions Response Actions* (EM 200-1-15). The tests ensure that the equipment and sensors are functioning as intended. A designated area clear of subsurface metallic debris and adjacent to the main IVS (or one of the satellite IVSs) is typically used for the daily QC tests for each DGM system. The Data Processor/Analyst reviews the results of the QC tests each day and documents the results in predefined MS Access database tables.

Each DGM field team is required to use consistent test procedures, including the use of a “jig” (or equivalent) and standard item (e.g., small ISO) for the static spike test. If the standard item is lost or damaged during the project, the DGM team leader notifies the Data Processor/Analyst and another standard item is identified for use. The replacement standard item is documented in the MS Access database.

The daily test regimen provides information on environmental sources of interference or connectivity issues and ensures that the DGM data is of sufficient quantity and quality to meet the project objectives. The daily test regimen at the IVS includes the following instrument functional tests. Typical quality metrics are shown in parentheses (actual metrics are specified in the project-specific planning documents).

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- **EM61 Warmup Period** (10 to 15 minutes or project-specific time).
 - Metal check of acquisition personnel.
- **Static and Static Spike** (Response for all data channels to a standard test item within +/- 20 percent of the predicted response).
 - **REGIMEN:** Collect data for a minimum of 3 minutes in the designated background area. This includes 1 minute of static data followed by 1 minute of data collection with the standard item and then 1 minute of additional static data.
 - Write the required Channel 1 to 4 response ranges on the standard test item (or in the logbook) and ensure that each channel is within the required range during the static spike test.
- **Personnel and Cable Shake** (No data spikes in excess of 3 mV for any data channel is typical.).
 - **REGIMEN:** Each team member approaches and then walks away from the sensor while the other observes the response.
 - Afterward, the team leader gently wiggles each system cable (i.e., simulate the motion that occurs during data collection) and observes the signal responses on the data logger. When using some EM61-MK2 platforms/systems, the cables are secured in place with plastic guides and the cables should not be shaken.
- **IVS Centerline** (Dynamic response for all data channels greater than 75 percent of the average response calculated from the first set of multiple passes along the IVS centerline [or compared to that predicted by NRL] for designated IVS items when SNR >5; dynamic positioning repeatability not to exceed 0.25 meter (RTK GPS or RTS) and 0.5 meter + ½ line spacing when fiducial positioning is used is typical.).
 - **REGIMEN:** Collect data along the IVS centerline and then reverse direction, traversing the line in forward and opposite directions (if required).
- **IVS Noise Line** (Dynamic noise documented).
 - **REGIMEN:** Collect data along the IVS noise line and then reverse direction, traversing the line in forward and opposite directions (if required).
- **Known Position Check** (Offset from known control point or monument within 0.10 meter [RTK GPS or RTS]. One test per day is usually required, preferably prior to starting work for the day.).
 - **REGIMEN:** Place the positioning system antenna or prism over an approved control point and digitally record the location while also ensuring the relative offset from the known location is within tolerance.

During anomaly reacquisition and acceptance sampling activities, the field team performs a static and static spike test daily to ensure that the EM61 is operating within specifications. If RTK GPS or RTS is used, a known position check is also necessary.

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To increase the efficiency of the data processing and analysis task, the DGM field team uses the following protocol (or similar) to designate the QC tests on the data logger:

- Line 0 – static for 1 minute;
- Line 1 – static spike for 1 minute;
- Line 2 – static for 1 minute;
- Line 3 – personnel (as required);
- Line 4 – cable shake (as required);
- Line 5 – IVS centerline;
- Line 6 – IVS noise line; and
- Line 7 – known position check (if positioning system antenna or prism not removed from platform).

In addition to the quality metrics for the daily instrument functional tests, typical quality metrics for the spatial sampling components of the DGM program are as follows:

- Along track sampling, 98 percent of the measurements for each data collection session must be less than or equal to 0.25 meter, and 100 percent must be less than 1 meter.
- For grid coverage, greater than 90 percent coverage of the project design line spacing must be achieved, with 98 percent coverage to less than 1 meter required for Remedial Investigations and 100 percent coverage to less than 1 meter required for Remedial Actions.
- For dynamic detection capability, blind seeds must be detected within 0.25 meter + ½ sensor spacing (RTK GPS or RTS) or within 0.5 meter + ½ sensor spacing of their known location (line and fiducial) with a signal intensity for all data channels of at least 75 percent of the minimum expected.

The Project and/or QC Geophysicist reviews the anomaly resolution information in the project database weekly and documents the findings in a representative table. Based on the findings each week, future checks may occur at an increased rate.

11.2 GOOD FIELD PRACTICES

- Given that the EM61 instrument is a metal detector, it is important that the operators be metal-free. Unless dictated by health and safety concerns, this includes the absence of cell phones, communication radios, and boots with metal eyelets or shanks.
- It is important to secure cables firmly to the data acquisition platform using zip ties or other tension relief materials.

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- If RTK GPS or RTS is used for positioning, the antenna or prism should be mounted as close as possible to the pivot point of the sensor system to minimize “tilt” errors, while still maintaining an adequate distance to minimize system “noise.”
- If multiple single sensor EM61 systems are being used by independent teams on a project, the separation distance between the units should not be less than approximately 60 meters, or a distance determined during initial project testing at the main IVS.
- It is beneficial to digitally record the warmup period of the EM61; designate the file name in the readme.txt or activity list file that is transferred to the Data Processor/Analyst daily.

12.0 REFERENCES

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13.0 REVISION HISTORY

Revision Number	Revision Date	Reasons for Revision
7	March 8, 2022	Initial CMS Library Version
8	August 7, 2023	Updated per the required annual review.

ATTACHMENTS

None.

ATTACHMENT C

**ADVANCED CLASSIFICATION VERIFICATION AND
VALIDATION PLAN**

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Attachment C: RSA-313-R-01 Advanced Classification Verification and Validation Plan

Introduction

This Advanced Classification Verification and Validation Plan has been developed to describe procedures to verify and validate the results for the advanced geophysical classification (AGC) dynamic and cued surveys at RSA-313-R-01. Verification is typically performed by digging a certain number of anomalies past the stop-dig point, and validation includes investigation of a population of targets classified as non- target of interest (TOI). The intent is to provide assurance that there are no native TOI classified as non-TOI.

The final number of verification and validation digs rely on information gained during project execution, such as the classification approach selected and the results of the quality control (QC) and quality assurance (QA) seeds. The plan will be amended during project execution and sent to the project team for concurrence.

The project delivery team determined that 75 validation and 75 verification targets will be intrusively investigated. In addition, 50 Inconclusive targets with no metallic signature will be intrusively investigated. The following project elements will be considered when selecting targets:

- Proximity of targets to major roadways
- Historical information
- AGC data quality
- Ranked order location of the last recovered TOI versus the stop-dig point.

One hundred fifty-seven (157) targets removed by informed source selection (ISS) processing will be selected in concert with the client and cued to verify that the ISS processing parameters are acceptable.

RSA 313-R-01

The approach at RSA 313-R-01 involves a dynamic survey followed by a cued survey of specific targets. Both the dynamic and cued surveys will be performed with an advanced electromagnetic induction sensor. The data from the dynamic survey will be processed using ISS. Targets passed through by ISS will be cued. A percentage of the targets removed by ISS will be sampled to ensure no native TOI are classified as non-TOI.

The processing parameters for ISS will be determined in concert with the client and are anticipated to be conservative and based on the smallest TOI at the site. The target selection parameters will be documented in the AGC Target Selection Technical Memorandum. Training digs will be used by the analyst, if necessary, during the classification process.

Dynamic

ISS is a standard processing method that removes targets (sources) from consideration based on size and decay. The resulting target list includes all sources that could potentially be TOI. The sources that are not part of the target list can be evaluated in terms of their intrinsic properties (size, shape/symmetry, wall thickness, decay) and extrinsic properties (depth, orientation). The validation process for the dynamic survey includes the following:

- Quantitative analysis of QC and QA seed results
- Review of intrusive results for all grids with respect to conceptual site model (CSM)
- Identification of significant deviations between intrusive results and CSM (if they exist)
 - Type of munitions
 - Depth
- Selection of a proportion of additional targets originally rejected by ISS for investigation.

A root cause analysis (RCA) will be performed for any failures, e.g., QC seed screened out by the selected data processing parameters.

Cued

Once an anomaly is identified as a potential target using advanced classification, there are three ways to be classified as a TOI:

- Match any TOI item in the site-specific library
- Be in a cluster or group of similar polarizabilities that are identified as TOI through training digs
- Have features that are typical of TOI (axial symmetry, thick walled, or large)

One of the objectives of the validation process is to demonstrate that no TOI were classified as non-TOI. Targets are classified as non-TOI by:

- The anomaly screening process (anomalies below a response threshold or a size filter threshold are non-TOI)
- Not matching any of the TOI in the library
- Not belonging to an identified cluster of anomalies that are subsequently found to be TOI
- Not having characteristics indicative of items that are axially symmetric and thick walled.

The validation process for the cued survey is summarized in the following sections.

Anomaly Selection

The anomaly selection threshold(s) – i.e. amplitude, size, and decay will be established after site-specific noise levels have been measured and several days of dynamic data have been collected. The target selection parameters will be documented in the AGC Target Selection Technical Memorandum.

Library-Match Verification

Classification will be based primarily on the decision statistic generated by comparing the polarizabilities for each cued target against the site-specific munitions library, with higher metrics indicating a better fit between the target and the corresponding item in the library.

The library matching process will be performed for each single-solver model and every target model in each of the multi-solver candidate realizations. For each flag position, the highest value decision metric (i.e., most likely TOI) from the combined set of single-solver and multi-solver

models will be used as the decision statistic for that target location. A stop-dig decision statistic threshold will be established as described in Standard Operating Procedure 500-08.

The stop-dig threshold will be verified by direct comparison with the intrusive results after the government reviews and accepts the final ranked dig list for the cued data. An RCA will be performed for any validation failures, e.g., TOI exist with decision statistics below the stop-dig threshold. Stop-dig threshold digs for verification may not require additional intrusive investigation and the number of digs will be dependent on the ranked order location of the last recovered TOI compared to the stop-dig point.

Non-TOI Validation

In addition to the verification targets investigated as described above, a percentage of the anomalies classified as non-TOI across the project site will be selected for validation. Rather than selecting the targets based on ranking on the dig lists, specific targets classified as non-TOI will be chosen by the client. The method(s) used for selecting the validation targets will be discussed by the project team, but three possible methods of identifying these targets are described below.

Cluster Analysis

Cluster analysis identifies groups of items with similar polarizabilities, with the underlying assumption that within a cluster the items will all be very similar in size, shape and composition. Identified clusters in which most or all items have been classified as non-TOI may represent a group of TOIs that were not expected at the site and for which library entries did not exist during the classification process.

Feature Space Analysis

Feature space analysis involves examining the target-specific features such as size and decay, which are also involved in cluster analysis. In this case, rather than requiring that a group of items all resemble each other, there may be a single trait specific to a single target classified as non-TOI that suggests it is worth examining. Examples include targets with large sizes or very slow decays that stand out in a size/decay plot but did not match any library examples and were classified as non-TOI.

Random Selection

Validation targets are selected randomly throughout the list of non-TOI. Random selection can be performed using random number generators in programs such as Microsoft® Excel that can be used to re-sort the non-TOI target identifications (IDs) on the ranked dig list, selecting 1 out of every X non-TOI targets on the ranked dig list, with X determined based on the total number of non-TOI targets, or simply by picking out non-TOI anomaly IDs while proceeding down the ranked dig list.

For each selected validation target, the data analyst will be required to provide a short rationale for why that target was classified as a non-TOI. Examples of acceptable rationales include, but are not limited to:

- Too small to be TOI
- Decays too quickly to be TOI
- Asymmetric or plate-like (wrong shape)
- Geologic response

- Detection anomaly due to instrument noise.

All validation targets will be excavated and the resulting sources, or lack of a source, will be qualitatively compared to the stated rationale for the non-TOI classification. Recovery of a TOI from one of these targets will stop work and require a thorough re-examination of the classification process. A qualitative mismatch between a recovered source and the non-TOI rationale will require an RCA and possible corrective action.

ATTACHMENT D
BLIND SEED FIREWALL PLAN

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**ATTACHMENT D
BLIND SEED FIREWALL PLAN**

**CORRECTIVE MEASURES IMPLEMENTATION AT
MULTIPLE (9) SITES AT THE REDSTONE ARSENAL
MADISON COUNTY, ALABAMA**

**RSA-313-R-01, WESTERN SIDE OF FORMER HIGH
EXPLOSIVE DROP AREA A, OPERABLE UNIT 15**

**CONTRACT NO. W912DY-17-D-0003
TASK ORDER NO. W912DY19F1116**

Prepared for



U.S. Army Corps of Engineers

June 2025

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Attachment D- Blind Seeding Firewall Confidentiality Agreement

1.0 INTRODUCTION

1.0.1 This Blind Seed Firewall Plan has been developed to describe general procedures for maintaining the confidentiality for the locations of blind quality control (QC) seeds placed within full coverage grids for the terrestrial dynamic advanced geophysical classification (AGC) survey and cued surveys using the MetalMapper 2x2. Only specific project personnel are required to have knowledge and access to the QC seed information to ensure the integrity of the data collection, processing, analysis, and classification efforts. After the Quality Assurance Project Plan is finalized and before mobilization the AGC Subcontractor QC Geophysicist, and the U.S. Army Engineering Support Center, Huntsville (CEHNC) Geophysicist will agree on the number, type, and spatial distribution of QC seeds for AGC.

2.0 QUALITY CONTROL PERSONNEL

2.0.1 AGC Subcontractor and Contractor personnel involved in data collection, processing/classification, and intrusive investigation activities on the project will be prevented from having access to information related to the detailed information for the QC seeds. The information will be provided to them only as needed for post-classification analyses, such as a root-cause analysis, and only after documented permission to share the information has been received from the CEHNC Geophysicists. The following personnel are the only members of the project team who will have access to the detailed QC seed information:

- AGC Subcontractor QC Geophysicist
- AGC Subcontractor QC Manager
- CEHNC Geophysicists.

3.0 INFORMATION TRANSFER/STORAGE

3.0.1 The QC seed information will be recorded by the AGC Subcontractor QC Geophysicist upon placement of the seeds in the field. Unless permission is received from the CEHNC Geophysicist to share with other members of the project team, information may only be transferred between the individuals identified above. The information will be transferred to the AGC Subcontractor QC Geophysicist. Transfer of QC blind seed data may occur as email attachments or directly to a protected network drive. The information and data will be stored only in 1. password protected files on local hard drives assigned to the individuals listed above or 2. protected folders on the AGC Subcontractor file server accessible only to the staff listed above and the server administrator. The QC seed information will be transferred to the CEHNC Geophysicist on a weekly basis during the blind seed program in digital format (e.g., Microsoft® Excel or Microsoft® Access).

3.0.2 Seeding positioning equipment will be separate from equipment used by the field teams. If the need arises and the seeding team and field survey teams share equipment, the seeding operations data will be deleted from the survey/global positioning system equipment each day.

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Attachment D- Blind Seeding Firewall Confidentiality Agreement

RSA-313-R-01 Corrective Measures Implementation

Letter of Confidentiality

In performing my assigned duties and responsibilities with the RSA-313-R-01 Corrective Measures Implementation, I understand that maintaining confidentiality is critical to USACE's mission.

"I will abide by the requirements of the Blind Seed Firewall Plan and not distribute any information related to the blind QC seeds to any other project personnel except those specified in the Blind Seed Firewall Plan"

My signature below indicates my agreement to maintain strict confidentiality of all information gained or exposed to during the course of fulfilling my job duties and responsibilities.

Print Name: _____

Signature: _____

Date: _____

ATTACHMENT E
DATA MANAGEMENT AND VALIDATION

ATTACHMENT E

DATA MANAGEMENT AND VALIDATION

1.0 INTRODUCTION

After sample collection and analysis, the data must be reviewed, reported, and validated. The procedures described in this attachment are to be followed to ensure that the data were collected and obtained in accordance with this project-specific Quality Assurance Project Plan (QAPP), applicable guidance documents, and good practices. The overall goal is to ensure that the data quality requirements of the project are met.

2.0 LABORATORY DATA MANAGEMENT REQUIREMENTS

Each project laboratory is responsible for providing complete and correct data for all requested analyses. The QAPP addresses the project-specific requirements for analyses in Worksheets #12, #15, #24, and #28. Following analysis of the samples, the laboratory will perform a series of steps to deliver acceptable final data reports.

2.1 DATA REDUCTION

Data reduction is the process for collecting and transforming measurements, through mathematical and/or statistical formulas, into final reportable measurements. The calculations may be performed manually or electronically. Data reduction is performed by the analyst and consists of calculating concentrations in samples from the raw data. The complexity of the data reduction depends on the analytical method and the number of discrete operations involved (for example, extractions, dilutions, instrument readings, and concentrations). The analyst calculates the final results from the raw data or uses appropriate computer programs to assist in the calculation of final reportable values. Calculations and data reduction steps for various methods are summarized in the respective laboratory standard operating procedures (SOPs) or program requirements.

Copies of all raw data and the calculations used to generate the final results, such as bound laboratory notebooks, strip-charts, chromatograms, spreadsheets, and computer record files, are retained on file as specified in this QAPP. Should the Contractor determine that the laboratory's data reduction processes require an in-depth review, these calculations and the associated raw data will be provided by the laboratory upon request.

2.2 DATA REVIEW

Data review is performed to assess whether the quality control (QC) requirements are met. All project laboratories will perform data review on 100 percent of the data deliverables. No data will be released to the Contractor without the appropriate analyst and supervisory review performed and documented.

The individual analyst continually reviews the quality of data through evaluating the results of calibration checks, QC samples, and performance evaluation samples. The analyst performs data review during, immediately following, and after the completed analysis. The laboratory supervisor,

analyst, or data specialist performs a secondary review of the data. The data reviewer is trained by the quality assurance (QA) manager or section leader to perform the data review.

The analytical laboratory data reviewer, who has the initial responsibility for the correctness and completeness of the data, will conduct the first level of review, which may contain multiple sublevels of all project related data. Data reduction, QA review, and reporting by the laboratory will be completed as follows:

- Raw data produced by the analyst are processed and reviewed for attainment of QC criteria as outlined in the SOPs, laboratory QA manual, and established U.S. Environmental Protection Agency (EPA) methods, as well as for overall reasonableness. These general QC criteria are modified by the requirements of this QAPP and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM), Version 5.1.1.
- After entry into the laboratory information management system, a computerized report is generated and sent to the laboratory data reviewer.
- The data reviewer will decide whether any sample reanalysis is required.
- Upon acceptance of the preliminary reports by the data reviewer, final reports will be generated.

The laboratory data reviewer will evaluate the quality of the work based on an established set of laboratory guidelines. This person will review the data package to ensure the following:

- Sample preparation information is correct and complete.
- Analysis information is correct and complete.
- The appropriate standard operating procedures have been followed.
- Analytical results are correct and complete.
- QC samples are within project-specific control limits.
- Special sample preparation and analytical requirements have been met.

Documentation is complete when all anomalies in the preparation and analysis have been documented.

The laboratory will perform the in-house analytical data reduction and QA review under the direction of the laboratory QA director. The QA director or designee is responsible for assessing data quality and advising the project manager of any data that were rated “preliminary” or “unacceptable,” or other notations that would caution the data user of possible unreliability.

2.3 LABORATORY DOCUMENTATION

Analytical reports transmit final results, methods of analysis, levels of reporting, associated QC data, and method performance data. The laboratory will submit the data report for each sample delivery group using a reporting format that, at a minimum, presents the information for a Stage 2B deliverable as described in EPA’s 2009 *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use*. In addition, issues affecting the analytical process will be noted in the case narrative included in each report. The number of significant figures reported will be consistent with the limits of uncertainty inherent in the analytical method.

Consequently, most analytical results will be reported to no more than two or three significant figures.

Data are normally reported in units commonly used for the analyses performed. Concentrations in liquids are expressed in terms of weight or activity per unit volume (for example, micrograms per liter or milligrams per liter). Concentrations in solid or semisolid matrices are expressed in terms of weight or activity per unit weight of sample (for example, micrograms per kilogram or milligrams per kilogram). Solid and semisolid matrices will also be reported on a dry weight basis. The sample-specific sensitivity limits (detection limits [DLs], limits of detection [LODs], and limits of quantitation [LOQs]) are reported adjusted for subsample size and percent moisture, as well as all appropriate concentration, dilution, and extraction factors.

If analytical anomalies are encountered during the analyses (for example, an out-of-control matrix duplicate), they will be documented in a case narrative. Copies of the sample discrepancy reports or corrective action reports must be included in the laboratory data reports.

2.4 LABORATORY RECORD KEEPING

At a minimum, the laboratory will retain all data related to sample preparation, analysis, and general observations in appropriate hardbound laboratory notebooks or files. Laboratory notebook pages must be reviewed, signed, and dated by the author and receive an independent secondary review by a peer or supervisor who signs/initials and dates the data pages.

Corrections to notebook entries are made by drawing a single line through the erroneous entry and writing the correct entry next to the one that is crossed out. All corrections are initialed and dated by the individual performing the correction.

After delivering acceptable hard copy and/or electronic data deliverables, the laboratory will store the original project data for at least 5 years unless otherwise specified in the subcontract agreement.

2.5 LABORATORY ACCREDITATION

2.5.1 Department of Defense Requirements

Laboratories supporting this project must be accredited under the DoD Environmental Laboratory Accreditation Program (ELAP). This accreditation must be maintained and renewed as necessary during the lifetime of the project. DoD ELAP accreditation involves the successful completion of an on-site audit by an auditing firm contracted by the DoD, the evaluation of performance evaluation sample results, and an extensive review of the laboratory's facilities and procedures to ensure compliance with the requirements of the QSM.

2.5.2 State Requirements

Alabama maintains a laboratory accreditation program for laboratories performing analysis on drinking water samples but does not currently include environmental sampling in this accreditation program. Should the Alabama accreditation program be expanded to include environmental sampling during the lifetime of this project, each project laboratory will be required to maintain all appropriate state accreditation for all work performed.

2.5.3 Other Assessment and Audit Tasks

No subcontractor laboratory technical system audits are currently planned for this project; however, an audit may be performed at any time during this program at the Contractor's discretion or at client direction. In the event that laboratory performance does not meet QAPP requirements or significant data quality issues arise, the Contractor reserves the right to perform additional system or project audit at any time throughout the program.

3.0 SUBCONTRACTOR DATA MANAGEMENT REQUIREMENTS

Upon receipt of a laboratory data package and the associated electronic database deliverables (EDD), the Contractor will perform data management tasks required to ensure that all analyses were performed in accordance with project requirements. The data management requirements include conducting data verification and data validation to determine the usability of the data for the original project objectives. Data verification, data evaluation, and data validation are each separate levels of review that can be performed by themselves or in conjunction with each other. Evaluation activities will be documented in the QA reports listed in Worksheet #29 and will be used to assess the usability of project data in levels of detail ranging from an analyte- and sample-specific basis to the overall data set for each sampling event (Attachment B).

3.1 DATA VERIFICATION

Initially, laboratory deliverables are received at the Contractor in both pdf (laboratory data report) and EDD formats, as discussed previously. When the data verification process described below is complete, laboratory data reports and EDDs will be transmitted to staff chemists or the data validation subcontractor who will perform data validation.

3.1.1 Laboratory Report Verification

The Contractor will perform data verification on every report submitted by a laboratory. Upon receipt of the laboratory deliverables, a data management staff member will perform the following actions:

- The deliverable will be inspected to verify that results were received for each requested analysis for each sample. If a result is missing, the staff member will determine whether the laboratory submitted a deficiency report that accounts for the missing data.
- The data deliverable will be inspected for completeness based on the requirements specified in this plan. Inspection will verify only that all required report elements are present, not that the data within the report are complete.

3.1.2 Electronic Data Deliverable Verification

All analytical results are required to be submitted to the Contractor in a format that meets the requirements of the Environmental Quality Information System (EQuIS) file format. Once it has been verified that each EDD meets format requirements, it will be loaded into the project's electronic database management program as "unvalidated" for user access on the network. These analytical results will be considered preliminary until data validation is complete.

The EDDs will be compared to the pdf version of the laboratory data report by the Contractor data management coordinators. This review will be performed on 10 percent of the electronic data results. If a discrepancy is identified, the laboratory will be required to correct the error. The laboratory will also be required to determine if the error was a simple mistake or was caused by a systematic problem in data reduction and reporting.

3.2 DATA EVALUATION

Data evaluation is performed to assess whether the QC requirements for field duplicates, laboratory duplicates, equipment blanks, surrogates, matrix spikes (MSs)/matrix spike duplicates (MSDs), percent solids, method blanks, and laboratory control samples (LCSs) were met. Data evaluation will be performed on 100 percent of the laboratory deliverables generated during this program. This data evaluation procedure will be performed in conjunction with the data validation performed on each data report and described below.

The data evaluation will be performed using the latest version of the ADR.net software program developed by Laboratory Data Consultants, Inc. In addition to the EQUIS EDD described in Section 3.1.2, the laboratory will deliver the data associated with each laboratory report in the A1 and A3 file formats that meet the requirements of the ADR.net data review program. Following ADR, the Contractor chemist will evaluate ADR outputs, which approximate an EPA Stage 2A validation, and integrate those results into the manual data validation process in accordance with Appendix D of the Contractor's corporate data validation SOP.

3.3 DATA VALIDATION

Data validation is a systematic process to ensure that all chemical analytical information meet uniform requirements and to determine that the usability and defensibility of the data are adequate for their intended use. Data validation for this project will be performed by qualified Contractor project staff or by a subcontracted data validation firm. Validation of analytical results will be performed by a data validator and be reviewed by a senior chemist. Data validation will be performed on the results for environmental samples as required in Worksheet #36, which specifies the validation level of effort required to meet site-specific data quality objectives (DQOs).

The data will be validated against the method-specific criteria presented in Worksheets #12, #15, #24, and #28. These requirements are based on the requirements presented in Appendices B and C of the QSM, Version 5.1.1, and other applicable guidance. Data validation guidelines are presented below in Table E.1, and data qualifiers are defined in Table E.2. The qualification requirements and data qualifiers are based on the EPA National Functional Guidelines for data review. These guidelines were developed for the review of data generated using analyses performed in accordance with the Contract Laboratory Program Scope of Work. The qualification guidelines presented in Table E.1 have been modified to accommodate differences between Contract Laboratory Program method requirements and the method requirements presented in the SW-846 methods, the programmatic requirements of the QSM, and project DQOs.

Upon completion, the data validator will provide a data validation report and an annotated EDD that contains all final data result qualifiers. These data qualifiers will then be uploaded into the project database, which will then be made accessible to the Contractor project team.

Table E.1
Data Qualification Guidelines

Control Parameter	Exceedance of Control Limits	Qualification of Detected Results ¹	Qualification of Nondetected Results ²	Associated Results
<i>Compliance of sample receipt condition checks and holding times (Stage 1 review items)</i>				
Sample temperature (if cooling required in Worksheets #19 and #30)	12°C ≥ temperature > 6°C	J	UJ	All method results in affected sample or cooler
	Temperature > 12°C	J	R	All method results in affected sample or cooler
Sample headspace (VOCs only)	Bubbles ≥ 6 mm noted in sample containers if used for analysis	J	Validator judgment	All results in affected sample
Sample condition	Evidence of frozen samples	Validator judgment	Validator judgment	All method results in affected sample or cooler
	Issues noted by field team, sample receipt department, or analyst	Validator judgment	Validator judgment	All method results in affected sample
Holding time	Holding time exceeded	J–	UJ	All method results in affected sample
	Holding time exceeded by greater than a factor of 2	J–	R	All method results in affected sample
<i>Completeness and compliance checks of batch- and sample-related QC (Stage 2A review items)</i>				
Analyte quantitation	Analyte concentration ≥ DL but below LOQ	J	Not applicable	Affected results in sample
	Analyte concentration above calibrated range, no corresponding diluted result	J	Not applicable	Affected results in sample
Method (preparation) blanks	Analyte detected ≥ DL in blank: Multiply by 5 (10 for common contaminants) to obtain artifact threshold ³	Results below artifact threshold: U; raise results < LOD to LOD	Not applicable	Affected analyte results in preparation batch
Method (preparation) blanks (metals only)	Negative drift with absolute value ≥ aqueous DL: Multiply by 5 to obtain qualification threshold ³ Absolute value < ½ LOQ Absolute value ≥ ½ LOQ	For results below the calculated level: J– J–	UJ R	Affected analyte results in preparation batch
Trip blanks and ambient blanks	Analyte detected ≥ DL in blank: Multiply by 5 (10 for common contaminants) to obtain artifact threshold. Not adjusted for sample-specific factors.	Results below artifact threshold: U; raise results < LOD to LOD	Not applicable	Trip blanks: Affected analyte results in all samples shipped in same cooler; Ambient blanks: Specific site association

Table E.1
Data Qualification Guidelines (Continued)

Control Parameter	Exceedance of Control Limits	Qualification of Detected Results ¹	Qualification of Nondetected Results ²	Associated Results
Equipment blanks	Analyte detected $\geq$ DL in blank: Multiply by 5 (10 for common contaminants) to obtain artifact threshold. Convert to soil as necessary, but not adjusted for other sample-specific factors	Results below artifact threshold: U; raise results <LOD to LOD	Not applicable	Affected analyte results in samples in the same sampling event (same day)
Surrogate recovery (VOCs, PAHs, and explosives)	recovery > UCL LCL > recovery $\geq$ 10% recovery < 10% 2 or more mixed high and low ($\geq$ 10%)	J+ J- J- J	Not applicable UJ R UJ	All method results in affected sample ⁴
Surrogate recovery (SVOCs)	recovery > UCL LCL > recovery $\geq$ 10% recovery < 10% 2 or more mixed high and low ($\geq$ 10%)	J+ J- J- J	Not applicable UJ R UJ	All method results in the affected fraction in the affected sample ⁴
LCS recovery	recovery > UCL LCL > recovery $\geq$ ME recovery < ME	J+ J- J-	Not applicable UJ R	Affected analyte results in the preparation batch
LCS/LCSD RPD	RPD > CL	J	Not applicable	Affected analyte results in the preparation batch
MS/MSD ⁵ (Organics)	recovery > UCL LCL > recovery Precision > CL	J+ J- J	Not applicable UJ Not applicable	Parent sample only; evaluate applicability to other samples
MS/MSD ⁵ (Metals/mercury and perchlorate)	recovery > UCL LCL > recovery $\geq$ 30% recovery < 30% Precision > CL	J+ J- J- J	Not applicable UJ R Not applicable	Affected analyte results in the preparation batch ⁶
Serial dilution (Metals; see Worksheet #28.2 for applicability requirements)	%D > 10% %D $\leq$ 10%	Retain J+ or J- Remove J+ or J-	Retain R or UJ UJ if MS/MSD < 30%	Affected analyte results in the preparation batch; modifies any qualifier applied for MS/MSD discrepancies. DO NOT APPLY QUALIFIERS IF MS/MSD RESULTS IN CONTROL
PDS ⁵ (Metals; see Worksheet #28.2 for applicability requirements)	recovery > 120% recovery < 80% recovery 80-120%	Retain J+ or J- Retain J+ or J- Remove J+ or J-	UJ if MS/MSD < 30% Retain R or UJ UJ if MS/MSD < 30%	
Laboratory duplicate RPD (Metals/mercury and perchlorate)	RPD > CL and both sample and duplicate results $\geq$ LOQ	J	UJ	Affected analyte results in the preparation batch ⁶

Table E.1
Data Qualification Guidelines (Continued)

Control Parameter	Exceedance of Control Limits	Qualification of Detected Results ¹	Qualification of Nondetected Results ²	Associated Results
Field duplicate RPD	RPD > CL and both sample and duplicate results ≥ 5x LOQ	J	NA	Parent and duplicate samples only
	Result difference ≥LOQ and either sample or duplicate result < 5x LOQ or nondetect ⁷	J	Not applicable (lower result is a detect) or UJ (lower result is a nondetect)	
Completeness and compliance checks of instrument-related QC (Stage 2B review items)				
Instrument tuning	Method tuning requirements	R	R	All sample analyses associated with affected tune
Initial calibration target analyte response (VOCs and PAHs)	Analyte-specific minimum mean RRF	J	UJ	Affected analyte results associated with the initial calibration
Initial calibration linearity	Method-specific criteria (Worksheet #24)	J	UJ	Affected analyte results associated with the initial calibration
Low-level calibration verification at LOQ (Metals)	recovery >120% 80% > recovery ≥50% recovery <50%	J+ J– J–	Not applicable UJ R	Analyte results in the analytical batch: all non-detections and detections <10x LOQ
ICV (second source) performance (Organic methods)	Method-specific criteria (Worksheet #24)	J	UJ	Affected analyte results associated with the initial calibration or analytical sequence
Opening and ending CCV %D (Organic methods)	Method-specific criteria (Worksheet #24)	J	UJ	Affected analyte results associated with the continuing calibration
Opening CCV target analyte response (VOCs, SVOCs, and PAHs)	Analyte specific minimum CCV RRF	J	UJ	Affected analyte results associated with the initial calibration

Table E.1
Data Qualification Guidelines (Continued)

Control Parameter	Exceedance of Control Limits	Qualification of Detected Results ¹	Qualification of Nondetected Results ²	Associated Results
Internal standards (VOCs, SVOCs, and PAHs)	IS area >200% or <50% corresponding area in the applicable calibration standard ⁸	J	UJ	Target analytes quantitated using affected IS in affected sample.
	IS area <25% corresponding area in the applicable calibration standard ⁸	J	R	
	IS retention time outside ± 10 seconds from the applicable calibration standard ⁸	R	R	
	IS area <25% corresponding area in the applicable calibration standard ⁸	J	R	
Internal standards (PCDD/PCDFs, ICP-MS metals, and perchlorate)	Method response criteria (Worksheet #12) not met	J	R	Target analytes quantitated using affected IS in affected sample.
Perchlorate- ¹⁸ O relative retention time (perchlorate)	RRT outside 0.98-1.02	J	UJ	Results in affected sample
ICV and CCV recoveries (metals)	%R above method-specific criteria (Worksheet #24)	J	Not applicable	ICV: Affected analyte results in analytical batch CCV: Affected analyte results bracketed by the CCV
	%R less than method-specific criteria (Worksheet #24) but $\geq 75\%$	J	UJ	
	Recovery <75%	J	R	
Low-level ICV (when not used as LOQ check) and CCV recoveries (metals)	Recovery >130%	J (results <10x LOQ)	Not applicable	Low-level ICV: Affected analyte results in analytical batch Low-level CCV: Affected analyte results bracketed by the CCV
	Recovery <70% but $\geq 50\%$	J (results <10x LOQ)	UJ	
	Recovery <50%	J (results <10x LOQ)	R	
ICBs and CCBs (metals/mercury)	Positive results $\geq$ aqueous DL: Same as method blanks; convert to equivalent soil units if necessary	Results below artifact threshold: U; raise results <LOD to LOD	Not applicable	ICB: Analyte results in analytical batch CCB: Analyte results bracketed by the CCB
ICBs and CCBs (metals)	Negative drift with absolute value $\geq$ aqueous DL Same as method blanks; convert to equivalent soil units if necessary Absolute value < $\frac{1}{2}$ aqueous or soil-equivalent LOQ	For results below the calculated level: J	UJ	ICB: Analyte results in analytical batch CCB: Analyte results bracketed by the CCB
	Absolute value $\geq \frac{1}{2}$ aqueous or soil-equivalent LOQ	J	R	

Table E.1
Data Qualification Guidelines (Continued)

Control Parameter	Exceedance of Control Limits	Qualification of Detected Results ¹	Qualification of Nondetected Results ²	Associated Results
ICS A (metals)	Spiked analyte >120% 79% > recovery ≥ 50% Spiked analyte <50%	J+ J- J-	Not applicable UJ R	Analyte results in the analytical batch
	Nonspiked analyte ≥ ½ aqueous LOQ: multiply by 10 for action level; convert to equivalent soil units if necessary	For results below the calculated level: J+	Not applicable	Analyte results bracketed by the ICS A
	Nonspiked analyte ≥ aqueous LOQ: multiply by 10 for action level; convert to equivalent soil units if necessary	For results below the calculated level: R ⁹	Not applicable	Analyte results bracketed by the ICS A
	Nonspiked analyte with negative concentration with absolute value ≥ ½ aqueous LOQ: multiply by 10 for action level; convert to equivalent soil units if necessary	For results below the calculated level: J-	UJ	Analyte results bracketed by the ICS A
	Nonspiked analyte with negative concentration with absolute value ≥ aqueous LOQ: multiply by 10 for action level; convert to equivalent soil units if necessary	For results below the calculated level: J	R	Analyte results bracketed by the ICS A
ICS AB (metals)	Spiked analyte >120% 79% > recovery ≥ 50% Spiked analyte <50%	J+ J- J-	Not applicable UJ R	Analyte results bracketed by the ICS AB
ICS (perchlorate)	recovery >130% 70% > recovery ≥ 50% recovery <50%	J+ J- J-	Not applicable UJ R	Analyte results in the analytical batch
Detected analyte retention time (pesticides, PCBs, explosives, and DRO/ORO)	Criteria not met (Worksheets #12 and #24)	Validator judgment	Not applicable	Affected target analytes in affected samples

Table E.1
Data Qualification Guidelines (Continued)

Control Parameter	Exceedance of Control Limits	Qualification of Detected Results ¹	Qualification of Nondetected Results ²	Associated Results
Confirmation (explosives)	RPD >40%	J	Not applicable	Affected target analytes in affected samples
	Result not confirmed	Validator judgment	Not applicable	Affected target analytes in affected samples
Ion abundance ratio (PCDD/PCDFs)	Ion ratio not met or result reported as an estimated maximum potential concentration (EMPC)	NJ	Not applicable	Affected target analytes in affected samples
³⁵ Cl/ ³⁷ Cl isotope ratio (perchlorate)	Ion ratio not met	J	Not applicable	Affected target analytes in affected samples
Other validator actions				
Multiple results reported for an analyte in a single sample/method combination due to multiple dilution levels or reanalysis due to QC issue	NA; the validator will review the available data and associated QC results and determine the “best” data point for each analyte reported for each sample	X	X	Applied to all results not selected as the “best” data point.
Calculation and transcription verification	Errors or inconsistencies noted	Validator judgment	Validator judgment	Results associated with the error; also notify Contractor Project Manager or Senior Chemist
General data review	QC element not performed	Validator judgment	Validator judgment	Results associated with missing QC element

Notes:

¹ The priority of qualifiers for detected results is: X > R > NJ > J > J+ or J- > no qualifier.

² The priority of qualifiers for nondetected results is: X > R > UJ > U.

³ The artifact threshold derived from method (preparation) blank contamination should be adjusted on a sample-specific basis to account for dilution and subsample size.

⁴ If surrogate compounds are added prior to the dilution step and the recoveries are diluted out (>5x dilution), no qualification is required.

⁵ MS/MSD and post-digestion spike recovery results for an analyte are not considered applicable if the concentration in the parent sample is >4x the spike concentration.

⁶ If the spiked sample or duplicate is not considered representative of the analytical batch, only the parent sample is qualified.

⁷ When comparing the results of a duplicate pair which consists of a detected result and a nondetected result, the numerical value of the nondetected result should be considered to be the LOQ. Two results below the LOQ or a result below the LOQ and a nondetection are always considered to be in control.

⁸ The performance of sample internal standards should reference the internal standards of most recent opening CCV standard. For samples analyzed in the sample sequence as the initial calibration with no associated opening CCV, the performance of sample internal standards should reference the internal standards of the midpoint initial calibration standard.

⁹ If the affected analyte is a known contaminant in the purchased spiking standard, the validator may apply a J+ qualifier instead of R.

CCB - continuing calibration blank
CCV - continuing calibration verification
CL - control limit
%D - percent difference
DL - detection limit
ICB - initial calibration blank
ICV - initial calibration verification
IS - internal standard

LCL - lower control limit
LOD - limit of detection
LOQ - limit of quantitation
LCS - laboratory control samples
LCSD - laboratory control sample duplicate
MS - matrix spike
MSD - matrix spike duplicate

mm - millimeter
QC - quality control
RPD - relative percent difference
%RSD - percent relative standard deviation
S/N - signal-to-noise ratio
UCL - upper control limit

Table E.2
Data Qualifier Definitions

Qualifier	Definition
No qualifier	Confirmed identification. The analyte was positively identified at the reported concentration. The reported concentration is within the calibrated range of the instrument and the result is not affected by any deficiencies in the associated QC criteria.
J	Detected result; the quantitation is an estimate.
J+	Detected result; the quantitation is an estimate which is likely affected by a high bias.
J–	Detected result; the quantitation is an estimate which is likely affected by a low bias.
NJ	Tentative identification; the associated numerical value is the estimated concentration in the sample.
R	The result is rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Following the data validation process, this result must be examined during the data usability evaluation to determine if R is the appropriate final qualifier (see Attachment B, Section 3.3).
U	Not detected or considered non-detected as an artifact. The associated number indicates the analyte LOD or the reported concentration, whichever is higher.
UJ	Not detected or considered non-detected as an artifact. The associated number indicates the analyte LOD or the reported concentration, whichever is higher. This reported value may be inaccurate due to associated QC discrepancies.
X	Excluded. The data point is associated with reanalyses or diluted analyses and is excluded because another result has been selected as the definitive result for the analyte.

APPENDIX E

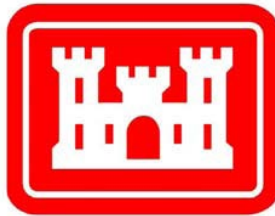
ACCIDENT PREVENTION PLAN/SITE-SAFETY AND HEALTH PLAN

**Accident Prevention Plan
Corrective Measures Implementation at Multiple (9) Sites**

**RSA-313-R-01,
Western Side of Former High Explosive Drop Area A,
Operable Unit 15**

**U.S. Army Garrison-Redstone
Madison County, Alabama
U.S. EPA ID No. AL7 210 020 742**

Prepared for:



**U.S. Army Corps of Engineers, Huntsville District
U.S. Army Engineering and Support Center, Huntsville**

**Contract No. W912DY-17-D-0003
Delivery Order No. W912DY19F1116**

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Aptim Federal Services, LLC
11400 Parkside Drive, Suite 400
Knoxville, Tennessee 37934**

June 2025

EMERGENCY CONTACT INFORMATION

In case of emergency or unplanned situation, contact the appropriate responder from the list below. This list precedes this Accident Prevention Plan for quick reference.

- In emergency situations, contact the site Point of Contact (POC) who will then contact the appropriate response teams.
- If a serious, life threatening emergency arises, contact emergency personnel before contacting the site POC.

EMERGENCY TELEPHONE NUMBERS AND PROJECT CONTACTS

Emergency Medical Care		
Hospital:	911	
Huntsville Hospital (Emergency/Trauma Center)	(256) 265-1000	
Chemical Agent Emergencies (state that you are at Redstone)	911	
Core Health Networks	(877) 347-7429	
Occupational Health Center, Crestwood Family Practice	(256) 721-9916	
Crestwood Workers Care Madison	(256) 830-8930	
National Poison Control Center	(800) 222-1222	
National Response Center	(800) 424-8802	
Environmental Emergencies		
Federal Occupational Safety and Health Administration (OSHA) Emergency Hotline	(800) 321-6742	
Local Emergency Numbers		
Fire Department	Emergency	911
Emergency ask for Redstone Arsenal Fire Department	Nonemergency	(256) 876-2117
Law Enforcement	Emergency	911
Military Police	Nonemergency	(256) 876-2222
Installation Emergency Operations Center	Nonemergency	(256) 313-1043
Installation Operations Center	Nonemergency	(256) 313-1043
Garrison Safety Office	Nonemergency	(256) 876-2944
Safety Manager	Charlie Carter	(256) 503-0715
Safety & Occupational Health Specialist	Keith Coates	(256) 876-3383
Munitions and Explosives of Concern (MEC) support	Rusty Brands	(256) 876-3855
USACE and Army		
U.S. Army Engineering and Support Center, Huntsville (CEHNC) Contracting Officer's Representative (COR), Project Manager (PM), and the Government Designated Authority (GDA)	Nicholas Konovodoff	(256) 201-7003 (mobile)
CEHNC-OEC, Acting Safety Chief	James Walker	O: (256) 655-0236
US Army Garrison-Redstone	Clint Howard	O: (256) 758-7084 C: (256) 842-3702
Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Analytical and Remediation Activity – Program Manager	Mark Hammond	(256) 842-2885 (office) (256)-929-9995 (cell)

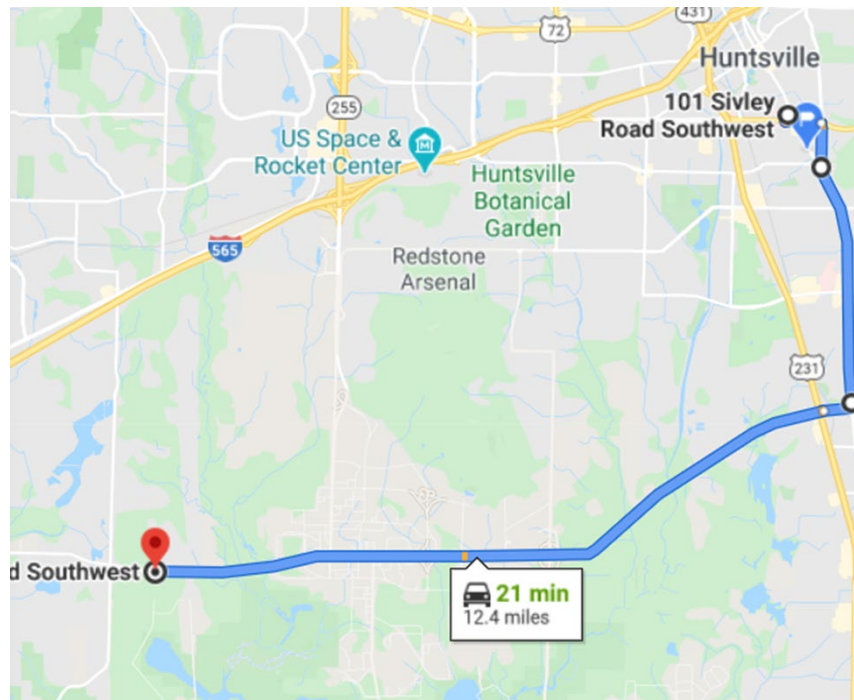
Contractor Contact Information		
Health and Safety Emergency Number		(800) 341-3647
APTIM PM	Mark Shoemaker	(865) 560-7927 (office) (865) 771-4133 (mobile)
Regional HSEQ Manager	Sean McCutcheon, PE	(256) 714-6926 (mobile)
Corporate Quality Management Director	Ken Walker	(541) 639-2000
HGL PM	Timothy Hiles	(256) 541-0944
HGL Corporate Quality Management Representative	Neil Feist	(256) 970-2103
Site Manager/Unexploded Ordnance Safety Officer (UXOSO)	William Seppala	(386) 986-7084
Senior Vice President Health, Safety, Environmental	Jeff Thompson, CSP	(303) 741-7163
Project Certified Industrial Hygienist	Larry Verdier	(513) 378-8021
Occupational Physician (APTIM) Core Health	Dr. William Nassetta	(225) 756-2673 (877) 347-7429
Occupational Physician (HGL/Subcontractor) Work Care 24-Hour hotline nurse	Dr. Peter Greaney	(714) 978-7488 (888) 449-7787
Wolf Creek (Utility Marking)	N/A	(256) 876-2801

DIRECTIONS TO THE EMERGENCY MEDICAL CENTER

The Huntsville Hospital is located at 101 Sivley Rd SW, Huntsville, AL 35801.

Directions to the hospital from RSA-313 North:

- From the eastern portion of RSA-313, take Zeirdt Road south to Martin Road
- Head east on Martin Road 5.0 miles
- Turn left onto Whitesburg Drive 2.8 miles
- Turn right onto California Street 0.5 miles
- Your destination will be on the left



Redstone Arsenal Gate Hours

Location	Weekdays	Weekends
Gate 1	0530 - 2100*	Closed
Gate 3	0530 - 1300**	0530 - 1300
Gate 7	0530 - 2100	Closed
Gate 8	0530 - 2100	0530 - 2100
Gate 9	24/7	24/7
Gate 10	Closed	Closed
Visitor Center 1	0600 - 1430	Closed
Visitor Center 9	0600 - 1700	Closed

Notes:

* Truck lane at Gate 1 open 0530 - 1300, Monday - Friday

** Gate 3 outbound lanes will remain open until 1800

*** Gate 7 outbound lanes will remain open until 2100

Gate hours and conditions are subject to change due to homeland defense initiatives; therefore, the point of contact for the most current gate operational hours is the Provost Marshall Office at (256) 876-4195.

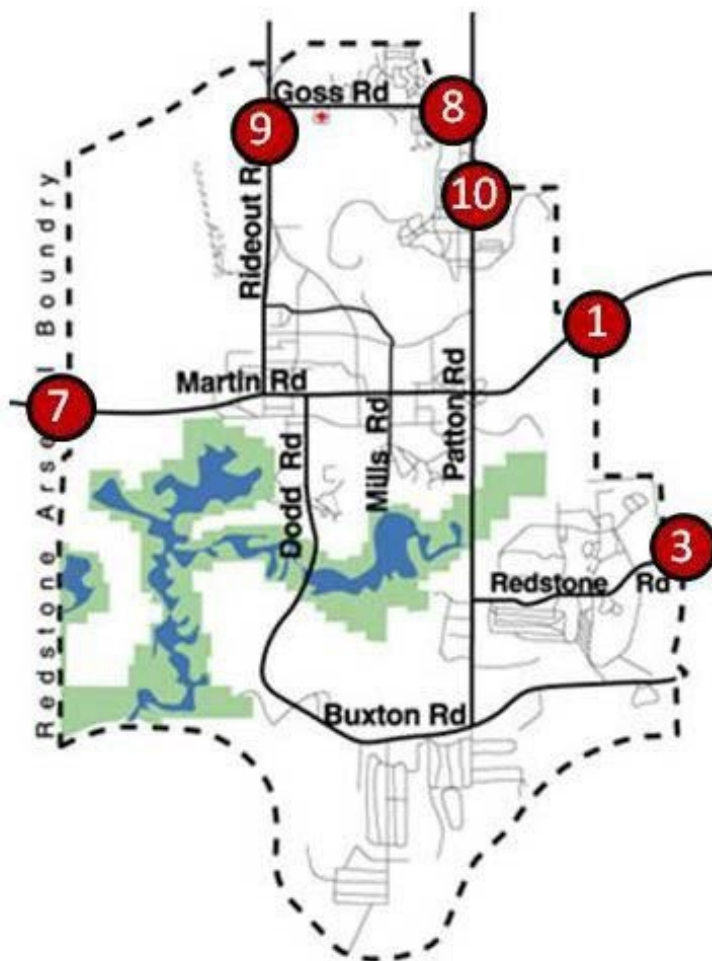


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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
ACGIH	American Conference of Governmental Industrial Hygienists
AHA	activity hazard analysis
AMS	APTIM Management System
APP	Accident Prevention Plan
APTIM	Aptim Federal Services, LLC
CA	chemical agent
CDC	Centers for Disease Control
CDHS	Corporate Director of Health and Safety
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COR	Contracting Officer's Representative
COVID-19	coronavirus
CPR	cardiopulmonary resuscitation
CSP	Certified Safety Professional
CWM	Chemical Warfare Materiel
DA PAM	Department of the Army Pamphlet
dBA	A-weighted decibels
DFW	definable feature of work
DID	Data Item Description
DoD	U.S. Department of Defense
ECT	equivalent chill temperature
EM	Engineer Manual
EMS	emergency medical services
ENG	Engineer
EOD	explosive ordnance disposal
FM	titanium tetrachloride
FTL	Field Team Leader
GDA	Government designated authority
H&S	health and safety
HAZCOM	Hazard Communication
HAZWOPER	Hazardous Waste Operations and Emergency Response
HE	high explosive
HGL	HydroGeoLogic, Inc.
HR	Human Resources

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

HSE	health, safety, and environmental
HSM	Health and Safety Manager
HTRW	hazardous, toxic and radioactive waste
IAW	in accordance with
IM-AE	isobutyl methacrylate incendiary mix
JSA	Job Safety Analysis
KO	Contracting Officer
mm	millimeter
MEC	munitions and explosives of concern
mph	miles per hour
MPPEH	material potentially posing an explosive hazard
MRS	munitions response site
NFPA	National Fire Protection Association
OESS	Ordnance and Explosive Safety Specialist
OJT	on the job training
OSHA	Occupational Safety and Health Administration
PM	Project Manager
POC	point of contact
PPE	personal protective equipment
RAC	Risk Assessment Code
RSA	Redstone Arsenal
SDS	Safety Data Sheet
SHM	Safety and Health Manager
SS	Site Supervisor
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SUXOS	Senior Unexploded Ordnance Supervisor
TA	Test Area
TLV	threshold limit value
TSM	tailgate safety meeting
USACE	U.S. Army Corps of Engineers
UXO	unexploded ordnance
UXOSO	UXO Safety Officer

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

WBGT	wet bulb globe thermometer
WP	white phosphorus

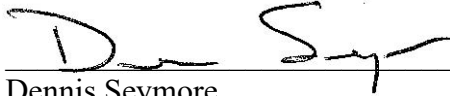
I have read, understand, and agree to abide by the provisions as detailed in this Accident Prevention Plan prepared by APTIM. Failure to comply with these provisions may lead to disciplinary action that may include dismissal from the work site, termination of employment or, for subcontractors, termination of the work contract.

Date

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1.0 SIGNATURE SHEET

1.1 PLAN PREPARED BY



Dennis Seymore
Aptim Federal Services, LLC

Date: 6/5/2025

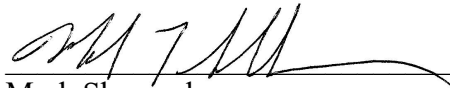
1.2 PLAN APPROVAL



Sean McCutcheon, P.E.
Regional HSEQ Manager
Aptim Federal Services, LLC

Date: 6/5/2025

1.3 PLAN CONCURRENCE



Mark Shoemaker
Project Manager
Aptim Federal Services, LLC

Date: 6/5/2025

2.0 BACKGROUND INFORMATION

This Accident Prevention Plan (APP) describes the health and safety (H&S) guidelines and considerations developed to protect on-site personnel, visitors, and the public from potential hazards while performing environmental program management and remediation services contract work at Redstone Arsenal (RSA), Madison County, Alabama.

This APP was prepared in accordance with (IAW) U.S. Army Corps of Engineers (USACE) Engineer Manual (EM) 385-1-1, *Safety and Health Requirements Manual*, Appendix A, Minimum Basic Outline for APPs (USACE, 2014), per the substantive requirements of Data Item Descriptions (DID) HNC-001.03 and other applicable DIDs for subplans, EM 200-1-15, EM 385-1-97 (including Errata Sheets and Changes), Engineer Pamphlet 75-1-3, DESR 6055.09, applicable U.S. Environmental Protection Agency guidance, and State regulations. The purpose of this APP is to establish the safety and health procedures, practices, and equipment to be used to protect field personnel from potential hazards associated with project site activities. The APP assigns responsibilities, establishes standard operating procedures, and provides contingency plans for situations that may arise during field activities. The requirements identified in this APP are a minimum requirement and do not take the place of the contractor's responsibility to evaluate contract work being conducted and ensure that all hazards are appropriately addressed.

In addition, a site-specific safety and health plan will be prepared for each site and included as an attachment to the site-specific work plan. Site Safety and Health Plans (SSHP) will also include the following site-specific information:

- Site work plan summary
- Site characterization and analysis
- Site description
- Hazard assessment
- Personal protective equipment (PPE)
- Activity hazard analysis
- Emergency procedures.

All activities will be conducted in full compliance with USACE, Department of the Army, and U.S. Department of Defense (DoD) safety standards and state and local safety requirements regarding personnel, equipment, and procedures.

2.1 CONTRACTOR

Aptim Federal Services, LLC (APTIM)
11400 Parkside Drive, Suite 400
Knoxville, Tennessee 37934

Subcontractor:
HydroGeoLogic, Inc.
4825 University Square, Suite 6
Huntsville, Alabama 35816

2.2 CONTRACT NUMBER

Contract No. W912DY-17-D-0003
Delivery Order No. W912DY19F1116

2.3 PROJECT NAME

Corrective Measures Implementation at Multiple Sites, Redstone Arsenal, Madison County, Alabama.

2.4 PROJECT DESCRIPTION

Available historical information indicates that the areas within RSA-313-R-01 were not used as impact or explosives testing areas. The western boundaries of Test Area (TA) 3 and TA-6 are included in RSA-313-R-01. Current operations on TA-3 include field testing of a variety of sensor and designator systems on ground and aerial platforms under clear and simulated battlefield conditions. No conventional munitions are currently tested or expended on TA-3. Current operations on TA-6 consist of testing the same types of sensor and designator systems that are tested on TA-3. Some areas of TA-6 located well east of RSA-313-R-01 are currently used for firing small missiles and rockets. RSA-313-R-01 is located within the industrialized area of groundwater units RSA-150 and RSA-153. The northern and southern areas of the site are wooded, with limited pasture and forested areas present within the remainder of the site. The open areas of the site are mowed grassy areas. There are no delineated surface water channels within the site boundaries; however, storm water runoff flows through drainage ditches and culverts, where most infiltrates into the ground before reaching perennial streams. The topography at the site ranges from approximately 570 feet above mean sea level near Martin Road to approximately 660 feet above mean sea level in the northwest corner of the site.

2.5 DESCRIPTION OF WORK TO BE PERFORMED

The objective of the work to be performed under this APP is to excavate targets of interest within Munitions Response Site (MRS)-2 (northern portion of RSA-313-R-01) previously identified through the mapping of geophysical anomalies using advance geophysical classification methods, groundwater sampling, and initiation of land-use controls. This document shall be used in conjunction with the APTIM Management System (AMS) policies and procedures; the SSHP; federal, state, and local regulations; and established USACE technical and administrative procedures deemed applicable by the U.S. Army Engineering and Support Center, Huntsville (CEHNC). The SSHP cited herein is included as Attachment E1.

2.6 LOCATION OF THE PROJECT

RSA is located in the southwestern portion of Madison County, which is in the northern portion of Alabama. RSA is bounded by the city of Huntsville on the north and east and the Tennessee River to the south. The city of Madison and the town of Triana are northwest and southwest, respectively, of RSA. Huntsville has a population of nearly 175,000. Madison County has a population of approximately 304,000. Approximately 500 military families reside in the government quarters on RSA, and approximately 26,000 government employees and contractors work on the facility.

RSA is an active U.S. Army facility that encompasses approximately 38,182 acres of land, all of which are either owned or controlled by the Army. Development within RSA has largely revolved around the historical need to produce (and later dispose of) conventional and chemical munitions and, more recently, to develop and test missiles and rockets. Chemical wastes have been produced by these processes since operations began in the early 1940s.

RSA consists of the U.S. Fish and Wildlife Service's Wheeler National Wildlife Refuge in the central and southern portions; industrial areas in the southeastern portion; facilities at the National Aeronautics and Space Administration's George C. Marshall Space Flight Center for space flight research in the central portion; and training areas, family housing, and commercial, recreational, and medical centers in the northern portion. Missile/rocket test ranges, the associated range fans, test area safety fans, and explosive safety-quality distance arcs are present in the western and southern portions of RSA. Other mission-related land use in the southern portion of RSA includes munitions storage.

MRS-2 within RSA-313-R-01 is approximately 19 acres located in Madison County, Alabama, consisting mostly of wooded and limited pasture areas and contains a man-made lake, Lady Ann Lake, which intersects the site and extends to the west of RSA. While numerous range areas were developed in support of testing activities for ordnance manufactured at RSA during World War II, available historical information indicates that the areas within RSA-313-R-01 were not used as impact of explosives testing areas. An area of the site is within the buffer zone for two former range areas: Area 2 (Former Bombing Range) and RSA-071 (High Explosive Drop Test Site, Area A). RSA-312-R-01 is located immediately east of RSA-313-R-01, on the north and south sides of Martin Road. Area 2 is a former bombing range. Munitions used at the range include AN-M76 bombs, PT1 (incendiary mixture similar to Goop) filled; M47 type bombs, isobutyl methacrylate incendiary mix (IM-AE) and napalm filled; M69 bombs, IM-AE filled; 155-millimeter (mm) white phosphorus (WP) projectiles; 81-mm WP projectiles; 105-mm WP projectiles; 155-mm titanium tetrachloride (FM) projectiles; 75-mm FM projectiles; 81-mm high explosive (HE) projectiles; 40-mm HE projectiles; and M5 bursters. A small portion of RSA-071 is within the RSA-313-R-01 boundary. RSA-071 is within the range fan that was reportedly used for various types of 4.2-inch mortars, including 4.2-inch chemical mortar, inert (sand filled); 4.2-inch chemical mortar, HE filled; 4.2-inch chemical mortar, FS (a mixture of sulfur trioxide and chlorosulfonic acid) filled; and 4.2-inch chemical mortar, WP filled.

Figure E-2.1 shows the location of RSA, and Figure E-2.2 shows the location of RSA-313-R-01 within RSA.

Figure E-2.1 RSA Location Map

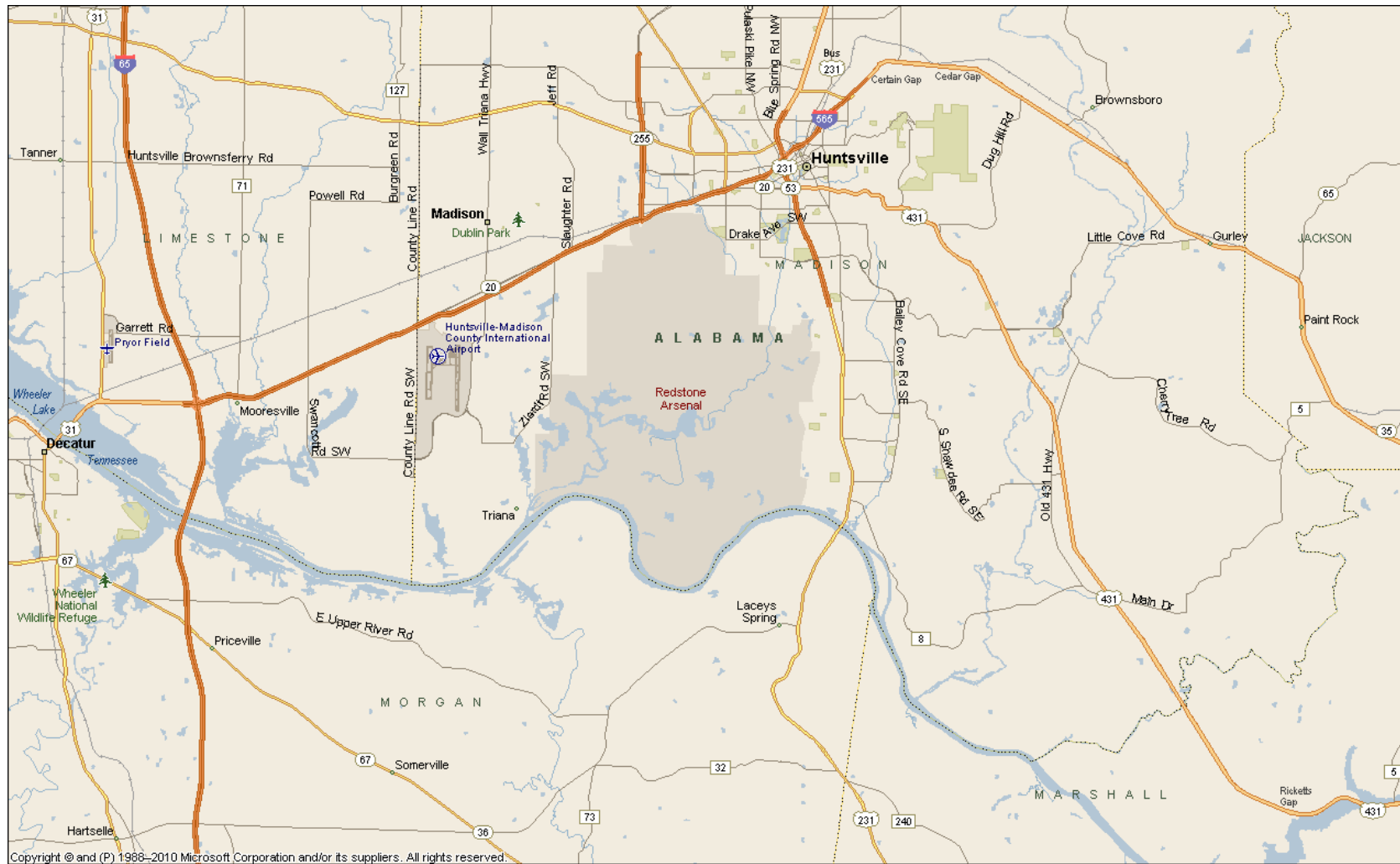
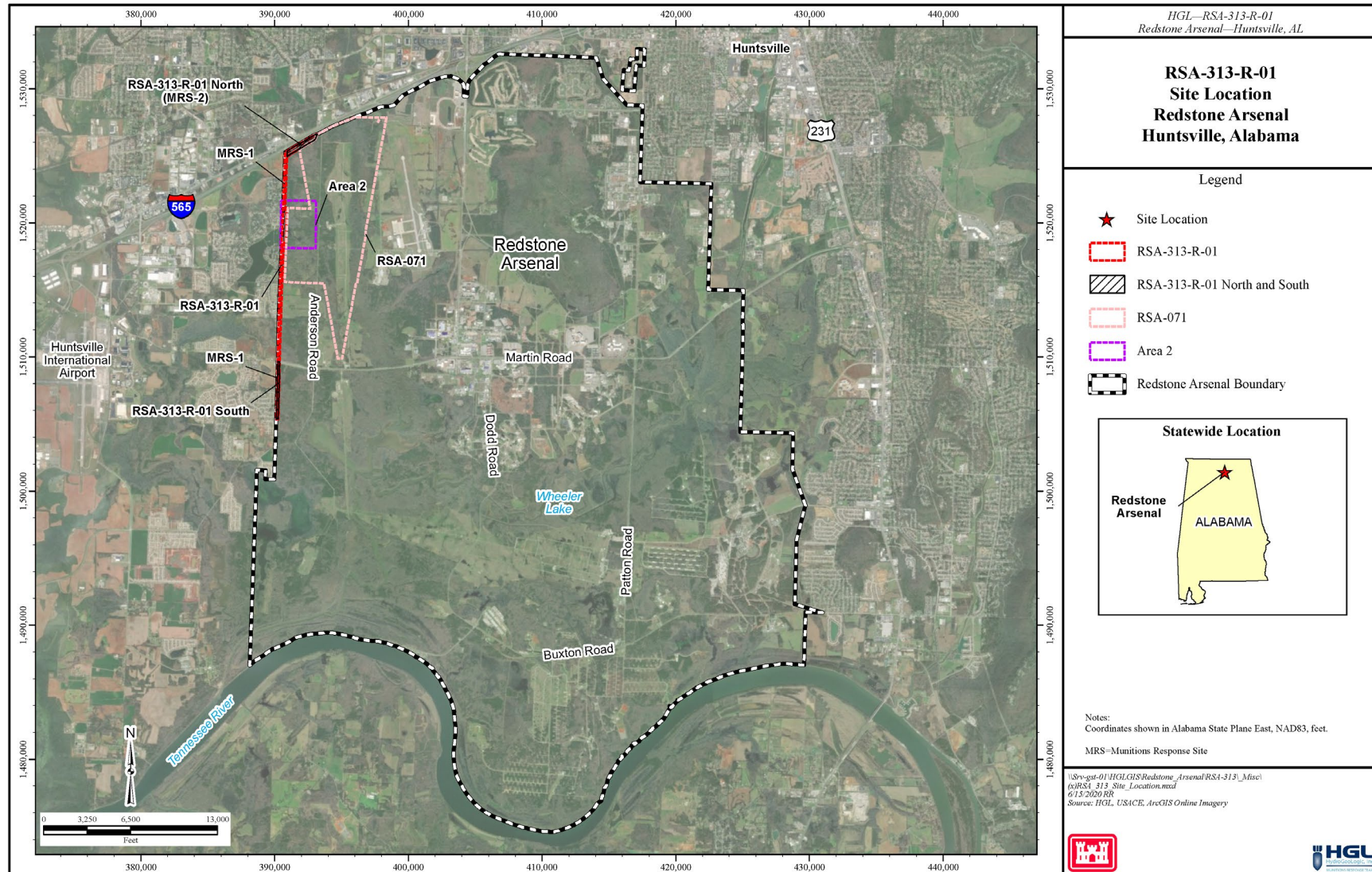


Figure E-2.2 RSA-313-R-01 Site Location Map



2.7 EQUIPMENT TO BE USED

The following equipment will be used for this project:

- Intermodal containers
- Personal digital assistants
- PPE
- Documents
- First-aid kits
- Fire extinguishers
- Global positioning systems
- Digital cameras
- Field radios
- Heavy open-front barricade.

2.8 HIGH RISK ACTIVITIES

To evaluate the potential explosive hazards associated with conventional munitions and explosives of concern (MEC) and determine the relative risks posed from an MRS, a MEC hazard assessment and MRS Prioritization Protocol scoring tables were respectively completed (APTIM, 2019). The MRS priority assigned to RSA-313-R-01 is 5.

Activity hazard analyses (AHA) that provide the overall Risk Assessment Code (RAC) are provided in Attachment E2.

2.9 PHASES OF WORK AND HAZARDOUS ACTIVITIES

Definable features of work (DFW) include but are not necessarily limited to the following:

- Mobilization
- Site preparation (vegetation removal)
- Anomaly reacquisition
- Intrusive activities (anomaly resolution)
- MEC/material potentially posing an explosive hazard (MPPEH) handling, disposal, and certification
- Demobilization.

Based on the data collected from the Resource Conservation and Recovery Act facility investigation, MRS-2 or “RSA-313 North” has a designated UXO probability of “Moderate/High.” Given the nature of work at RSA, MEC considerations will be applied into processes and procedures. It is likely that additional munition-related items similar to those found during the intrusive investigation are still present within the subsurface of this area, and each munition encountered must be individually assessed when encountered. The final phase of the field effort will involve site restoration and demobilization of the project team from the site.

AHAs have been prepared for each of the anticipated work activities and are included in Attachment E2. A list of preliminary AHAs for the following activities is provided below:

- a. Mobilization and Demobilization
- b. General Site Work
- c. Civil Survey
- d. Vehicle Operations
- e. Vegetation Clearance
- f. Anomaly reacquisition
- g. MEC Subsurface Clearance/ Excavation
- h. MPPEH Inspection and Handling
- i. MEC Disposal
- j. Excavation and backfilling
- k. Coronavirus Practices and Prevention Exposure.

3.0 STATEMENT OF SAFETY AND HEALTH POLICY

3.1 CONTRACTORS WRITTEN SAFETY PROGRAM GOALS

HEALTH, SAFETY, AND ENVIRONMENTAL (HSE) POLICY

APTIM will conduct business with honesty and honor to promote the safety and security of people while preserving the environment and maintaining quality. Employees are required to follow applicable laws, regulations, standards, and codes while meeting company and client requirements.

Fundamentally, I believe a safety program must have the following three things:

ACCOUNTABILITY

This means holding ourselves responsible to our fellow workers and our team to conduct our work safely.

CULTURE

We will look out for our fellow workers and lead with a safety mindset at all levels in the organization.

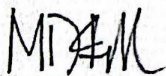
EMPOWERMENT

All employees are authorized to take the proper action at anytime and anywhere even if it means stopping work.

We will live our values by:

- ▶ Leading and empowering our workforce to be incident-free from the top down and bottom up
- ▶ Involving employees in decision-making to identify and manage risks presented by our work
- ▶ Considering HSE in all business decisions, including contractor and vendor selection, purchasing, design, modification, construction, and operations
- ▶ Empowering all employees and subcontractors with the right to STOP WORK or refuse to work in situations where conditions or practices are thought to be unsafe
- ▶ Maintaining a safety-conscious work environment where employees feel comfortable raising safety and quality concerns without fear of reprimand or retaliation
- ▶ Using observations, great catches, and near miss events to identify and correct issues before incidents occur
- ▶ Providing our work teams with the right people, skills, tools, and support to meet our promises without compromising on our values
- ▶ Promoting the right and responsible use of resources to benefit the communities where we work
- ▶ Conducting HSE Assessments to identify preventive and corrective actions that drive continuous improvement of our HSE Management System

By building and maintaining this culture, our team members will be empowered and prepared to deliver incident-free work that benefits themselves, the company and its customers, the public, and the environment.



MARK D. FALLON
Chairman and Chief Executive Officer
February 2022

APTIM.com



Expect the Extraordinary.

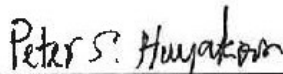


HGL's Commitment to Employee Health and Safety

HydroGeoLogic, Inc. (HGL) is committed to providing safe and healthful working conditions for our employees and we pursue this commitment by implementing an occupational health and safety management system based on ANSI/ASSP standard Z10.0 - 2019 Occupational Health and Safety Management Systems and ISO 45001:2018 Occupational Health and Safety Management Systems.

HGL takes the following actions to implement our health and safety management system:

- **Leadership:** Our senior managers have established a culture in which all our managers understand that ensuring safe work is a crucial part of their responsibility. Managers at every level are expected to provide the active leadership and budgeted resources required to facilitate a safe and positive work environment. Our managers participate in risk assessments, safety training, incident investigations and other core functions of the health and safety program, as specified in Health and Safety Procedure 1 - Health and Safety Management System.
- **Commitment:** We maintain a formally established and fully funded corporate H&S organization managed by the Corporate H&S Director, who reports directly to the Chief Operating Officer. We also maintain written H&S procedures, guidance documents, and implementing documents such as standard operating procedures (SOPs), and we update these documents at least annually.
- **Employee Participation:** All personnel are encouraged and expected to offer safety suggestions, report incidents and to stop work, as needed, to prevent accidents. We conduct annual safety training internally and employee feedback is an integral part of this training.
- **Planning:** We assess the hazards of each project and each new task, identify effective hazard controls, and document the hazards and controls. We ensure that health and safety plans and activity hazard analyses are reviewed by qualified specialists such as Certified Industrial Hygienists, Certified Safety Professionals, or Certified Health Physicists.
- **Training:** We ensure that personnel are adequately trained to perform their jobs safely by conducting annual training that is focused on our incidents, our lessons learned, and our improvement actions. In addition to this internally developed refresher training our personnel complete other training, as appropriate, such as hazardous waste 40-hour, OSHA Construction 30-hour, confined space entry, excavation competent person, and site-specific initial and routine (tailgate) training. We provide ongoing communication through monthly safety bulletins and monthly office staff meetings.
- **Diligence in Procurement:** We ensure that we work with qualified and safe subcontractors by screening potential subcontractors and excluding those that do not implement effective safety programs. This process addresses written programs, training, incident rates and citations.
- **Readiness Reviews:** Prior to conducting field work, we conduct readiness reviews as specified by our Quality Assurance program. The responsible manager conducts a meeting with project personnel to assess whether the required personnel, equipment, supplies and documents are in place and to establish schedules for completing any missing components.
- **Verification:** Site Safety and Health Officers and corporate safety personnel perform regular inspections of work in progress and correct or suspend work that may be unsafe.
- **Management Review:** Our senior managers receive a monthly briefing from our Health and Safety Director on incidents, incident trends, and pending improvement actions and provide feedback and direction aimed at seeking continuous improvement.


Peter S. Huyakorn, Ph.D.
President

2-25-2020

Date

3.2 CONTRACTORS SAFETY PROGRAM OBJECTIVES

APTIM targets the health, safety, and environmental (HSE) Goal of Zero Incidents. The targeted HSE Goal of Zero Incidents consists of the following:

- No harm to any person
- No Occupational Safety and Health Administration (OSHA) reportable or recordable incidents
- No damage to property
- No harm to the environment
- No compromise to project security
- Strive for continuous improvement.

APTIM's accident experience goals are as follows:

- Lost workday case incident rate below 0.02
- Restricted work or job transfer injury and illness case incident rate below 0.09
- Total recordable incident rate below 0.44
- Medical doctor's treatment incident rate below 0.24.

The accident experience goal for this contract is Target Zero Accidents.

The objectives identified for personnel to accomplish to achieve APTIM's goals for incident prevention and accident experience are as follows, with referenced AMS documents included as Attachment E2:

- Each crew member will attend the site HSE orientation prior to beginning work on the site (documented on the APP Acknowledgement Form and AMS-710-00-FM-01905, *HSE Training Attendance Record*).
- Hold a minimum of one Daily Tailgate HSE Meeting per day (documented on AMS-710-00-FM-01905, *HSE Training Attendance Record*).
- Hold a minimum of one Weekly HSE Toolbox Meeting per week (documented on AMS-710-00-FM-01906, *HSE Project/Facility Weekly Meeting Minutes*).
- Each supervisor will conduct a minimum of one Daily HSE Site Inspection per day (documented on AMS-710-05-FM-01401, *Daily HSE Inspection Form*).
- Each supervisor will conduct a minimum of one Weekly Supervisor's Inspection per week (documented on AMS-710-05-FM-01402, *Project HSE Inspection Form*).
- Perform one "Target" observation leading indicator per week (documented on "Target Observation Cards") and entered into the APTIM Incident Management system.
- Generate a minimum of one Job Safety Analysis (JSA) per work crew per day (each crew supervisor prepares a JSA for each different activity and then engages the crew for furthering the development of the JSA) (documented on AMS-710- 00-FM-01704,

“Job Safety Analysis,” with the JSA Checklist Form or on AMS-710-00-FM-01705, *Job Safety Analysis*).

- Perform one emergency evacuation drill per year (documented on AMS-710-00-FM-01905, *HSE Training Attendance Record*).
- Perform one emergency evacuation drill review per month (documented on AMS-710-00-FM-01905, *HSE Training Attendance Record*).
- Perform one spill response drill review per year (documented on AMS-710-00-FM-01905, *HSE Training Attendance Record*).
- Perform one fire-control response drill review per month (documented on AMS-710-00-FM-01905, *HSE Training Attendance Record*).
- Perform one emergency evacuation to tornado shelter drill per year (documented on AMS-710-00-FM-01905, *HSE Training Attendance Record*).

The Subcontractor’s H&S Program is detailed in the Corporate H&S Manual, available in print or electronically, and implemented/overseen by the Subcontractor’s Corporate Director of Health and Safety (CDHS), Stephen Davis, Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP). Subcontractor managers and employees are expected to conduct business in compliance with governmental environmental and safety regulations, client programs, and company policies and procedures. The “rules of construction” for subcontractors apply, as specified in 29 Code of Federal Regulations (CFR) 1926.16.

4.0 RESPONSIBILITIES AND LINES OF AUTHORITY

The following organizational information identifies key personnel for safety and operations at the program level and the lines of authority.

4.1 STATEMENT OF EMPLOYER'S ULTIMATE RESPONSIBILITY

The prime contractor will manage H&S activities on this project IAW its corporate H&S procedures and project-specific documents. All personnel on site are responsible for continuous adherence to this APP and safety and health procedures during the performance of their work.

4.2 IDENTIFICATION AND ACCOUNTABILITY OF PERSONNEL RESPONSIBLE FOR SAFETY

No person may work in a manner that conflicts with the intent of, or the inherent safety and environmental precautions expressed in, these procedures. After due warning, any person who intentionally violates these safety procedures will be dismissed from the site. Employees and subcontractors may be subject to progressive discipline (i.e., verbal warning, written warning, and dismissal) and may be terminated for continued violations. All on-site personnel will be trained IAW this document. Key project personnel include the following:

- Contractor Project Manager (PM): Mark Shoemaker
- Subcontractor PM: Tim Hiles
- Contractor HSE Manager: Sean McCutcheon, P.E.
- Contractor UXO Safety Officer (UXOSO): William Seppala
- Subcontractor Safety and Health Manager (SHM)/Project CIH: Edie Scala-Hampson, CIH, Certified Hazardous Materials Manager
- Subcontractor CIH: Edie Sala-Hampson.

The PM has the overall responsibility for this project and will execute the contract in a manner consistent with this APP/SSHP and other contract-specific requirements. The PM will coordinate with the Site Manager/UXOSO/Site Safety and Health Officer (SSHO) and SHM/CDHS to complete the work in a manner consistent with this APP/SSHP.

4.2.1 Management Accountability

Annually, written H&S goals are developed for members of the senior, office, and project management team. The goals are designed to advance development of the SSHP, involve all levels of employees, proactively address H&S issues, and reinforce accountability for staff H&S with the management team. Management personnel are held accountable for completion of these goals and compensation is tied to the success of an individual's performance in meeting the goals.

The Subcontractor holds managers and supervisors accountable for safety through implementation of H&S Procedure Number 1, *Health and Safety Management System*, and corporate Policy Number 7, *Employee Performance Appraisals*. Managers and supervisors' safety-related

responsibilities are listed in H&S Procedure 1, and the following is a partial list of those expectations:

- Be a role model for safety.
- Actively participate in safety and health activities at all levels.
- Promptly address any unsafe conditions or unsafe acts.
- Report all accidents, incidents and near misses.
- Implement disciplinary procedures as warranted, for those violating safety rules.

It is the duty of the first-line supervisor or Field Team Leader (FTL) to motivate employees to adhere to safety policy in each work situation. A first-line supervisor or FTL for these purposes is defined as that person designated to give immediate on-site supervision to personnel involved in a task. For this project, this person will be the UXOSO.

All FTLs shall have complete knowledge of the safe procedure for all jobs and tasks under their supervision, or when in doubt, shall seek assistance prior to initiating a task. This is the only acceptable manner in which to perform the task. If the task cannot be accomplished safely, it will not be attempted. The FTL or qualified designee shall:

- a. Explain the safety procedure involved with a task to each employee and check frequently to see that the employee understands and works as instructed.
- b. Allocate sufficient time for the training and coaching of all employees to ensure that everyone knows the correct procedure for safely accomplishing required tasks.
- c. Prevent new employees from performing any tasks until required training is completed.
- d. Immediately correct unsafe conditions that involve site employees or contractors.
- e. Ensure that the employees are trained and outfitted with and wear PPE as specified by the SSHP and other procedures or as directed by the SHM or FTL.
- f. Set a good safety example.
- g. Obtain the cooperation of employees and contractors.
- h. Provide a safe work environment for employees and contractors.
- i. Confirm contractor safety performance records have been verified prior to contract award and monitor contractor performance during operations.
- j. Report all accidents, near misses, and property damage IAW the Preliminary Accident Notification-Accident Notification Feeder Report (Attachment E7).
- k. Establish a safety culture which promotes awareness, encourages participation, and recognizes excellence.

4.2.2 All Personnel

Each person is responsible for completing tasks in a safe manner and reporting any unsafe acts or conditions to the UXOSO/SSHO. All persons on site are responsible for continuous adherence to the APP/SSHP provisions during the performance of project work. All employees/personnel have the authority and responsibility to stop work on the site if an imminent hazard is observed as

identified in the AMS-710-00-PR-00400, *Stop Work Authority*. Even when a hazard is not imminent, employees/personnel should intercede if unsafe behavior or conditions are observed as follows:

- Recognize the hazard that could bring harm to you, fellow employees, or the environment.
- Stop the task before an incident happens. This may be the most difficult part, but it is a responsibility and an expectation. Remember, every employee has the authority to stop work.
- Discuss the hazardous condition or behavior and share the information with others to help avoid similar situations. Develop a plan to eliminate or mitigate the hazard. The specific task or operation in question shall be discontinued until the issue is resolved.

All personnel will follow policies and procedures set forth in the AMS (available on site through AptNet, a company secure intranet). Site personnel concerned with any aspect of H&S shall bring it to the attention of the Site Supervisor (SS) or the PM. If not satisfied, they should contact the APTIM Health and Safety Manager (HSM). All project personnel have the authority to stop work if, in their judgment, serious injury or environmental harm could result from continued activity. The SS, SSHO, Senior Unexploded Ordnance Supervisor (SUXOS), UXOSO, or PM shall be notified immediately if this becomes necessary. When a stop work order is issued, the HSM and PM will be notified within 1 hour. To protect the H&S of all personnel, employees that knowingly disregard safety policies or procedures could be subject to disciplinary actions up to and including termination. In no case may work be performed in a manner that conflicts with the inherent HSE precautions outlined in this APP. Personnel violating safety procedures will be coached, counseled, or disciplined. Disciplinary procedures may include the suspension and termination of personnel who violate established APTIM HSE policy and procedures as outlined in AMS-710-05-PR-00200, *Disciplinary Action Program* (Attachment E2). APTIM will provide designated competent persons to perform as SSHO for all hazardous, toxic, and radioactive waste (HTRW) and MEC operations and they will have completed OSHA 30-hour Construction Industry training. In the remainder of this document, it is understood that the UXOSO will also perform the role of the SSHO for MEC-specific operations.

4.2.3 Program and Project Manager

The PM is ultimately responsible for ensuring that all project activities are completed IAW requirements set forth in this plan. Responsibilities include:

- Enforcing the requirements of the SSHP. This includes ensuring implementation of daily safety inspections of the work site and, at a minimum, one formal site safety inspection each month.
- Stopping work, as required, to ensure personal safety and protection of property, or where life or property-threatening noncompliance with safety requirements is found.
- Ensuring all accidents, incidents, and near misses on the project are reported and thoroughly investigated.

- Working with the SSHO to ensure that all site personnel have received the proper medical clearance, ensuring that all site personnel have met appropriate training requirements and have the appropriate training documentation on site, and monitoring all team members to ensure compliance with the APP and subsequent SSHPs.
- Ensuring this APP and subsequent SSHPs are updated as site conditions change, new hazards are identified, or as necessary and are reviewed at least annually. Approve in writing any addenda or modifications of the SSHP with the concurrence of the SHM for the project.

4.2.4 Site Manager/Site Safety and Health Officer/UXO Safety Officer

The UXOSO will be the competent person to supervise operations. The UXOSO reports directly to the PM and responsibilities include but are not limited to:

- Implementing the approved plans in the field and must review and approve any changes to the approved plans
- Directly controlling the operations of all field personnel and will monitor performance of project personnel to help achieve maximum operational safety and efficiency
- Authorized to temporarily stop work to correct an unsafe condition or procedure.

UXOSO responsibilities include but are not limited to:

- Implementing all safety procedures and operations on site and present during all site activities
- Taking immediate steps to correct unsafe or unhealthful conditions or that causes significant adverse impact to the environment, including the stoppage of fieldwork when deemed necessary
- Verifying required certifications and safety-related qualifications of applicable site personnel (i.e. medical surveillance, Hazardous Waste Operations and Emergency Response [HAZWOPER], OSHA, First Aid, Operator, Competent Persons, etc.)
- Conducting necessary project-specific training and daily inspections to determine if operations are being conducted IAW this APP, USACE requirements, and OSHA regulations
- Observing work crew members for symptoms of on-site exposure or stress
- Keeping an open dialogue between the SHM and PM to ensure that safety issues are quickly addressed and corrective actions taken, upgrading or downgrading, in coordination with the SHM and the PM, the levels of personal protection based upon site observations and monitoring results
- Informing the project SHM of significant changes in the site environment that require equipment or procedure changes and reporting directly to the SHM for matters pertaining to worker safety and health

- Arranging for the availability of first aid and on-site emergency medical care, as necessary
- Determining evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation
- Ensuring that all site personnel and visitors have received the proper training and medical clearance prior to entering the site
- Establishing exclusion zones, contamination reduction zones, and support zones
- Presenting tailgate safety meetings (TSM) and maintaining attendance logs and records
- Ensuring that decontamination procedures meet established criteria
- Ensuring that there are qualified first-aid persons on site who are trained in universal precautions and the use of PPE
- For MEC projects, the UXOSO will be the competent person identified to perform SSHO duties.

4.2.5 Safety and Health Manager/Corporate Director of Health and Safety

The SHM/CDHS along with the Project CIH is responsible for:

- Providing general safety and health program administration and available for emergencies and on-site consultation
- Developing, implementing, and overseeing the APP and subsequent SSHPs in coordination with the SSHO/UXOSO and conducting field safety and health audits for APP/SSHP conformance if needed
- Establishing air monitoring parameters based on expected contaminants
- Establishing employee exposure monitoring notification programs
- Establishing random and for cause drug and alcohol testing, as warranted
- Providing technical assistance and advise on safety and health issues to the PM and the UXOSO/SSHO along with the Project CIH
- Coordinating matters related to industrial hygiene with the Project CIH
- Investigating significant incidents, illnesses, and near-misses
- Providing support for evaluation of subcontractor actions as they pertain to protecting the safety and health of workers and the public.

4.2.6 Occupational Medicine Physician

The occupational physician's responsibilities include:

- Performing medical surveillance as directed by 29 CFR 1910.120

- Determining whether medical clearance per 29 CFR 1910.120 is needed on an annual or biennial basis
- Providing medical review officer services for drug and alcohol test results review
- Providing clinical consultation to injured employees before they go to an emergency room and consulting with treating physicians as necessary
- Maintaining contact with injured employees to determine if there are issues or barriers to rapid healing, rehabilitation, and return to full duty status
- Providing technical support as needed for determination of project-specific medical monitoring.

4.2.7 Subcontractor Management and Personnel

The management organization of each subcontractor is responsible for the compliance of its personnel with applicable laws and regulations, applicable provisions of this APP, site-specific SSHPs, and its own safety and health programs and AHAs. Subcontractors are directly responsible for the safety and health of their personnel.

Subcontractors are responsible to provide medical surveillance documentation reviewed and approved by their licensed occupational physician. The medical clearance shall reference an applicable exam has been performed in accordance with 29 CFR 1910.120 and 29 CFR 1926.65.

A copy of applicable medical clearance for subcontractor personnel shall be maintained on site and available to the COR prior to commencement of work.

The contractor will communicate significant site hazards and recommended controls to the subcontractors, review and comment on H&S-related document submissions, and verify that subcontractor staff are qualified to safely complete their tasks. The contractor will monitor activities to confirm that subcontractors are performing their operations IAW the provisions of this APP/SSHP, relevant AHAs, and the subcontractors' AHAs and contract documents.

The contractor has the ultimate responsibility for the implementation of this APP/SSHP for its own employees, all subcontractors, and all others on the work site. This includes the strict enforcement of the plan.

The APP/SSHP requirements that apply to contractor personnel (for example, training, substance abuse screening, and incident reporting) also apply to subcontractors and their field personnel.

Additional subcontractor safety responsibilities are detailed in Section 5.0.

4.2.8 On-Site Personnel and Visitors

Site access by personnel making deliveries or performing equipment maintenance, public or government officials, visitors, or base personnel will be limited to support areas only. Support zone access will be limited to designated work, delivery, or observation areas to minimize any potential exposure to MEC or HTRW operations. Authorization for limited site access will be determined on a case-by-case basis by the SSHO or UXOSO as applicable in consultation with the SHM and

PM. Site access for such personnel will be limited to areas with no potential for HTRW during routine operations.

Visitors to the project site will be briefed on the hazards present at that location by the SSHO or UXOSO. Visitors will be responsible for compliance with the requirements specified in this APP and SSHPs.

4.3 EQUIVALENT TRAINING TO THE OSHA 30-HOUR

The SSHO and/or UXOSO will have official authorized OSHA 30-hour training. The SSHO and/or UXOSO will be present at all times when field activities are being performed. If the SSHO and/or UXOSO has to be off site for any reason, the Alternate SSHO/UXOSO or Designated Representative will provide and fulfill the same roles and responsibilities.

4.4 COMPETENT PERSONS

A competent person, as defined by 29 CFR 1926.651(k)(1), is required to supervise activities requiring excavation and trenching, fall protection, scaffolding, permit-required confined space entry, and lockout/tagout.

EM 385-1-1 also has additional requirements for competent persons for cranes and rigging; trainers; rescuers; equipment operators; HTRW-competent persons (lead, asbestos control, radiation); site safety and occupational health; hazardous energy; PPE selection use and maintenance; and health hazard evaluation and control of chemical, physical, and biological agents.

Proof of competency will be provided in Attachment E5. The names of the competent person(s) required for a particular activity (e.g., excavation, scaffolding, fall protection, or other activities as specified by OSHA and EM 385-1-1) will also be identified and included in the AHA.

Subcontractors will provide licensing/qualifications of equipment operators and provide letters on company letterhead stating the competency on the equipment for which they are qualifying and the name of the qualified person. This information will be maintained in the site files by the SSHO/UXOSO.

No work will be performed unless the SSHO/UXOSO or the designated alternate competent person is present on the job site.

4.5 RISK MANAGEMENT PROCESS (AHAS)

A Risk Management Process/Plan is required for every project. Detailed project-specific hazards and controls are provided by AHAs for each activity or DFW.

AHAs will be used to document a risk management plan by which the steps required to accomplish a work task are outlined and the actual or potential hazards of each step are identified. Safety measures, precautions, and controls will be identified and put into place to reduce the level of hazard for each step. The RAC assigned to the entire activity is the highest RAC of all the steps in the AHA.

AHAs are intended to be created by the field crews performing the work, with the assistance of others (SSHO/UXOSO, etc.) as needed. They are living documents and are intended to be created in the field and updated (by the workers) as needed.

Once accepted, the AHAs will be updated in the field by the field crews so that they constantly reflect current equipment, personnel, conditions, PPE, etc. Government designated authority (GDA) acceptance of changes made to an AHA is not necessary as long as changes do not increase the original RAC level for the activity, requirements are being met, and a copy is provided to the Government in a timely manner.

4.6 AHA SUBMITTAL REQUIREMENTS

No work will begin on an activity (DFW) until the initial AHA has been accepted by the GDA.

4.7 CONTRACTOR COMPETENT PERSON REQUIREMENTS

No work will be performed unless the competent person (SSHO/UXOSO) or the designated alternate competent person is present on the job site.

4.8 DISCIPLINARY ACTION POLICY

No person may work in a manner that conflicts with the intent of, or the inherent safety and environmental precautions expressed in, these procedures. Disciplinary procedures may include the suspension and termination of personnel who violate established APTIM HSE policy and procedures as outlined in AMS-710-05-PR-00200, *Disciplinary Action Program*. Employees and subcontractors may be subject to progressive discipline (i.e., verbal warning, written warning, and dismissal) and may be terminated for continued violations.

4.9 COMPANY PROCEDURE FOR SAFETY ACCOUNTABILITY

All on-site personnel will be trained IAW this document. Key project personnel include the following:

- Contractor PM: Mark Shoemaker
- Subcontractor PM: Tim Hiles
- Contractor UXOSO: William Seppala
- Subcontractor SHM/Project CIH: Edie Scala-Hampson, CIH, Certified Hazardous Materials Manager
- Subcontractor CIH: Edie Sala-Hampson.

The Subcontractor's Occupational Medicine Physician is Peter Greaney, MD, President of WorkCare, Inc.

Subcontractor's policies and procedures regarding noncompliance with safety requirements follow Human Resources (HR) Policy No. 45, *Performance Improvement Plan Policy*, which involves a three-step process of identification, performance improvement, and employment action.

Employees who violate a company policy, whose actions pose a threat to co-workers, whose actions constitute harassment, or who violate the law may have their employment terminated without following the Subcontractor's Performance Improvement.

5.0 SUBCONTRACTORS AND SUPPLIERS

The subcontractors for the following DFWs/activities are not known at this time, but additional information will be submitted to the APP for acceptance prior to the start of any activities listed. Each subcontractor working on the project site will be required to adhere to the APP/SSHP and the requirements presented below. Subcontractors performing limited site work may include the following:

- a. Civil survey
- b. Vegetation removal
- c. MEC subsurface clearance
- d. MPPEH inspection and handling
- e. MEC disposal.

5.1 SUBCONTRACTOR/SUPPLIER COORDINATION AND CONTROL

All subcontractors performing work on site will be prequalified and screened for safety performance and compliance with federal alcohol and substance abuse requirements prior to being issued any contract. Subcontractors will comply with the requirements for site safety as outlined in this APP and applicable subsequent SSHPs. The UXOSO (as applicable) will be responsible for oversight of the conduct and control of subcontractors.

5.2 SAFETY RESPONSIBILITIES OF SUBCONTRACTORS AND SUPPLIERS

All subcontractor employees are subject to the same training and medical surveillance requirements described in this APP, which is dependent upon their specific job activity. All activities involving the potential for worker exposure to site-related hazardous materials will require medical and training certification as mandated by 29 CFR 1910.120, General Industry Regulations HAZWOPER; 29 CFR 1910.1200, Hazard Communication; EM 385-1-1; and USACE Safety and Health Requirements Manual.

All subcontractor personnel will be required to sign in daily and attend a daily meeting discussing operations and safety issues. All incidents involving subcontractor employees shall be reported immediately to the PM and SHM, and a copy of the subcontractor's incident report shall be submitted to the SSHO or UXOSO within 24 hours.

Subcontractors are required to read and sign the APP and comply with all requirements of this APP and applicable SSHPs. Contractors not in compliance will be immediately dismissed from the site.

Suppliers delivering various materials to the project site or providing equipment and/or equipment maintenance will comply with all rules and regulations:

- Supplier personnel will not be permitted into restricted areas unless training and medical surveillance are IAW 29 CFR 1910.120. They will follow hot work rules if spark- or flame-producing work is required.

- Trucks will be loaded and unloaded in a safe and effective manner, and materials will be stored safely in designated locations only.
- Associated packaging will be properly disposed, and litter will not be permitted to accumulate.
- Operators of mobile equipment on site must observe all traffic rules, such as speed limits and rights-of-way of pedestrians or troops.

The management organization of each subcontractor is responsible for the compliance of their personnel with the APP as well as their own H&S program. The UXOSO will ensure subcontractor compliance with this APP. Since subcontractors are hired for their specific expertise, they must assume primary responsibility for the safety and health of their personnel. However, the contractor is still responsible for the actions of the subcontractors, which is why subcontractors must abide by the APP.

The contractor may elect to allow subcontractors to follow their own H&S plan procedures as long as they are more protective of the contractor or EM 385-1-1 requirements following review and approval by the SHM and client as applicable. Subcontractor plans will be included as an addendum to the SSHP. The subcontractor's field supervisor or crew leader will be responsible for performing daily safety inspections of their operations, including the following:

- a. Compliance with OSHA Regulation 29 CFR 1910 and USACE EM 385-1-1
- b. Performance of all work IAW accepted work plans and specifications
- c. Providing and complying with PPE as prescribed in the APP
- d. Reporting immediately any unsafe conditions, faulty equipment, incidents, and near misses to the UXOSO
- e. Providing awareness level training to affected contractor or other subcontract personnel regarding any material, equipment, or operation that may pose a hazard.

6.0 TRAINING

6.1 INITIAL AND SUPERVISORY TRAINING

All contractor or subcontractor employees performing work at RSA shall receive initial safety indoctrination training before beginning actual fieldwork. This training will be performed by the competent/qualified UXOSO. At a minimum, this initial training shall include but not be limited to the following:

- a. RSA facility-specific H&S training
- b. Site location and description, including emergency routes, first-aid kit locations, occupational medical clinics, and hospital locations
- c. Statement of the contractor's H&S policy
- d. Project organization, key personnel, and responsibilities
- e. MRS-2 or "RSA-313 North" has a designated UXO probability of "Moderate/High." The chemical warfare materiel (CWM) probability rating is "Unlikely" for RSA-313-R-01. Given the nature of work at RSA, personnel will be trained on RSA chemical, physical, and biological hazards including the RSA Explosives Safety Management Program.
- f. MEC avoidance and anomaly investigation
- g. AHA
- h. Hazard Communication (HAZCOM) program
- i. Heat/cold stress
- j. Hearing conservation
- k. Control of hazardous energy
- l. Sanitation
- m. Coronavirus (COVID-19) controls
- n. Buddy system requirements
- o. Fire prevention and protection/hot work
- p. Excavation safety
- q. PPE
- r. Site control measures
- s. Exposure monitoring air sampling
- t. Medical surveillance
- u. Emergency Response and Contingency Plan
- v. Record keeping and data management
- w. Incident and near miss reporting and investigation

- x. Site-specific hazard communication.

6.1.1 Mandatory Training and Certifications

In accordance with CFR 1910.120(e) HAZWOPER; EM 385 1-1, *Safety and Health Requirements Manual*, Section 28; HAZWOPER, EM 385-1-97; and AMS-710-04-PR-00300, *Hazardous Waste Operations*, mandatory training and certifications applicable to the field personnel at the start of the project and any additional personnel assigned during project execution, and some subcontractors include the following at a minimum:

- a. APP/SSHP training
- b. HAZWOPER 40-hour training
- c. Twenty-four-hour supervised training
- d. Hazardous Waste SS training (for HAZWOPER supervisors)
- e. Thirty-hour OSHA Construction Safety Training (for UXOSO/SSHO)
- f. Eight-hour HAZWOPER refresher training
- g. Hazard communication training
- h. Cardiopulmonary resuscitation (CPR) and first-aid training for a minimum of two people.

Depending on the nature of work and risk assessment, the above requirements may be altered for certain activities.

UXO personnel shall meet the training requirements of TP-18, *Minimum Qualifications for Personnel Conducting Munitions and Explosives of Concern-Related Activities*. Recertification or refresher training for the cited Technical Paper shall be maintained and documentation available for review.

Personnel who are designated first-aid and CPR responders shall also have completed bloodborne pathogen training, and documentation should be provided in Attachment E5.

6.2 PERIODIC PROJECT SAFETY TRAINING

The SHM organizes and/or conducts annual 8-hour HAZWOPER refresher training. In addition to the above training, OSHA SSHOs also have 30-hour Construction or General Industry training. Records of due dates, certifications, 30-hour OSHA training cards, and 3-day supervised on the job training (OJT) are maintained at the Contractor and/or Subcontractor's Training and Certification database. Periodic retraining/recertification dates are maintained and monitored to ensure up-to-date certificates are maintained.

Topics covered in the annual training include the following:

- 29 CFR 1910.120 overview
- Content of Medical Surveillance Program
- Hazard Communication standard

- Hazards (Chemical, Biological and Physical)
- Site controls
- PPE selection and use
- Confined spaces/trenching and excavation
- SSHP contents
- Roles and responsibilities
- Leadership and supervision
- Emergency response
- Spills
- Air monitoring equipment
- Respiratory protection
- Lessons learned and work experience
- OSHA recordables and incident review.

6.3 EMERGENCY RESPONSE TRAINING

There are no tasks in the scope of work that require specific emergency response training beyond what is required in Section 6.1. All personnel who have completed the 40-hour HAZWOPER Training are qualified as emergency first responder operations level per 29 CFR 1910.120(q)(6)(ii).

Site-specific emergency response procedures will be reviewed with all site personnel as applicable to the scope of work as a part of site indoctrination. If unanticipated hazardous material is identified during site work or suspect CWM is encountered in Unlikely probability areas, work will stop; teams will leave the location; and the PM, SSHO, SHM, and UXOSO will be notified. Determinations will be made if assistance from the RSA Fire Department is warranted in the event CWM is suspected.

6.4 SAFETY MEETINGS

6.4.1 Daily Safety and Tailgate Meetings

The SSHO/UXOSO will conduct a safety briefing for all contractor and subcontractor site personnel daily. These briefings will be used as an opportunity to address site-specific safety issues, refresh workers on specific procedures, address new hazards and controls, and discuss any lessons learned.

Topics to be discussed at the TSM include the following:

- Day's activities
- Potential H&S issues
- Changes in activities and operations
- Changes in conditions
- Weather conditions and heat/cold stress or other precautions
- Methods of risk reduction
- Required PPE for each task

- New MEC hazards or ordnance identification
- Recent significant incidents
- Biological hazards
- Changes to the SSHP
- Completion of Pre-Task Safety and Health Analyses worksheet, as needed
- Other applicable information that will increase safety awareness on the project.

Employee feedback regarding H&S will also be solicited. Documentation of each meeting will be retained.

6.4.2 Site Safety Committee Meetings

During weekly progress meetings, the PM, UXOSO/SSHO, and subcontractor representatives (i.e., Site Safety Committee) will review and summarize upcoming work tasks, audits and inspections, competent person changes, and training. The Site Safety Committee will discuss and evaluate the risks of the upcoming work tasks and the planned mitigation measures for follow-on discussion during the daily TSMs. Activities will be added to the summary at least two weeks in advance of the work.

6.5 FIRST AID/CPR AND BLOODBORNE PATHOGENS TRAINING

6.5.1 First Aid/CPR

Personnel assigned to conduct fieldwork for this project will not conduct first aid or CPR as a primary job function. Rather, selected employees will have been trained in CPR and first aid for emergency use only. Acting in the capacity of a designated emergency first-aid provider is not mandatory, and anyone who is uncomfortable with the possibility of being so designated should notify the UXOSO/SSHO. IAW EM 385-1-1, at least two individuals currently certified in CPR and first aid shall be designated and present on site at all times during site operations.

6.5.2 Bloodborne Pathogens

An indoctrination to the bloodborne pathogens standard (29 CFR 1910.1030) will be provided to employees either during their first-aid training and/or during the initial site H&S meeting. Hepatitis B and Acquired Immune Deficiency Syndrome, among other pathogenic microorganisms, can be contracted because of contact with blood through emergency first aid and CPR.

Therefore, it is important to recognize the concept of “universal precautions.” Universal precautions require one to assume that all blood and bodily fluids contain pathogens and require the use of protective barriers to prevent exposure. Latex gloves and CPR barriers will be available in the first-aid supplies stored at each site and should be used before attending to a victim’s needs. Additionally, washing any body part or surface that has been contaminated with blood is an important part of the universal precautions. Notify the UXOSO/SSHO of any potential contact with blood or bodily fluids resulting from first aid or CPR administered on the job.

6.6 HAZARD COMMUNICATION TRAINING

IAW the OSHA HAZCOM Standard (29 CFR 1920.1200 and CFR 1926.59), the UXOSO/SSHO will make copies available on site of all safety data sheets (SDS) for hazardous chemical materials that are planned for use during site operations or that are present on site. The UXOSO/SSHO will maintain a copy of the full hazardous materials inventory, identification of use, approximate quantities, and a site map showing the storage location of these materials.

HAZCOM training IAW 29 CFR 1920.1200 and CFR 1926.59, Department of the Army Pamphlet (DA PAM) 40-173, DA PAM 385-61, and EM 385-1-1 will be presented during site-specific training to address site-specific hazards. Training will include, but not be limited to, all hazards or potential hazards associated with site activities and any hazardous chemical materials brought to or found on site. The UXOSO/SSHO will maintain on site the SDSs for chemicals potentially present.

6.7 VISITOR TRAINING

All visitors are required to comply with the provisions of this APP and all applicable federal, state, local, and RSA regulations. Visitors to the site shall abide by the following (“visitor” means persons not involved in routine site work activities):

- Visitors shall be escorted at all times by a competent person when observing site operations.
- Additionally, the visitor must have completed the training requirements established in **Section 5.2**.
- Visitors must check in with the UXOSO/SSHO, where the purpose of their visit will be evaluated. At a minimum, any visitor planning to access a work area will be briefed on the daily TSM information and will sign off attending the safety briefing.

6.8 UXO TRAINING

6.8.1 Non-UXO Personnel

All non-UXO trained site personnel will be trained in MEC/chemical agent (CA) recognition, hazards, and actions to take in the event that they are encountered.

6.8.2 UXO Personnel

All UXO-trained personnel, regardless of position, will receive site-specific MEC, CA, and demolition training.

6.9 EQUIPMENT TRAINING

Table E-6.1 lists the equipment to be used and the related inspection and training requirements for the project.

Table E-6.1
Project Equipment and Training Requirements

Equipment to be Used	Inspection/Test Requirements	Training Requirements
Vehicles	Daily – preventive maintenance and operational checks	Valid driver’s license and/or operator training.
Metal detection locators	Prior to operation	40-hour HAZWOPER (<i>CFR 1910.120</i>). 8-hour HAZWOPER Refresher (<i>CFR 1910.120</i>). 24-hour supervised field experience. Graduate of a military explosive ordnance disposal (EOD) school or a formal training course.
Blocking, bracing, and cushioning materials	Prior to operation	UXO Technician III certified or above.
Fire extinguishers	Monthly	Site specific.
First-aid kits	Weekly – inventory and inspection	CPR and first aid certified.
Manual hand tools	Prior to operation	OJT.
Mechanized equipment	Prior to operation	Operator’s certificate.
Geophysical instrumentation	Prior to operation	OJT.
Global Positioning System instrumentation	Prior to operation	OJT.
PPE	Prior to use	Site specific.
Communications equipment	Prior to operation	Site specific.
Battery charging station	Prior to operation – visual Monthly – entire system	Site specific.
Eye wash station	Weekly – visual Monthly – operational 90-day – solution replacement	Site specific.
Weather monitoring equipment	Prior to operation	UXO Technician III certified or above.

6.10 TRAINING DOCUMENTATION

Documentation of training requirements is the responsibility of the contractor and the subcontractors. Written documentation verifying compliance with 29 CFR 1910.120 (e)(3), (e)(4) (as applicable), and (e)(8) will be submitted to the UXOSO/SSHO before beginning work at the site. Types of training documentation include 40-hour HAZWOPER, 8-hour HAZWOPER refresher, 8-hour supervisor training, 30-hour OSHA construction safety, UXO, bloodborne pathogens, HAZCOM, first aid, CPR, current physician’s certificate, and hearing conservation training.

7.0 SAFETY AND HEALTH INSPECTIONS

7.1 PERSONNEL RESPONSIBLE FOR SITE SAFETY INSPECTIONS

Job site safety and health inspections (reviews and audits) can be conducted by SSHO/UXOSO, quality control officers, PM, SHM/CDHS, Project CIH, or SHM/CDHS designee. The following reviews will be performed:

- The SSHO/UXOSO will inspect the job site daily or more often if warranted by ongoing activities. Findings will be documented on the Daily Project Safety Inspection Report and the results posted on the project bulletin board.
- The PM or SHM/CDHS may conduct unannounced job site safety audits.

All safety deficiencies identified during the inspection processes will be tracked until resolved on the Safety and Occupational Health Deficiency Tracking Log (Attachment E6), which will be retained in the field or facility office. The log will include:

- Date deficiency is identified
- Name of person who identified the deficiency
- Description of deficiency
- Name of person responsible for correcting deficiency
- Projected resolution date
- Date resolved.

7.2 INSPECTOR TRAINING QUALIFICATIONS

The SSHO will have completed (1) the 30-hour OSHA General Industry safety class (may be web-based training if the student is able to directly ask questions of the instructor by chat or phone), (2) the 30-hour OSHA Construction Industry safety class (may be web-based training if the student is able to directly ask questions of the instructor by chat/phone), or (3) as an equivalent, formal construction or industry safety and health training covering the subjects of the OSHA 30-hour course and the EM 385-1-1 (Appendix A, Paragraph 3.d.[3]) applicable to the work to be performed and given by qualified instructors (may be web-based training if the student is able to directly ask questions of the instructor by chat/phone). The UXOSO assigned to the project will meet the qualifications of Department of Defense Explosives Safety Board Technical Paper 18.

7.3 FREQUENCY OF INSPECTIONS

Site safety inspections will be conducted daily and recorded.

Portable Fire Extinguishers: The SSHO/UXOSO is responsible for performing monthly inspections of and obtaining annual service for portable fire extinguishers that are not mounted on vehicles or equipment. The inspections will be documented on the inspection tag on each extinguisher. Vehicle and equipment operators are responsible for the daily inspection of fire extinguishers on vehicles or equipment.

First-Aid Kits: First-aid kits will be inspected monthly by the SSHO/UXOSO or his/her designee. A seal may be placed on first-aid kits to allow for less frequent inspections. If the seal is not broken, then an inspection is not required for up to 3 months.

7.4 DOCUMENTATION OF INSPECTIONS

Site safety inspections will be recorded on the Daily Project Safety Inspection Report.

7.5 DEFICIENCY TRACKING SYSTEM

All unsafe conditions, faulty equipment, incidents, and close calls will immediately be reported to the SSHO/UXOSO so that lessons learned can be discussed at TSMs. All deficiencies will be tracked on the Safety and Occupational Health Deficiency Tracking Log through resolution.

7.6 EXTERNAL INSPECTIONS

USACE or regulatory agencies may, at any time, perform inspections or audits of field H&S practices. The PM and SHM/CDHS will immediately be notified when a regulatory agency inspector requests access to a work site for a compliance inspection.

The COR will immediately be notified by the PM of any regulatory agency inspection. The inspection should not be delayed because of non-availability of the COR or his/her designee. If a citation is issued to the contractor or its subcontractors, a copy of the citation will be submitted to the USACE COR along with a corrective action plan.

8.0 MISHAP REPORTING

8.1 EXPOSURE DATA (MAN-HOURS WORKED)

The PM is responsible for reporting and maintaining records of all exposure and accident experiences incidental to the work, including those of subcontractors, and ensuring the information is reported to USACE. At a minimum, these records will include exposure work hours and equivalents as prescribed by 29 CFR 1904. This exposure data will be provided to USACE using the USACE Prime Contractor Monthly Record of Work-Related Injuries/Illnesses and Exposure Form (Attachment E4).

8.2 MISHAP INVESTIGATIONS, REPORTS, AND LOGS

The UXOSO and PM shall conduct accident/incident investigations in consultation with the SHM. A report is completed by the Site Manager or SUXOS and must be submitted to the SHM. The PM shall report all accidents to the U.S. Army Garrison, Chief Installation Restoration Branch, and COR as soon as possible but no more than 24 hours after the incident/accident.

Except for rescue and emergency measures, the accident scene will not be disturbed until it has been released by the SSHO/UXOSO and the investigation is complete. This means that the accident scene will be left as it was immediately after the accident occurred. Except for injured personnel, nothing at the scene will be moved, straightened, thrown away, or cleaned. Photographs of the incident site will be taken, and any independent witness statements will be recorded as soon as safely possible. Witnesses are to be isolated and questioned separately if possible.

On-site management personnel will investigate near misses, injuries, illnesses, and incidents and accidents to identify unsafe acts or conditions that occurred or existed at the time of the accident. The general information collected by the mishap investigation includes:

- Location, time, and date
- Description of the operation being performed at the time of the accident
- Outline of the sequence of events that led up to the mishap
- All personnel associated with the work task and incident
- All eyewitnesses.

The investigation team will proceed in the following manner:

- Identify, secure, and document any evidence, tools, or other materials pertinent to the investigation.
- Identify and interview all involved employees and eyewitnesses.
- Provide a private place and time for each individual to prepare a written statement.
- Prepare and issue a written report.

Engineer (ENG) Form 3394 is required to be prepared and submitted in reporting lost work day cases, accidents where three or more persons are admitted to a hospital, a fatality, permanent totally disabling injury, permanent partial disabling injury, or property damage greater than \$500,000.

ENG Form 3394 must be submitted to the Contracting Officer (KO) or authorized representative following the accident IAW EM 385-1-1 as soon as possible but no more than five days following the accident. Refer to Section 8.3 for a discussion of the requirements for submitting ENG Form 3394. Corrective actions should be implemented as soon as reasonably possible for all incidents. Minor incidents such as near-misses or on-site first-aid injuries shall be included in the daily field quality control reports. These incidents shall also be reported immediately to the HSM.

8.3 IMMEDIATE NOTIFICATION REQUIREMENTS

Employees are responsible for reporting all mishaps immediately to their employer or supervisor. The UXOSO/SSHO will investigate the accident after all emergency actions have been taken. ENG Form 3394 and/or the Preliminary Accident Notification form will be filled out by the UXOSO/SSHO and submitted to the SHM/CDHS. A verbal notification should be given to the SHM/CDHS that the forms are being filled out.

All recordable mishaps will be investigated and reported as soon as possible but not more than 24 hours afterwards to the GDA. The contractor will thoroughly investigate the accident and submit the findings of the accident along with the appropriate corrective actions to the KO as soon as possible but no later than five working days following the accident.

IAW 29 CFR 1904.39, the contractor will notify OSHA within eight hours when there is a fatality or the hospitalization (inpatient) of one or more persons as a result of a single occurrence. IAW DID HNC-001.02, HNC-002, the contractor will immediately report to the KO or GDA any accident that could bring adverse attention or publicity to the USACE. Other lost-time or OSHA-recordable accidents/incidents will be formally reported (i.e., using a written report) to CEHNC within five working days. The OEES will be notified within one day of any accident or injury that may require reporting. An OSHA 300 log of work-related injuries and illnesses will be maintained at the site.

Accidents will be reported immediately if there is:

- a. A fatal injury/illness
- b. A permanent totally disabling injury/illness
- c. A permanent partial disabling injury/illness
- d. One or more persons hospitalized as inpatients as a result of a single occurrence, including individuals becoming ill or having a medical condition that is suspected to be related to a site condition, or a hazardous or toxic agent on site.
- e. \$500,000 or greater accidental property damage
- f. A case of three or more individuals becoming ill or having a medical condition which is suspected to be related to a site condition or a hazardous or toxic agent on the site.

Additionally, any mishaps occurring in any of the following high hazard areas will also be immediately reported:

- a. Electrical, to include arc flash, electrical shock, etc.

- b. Uncontrolled release of hazardous energy
- c. load handling equipment or rigging
- d. Fall from height.

In addition to the reporting requirements identified above, the contractor is required to report and document in ENG Form 3394:

- a. Class A – Government or contractor fatality, or permanent total disability, > \$2,000,000 property damage, or USACE aircraft destroyed, missing, or abandoned
- b. Class B – Government or contractor permanent partial disability, inpatient hospitalization of 3 or more persons, or > \$500,000 < \$2,000,000 property damage
- c. Class C – Government or contractor lost workday, or > \$50,000 < \$500,000 property damage
- d. Class D – Government or contractor non-fatal injury or illness that results in restricted work or job transfer, medical treatment greater than first aid, needle sticks from potentially infectious material, medical removal, occupational hearing loss, and work-related case or property damage > \$2,000 < \$50,000.

Contractor, subcontractors and other non-contractor employees will report all near misses, equipment property damage, injuries, or illnesses to the UXOSO/SSHO. Records of all first-aid treatments shall be maintained and submitted to the GDA upon request. The contractor and/or subcontractor's safety personnel will investigate and analyze the incident so that the situation can be corrected. A copy of the contractor and/or subcontractor's investigation report will be made available to the PM. The PM will then forward the report to the SHM/CDHS.

9.0 PLANS, PROGRAMS AND PROCEDURES

The Contractor and/or Subcontractor will provide personnel with the necessary training and experience to safely execute project activities. As the employer, the Contractor and/or Subcontractor will determine which employees will be competent in the respective areas of site work for which they will be involved. This will entail selecting appropriate personnel based on the specific site needs (i.e., conventional MEC, CWM, or conventional HTRW).

In addition to this APP, the SSHP (Attachment C1) meets the major requirements of EM 385-1-1. The level of detail provided in the SSHP has been tailored to be RSA specific to the type of work, complexity of operations, and hazards anticipated.

Public and Garrison safety will be achieved by the means of site control zones and access to the work area by authorized personnel only. Site control measures are described in the SSHP.

The following sections discuss plans that have been identified as applicable to this project and notes plans that are not applicable.

9.1 FATIGUE MANAGEMENT PLAN

9.1.1 Excessive Work Hours

The following workday duration limitations for hours worked on the project will be in effect:

- Personnel working on site, including those who are operating hoisting equipment or mobile construction equipment, may work up to 12 hours at the site, not including travel time to/from their home/motel or uncompensated lunch breaks. This workday duration is subject to reduction by the other requirements and factors described in the bullets below. The 12-hour limit is primarily because of motor vehicle driving restrictions.
- While on duty, personnel will not operate motor vehicles after being in a duty status (regardless of their role or function) for more than 12 hours during any 24-hour period without at least 8 consecutive hours of rest. Personnel may work an additional 2 hours at the motel or their home (for a total 14-hour day), though they are still subject to reduction by the other requirements and factors described below. A minimum of 8 consecutive hours will be provided for rest in each 24-hour period.
- No employee may drive continuously for more than 10 hours in any single on-duty period (continuous period of more than 10 hours in any 24-hour period without at least 8 consecutive hours of rest).

9.1.2 Training

If during planning it is decided that the field crew will work extended hours, the UXOSO/SSHO will perform fatigue management training that includes the following topics:

- Health impacts, signs, and symptoms of fatigue (e.g., weakness, irritability, impaired memory or concentration, insomnia, muscle pain, joint pain without swelling, and headaches)
- Common fatigue risk factors during site operations (e.g., ambient temperature, PPE, downrange time, physically demanding tasks, worker age)
- Steps to prevent fatigue (e.g., worker rotation, optimizing work/rest schedules, importance of adequate rest, worker observation)
- Actions that workers should take if they observe fatigue in a co-worker (e.g., assist a co-worker who is experiencing fatigue, alert the supervisor or UXOSO/SSHO of the situation, encourage worker to take a break and to allow enough time for adequate sleep in the evening)
- Controls that are in place to prevent fatigue (e.g., allowing breaks throughout the day, maintaining a schedule that will allow for workers to have 8 hours of continuous sleep in the evening, training workers in signs/symptoms of fatigue and making their supervisor aware if they are experiencing fatigue).

9.1.3 Procedures

For each project effort, the UXOSO/SSHO is responsible for adjusting the workday duration within these limits. The following factors will be considered by the UXOSO/SSHO for adjusting the workday duration:

- Time of year (for example, reduce workday duration because there is less daylight in winter)
- Temperature/weather (for example, reduce workday duration when the temperature is very cold, very hot, or very windy)
- Type of work (for example, reduce workday duration for personnel involved in physically demanding phases of work)
- Individual personnel limitations (for example, reduce workday duration for personnel with minor head colds, suffering from temporary effects of allergies, or showing signs of heat stress).

The UXOSO/SSHO will implement this Fatigue Management Plan during site operations. Implementing this Fatigue Management Plan includes the following actions:

- Creating a work schedule
- Rotating teams to allow for sufficient rest/recovery breaks
- Minimizing environmental factors that influence fatigue (heat, humidity, etc.)
- Establishing a buddy check-in to detect early signs of fatigue.

Workers shall try to get 7 to 9 hours of sleep per night and avoid the following before bedtime:

- Heavy meals (2 to 3 hours before bed).

- Caffeine (according to your own sensitivity). This stimulant can help you stay awake while driving but can affect the body for five hours or more. Plan intake to prevent wakefulness during sleeping hours.
- Nicotine and other stimulants.
- Exposure to light from television and electronics (tablets, computers, etc.).

9.2 EMERGENCY RESPONSE PLANS

Pre-planning measures to avoid personal injury or exposure include employee training, fire and explosion prevention and protection, chemical spill and discharge prevention and protection, and safe work practices. In the event an emergency situation occurs, site personnel will assess the situation; decide if they have the equipment, supplies, PPE, and tools to respond to contain or clean up the incident; or decide if the situation is unsafe. If any aspect of an emergency response effort is missing, the UXOSO/SSHO will announce a site evacuation (emergency action) to the rally points detailed in the emergency action plan. Emergency response plans include the following:

- Emergency response team organization
- Communication means and protocols
- An evaluation of likely emergencies
- Staff training and capabilities
- Emergency response equipment
- A determination of likely emergencies that can be handled using internal resources and a list of likely emergencies needing outside emergency assistance
- Steps to summon and coordinate outside emergency responders
- Cleanup actions necessary after the immediate emergency has been contained
- Provisions for a critical review of actual emergency response activities against the activities specified for that type of emergency in the emergency response plan
- Changes to the written plan and briefing site personnel on the changes.

Emergency action plans limit site employee activities to the following:

- Emergency recognition
- Emergency notification inside the site and with outside emergency responders
- Communication means and protocols
- An evaluation of likely emergencies
- Staff training and capabilities
- Steps to coordinate with outside emergency responders on site
- Evacuation routes and rally points

- Cleanup actions necessary after the immediate emergency has been contained
- Provisions for a critical review of actual emergency actions against the actions specified for that type of emergency in the emergency action plan
- Changes to the written plan and briefing site personnel on the changes.

9.3 PROCEDURES AND TESTS

Upon mobilization to the project site, the UXOSO will:

- Verify that personnel have an effective means of communications (cellular telephone or two-way radio) from every work area on the site.
- Confirm the provisions for emergency response before project fieldwork commences.
- Test emergency communication equipment and that the routes to local medical facilities are accessible and practical.
- Establish a designated site emergency assembly point and communicate its location to the field team during the initial site safety orientation.

During any on-site emergency, work activities in the affected area will cease until the emergency is brought under control.

If an emergency arises, the first person to recognize the situation must take appropriate immediate response:

- The field crew will contact emergency response services by calling 911 (or the location-specific emergency communication system), and then immediately notify the UXOSO of the incident.
- The UXOSO or a qualified USACE representative has the authority to order personnel to evacuate the area.

If site evacuation is required:

- A continuous, uninterrupted horn will be sounded for approximately 10 seconds. Air horns in the work area or a vehicle horn will be used.
- Continuous communication will be maintained between the site and the main office.
- Personnel will evacuate to a designated safe, upwind location, and the crew leader will perform a head count.
- Once the head count has been performed, the UXOSO/SSHO will receive a status report of the event.

9.3.1 Weather Emergencies

The UXOSO/SSHO or designated on-site personnel will be responsible for checking weather conditions at a minimum of twice daily. When there are warnings or indications of impending

severe weather (heavy rains, thunderstorms, damaging winds, tornados, hurricanes, floods, lightning, etc.), weather conditions will be monitored using a weather station that is part of the National Oceanic and Atmospheric Administration weather radio all hazards network or similar notification system. Appropriate precautions will be taken to protect personnel and property from the effects of severe weather. A safe place of refuge will be discussed during the TSMs.

Thunder and lightning storms, hail, high winds, tornados, and hurricanes may occur. Fog and lighting may pose potential problems in the work area as well. If lightning is observed, all load handling equipment, drill rigs, work on elevated platforms or scaffolding, roofing activities, tree trimming activities, or work in open areas will stop. A determination will be made as to the proximity of the storm to the operation being performed.

Operations must cease if lightning approaches within 10 miles of the project location. Once lightning is seen, count the number of seconds until thunder is heard and divide by five to determine the distance (in miles) to where the lightning occurred. If lightning is 10 miles away or less, work should stop until 30 minutes after the last audible thunder or visible flash of lightning.

Work will cease if fog limits visibility during situations where accurate vision is required (e.g., driving, work around power lines, measuring, equipment spotting, and precise equipment operations).

The weather will be monitored routinely. It may be necessary to halt certain hazardous operations or stop work altogether to allow the situation to pass. The UXOSO/SSHO must decide what operations, if any, are safe to perform based on existing and anticipated conditions. If immediate shelter is required, all personnel will go to the designated meeting location and wait until hazardous conditions pass.

9.3.2 Spill Plans

The occurrence of chemical leaks or spills is anticipated to be remote because of the preventative measures implemented on the site and the nature of the contaminated materials present. Before fieldwork begins, the UXOSO/SSHO will conduct a hazard evaluation, which is part of the AHA. Any hazardous substances on site, or to be brought on site at a later date, will be noted in the evaluation.

Personnel will maintain the following equipment and materials on site for use during spill response activities:

- Spill control materials
- Shovels and assorted hand tools.

Potential spill events include those of vehicle and equipment fuels, oils, and other fluids that may occur during fueling operations or because of equipment leaks. Materials that may cause contamination will be present in radiators, fuel tanks, hydraulic reservoirs, fuel cans, and oil cans. To prevent leaks, the following measures will be taken:

- Vehicles and equipment will be inspected daily and immediately taken out of service in the event of leaks.

- Cans containing fuels or oils will be labeled and stored appropriately.

Waste stockpiles and other potential spills are not anticipated on this project.

If a hazardous material spill is observed at the site, the cause of the spill will be addressed (if possible) as soon as it is safe to do so. After addressing the cause, spill control materials will be applied to the spill if appropriate. The UXOSO/SSHO will then be notified and will assess the magnitude and potential impact of the spill, including whether the material represents a reportable quantity.

Fuels or oils spilled in excess of 100 pounds or 25 gallons will immediately be reported through the project chain of command and to the appropriate fire department. The fire department will be called to assist with spills that cannot be safely handled by on-site personnel. The UXOSO/SSHO will then notify the PM and the CDHS. The PM will notify the COR.

If a spill occurs during fueling operations, the vehicle tank will be capped and fuel dispensing device moved away from the equipment. Spill control materials will be applied to the spill (usually kitty litter), and the solidified spill will be dug up and transferred to 55-gallon metal open-top drums. The drums will be labeled with the location, date, time, and contents.

For other spills that can safely be handled by on-site personnel, the spilled material will be cleaned up when it is safe to do so as follows:

- The spill area will be approached from upwind.
- The spilled material will be identified based on the source of the material (fuel tank, labeled container, etc.). The SDSs will be reviewed by the UXOSO/SSHO. The potential hazards will be evaluated to determine the proper personal protection levels, methods, and equipment necessary for response.
- The spill area will be evacuated, isolated, and secured, if necessary.
- Work zones will be set up.
- Spill containment will initially be made without entering the immediate hazard area. Priority will be given to prevent the spilled material from entering any streams, ditches, or sewers.
- Entry to the spill area for cleanup will be made by personnel with the PPE, training, methods, and equipment necessary to perform the work. Spill cleanup and collection typically involves shoveling or excavating the affected soil into drums or larger containers.
- The spilled material will be stored for disposal. Disposal options will depend on the amount and type of material.

9.3.3 Firefighting Plan

If a fire or explosion occurs, the UXOSO/SSHO will notify the RSA fire department and Emergency Medical Services (EMS), contact the PM, and escort the response personnel to the

location of the fire or explosion. The UXOSO/SSHO will determine the extent of the fire, use available on-site fire extinguishers (Type 2A:10BC) on incipient stage fires only, and provide emergency first aid as needed. Site personnel will not fight fires containing explosives. The responding fire department personnel will be informed of the nature of the fire and if explosives are present.

9.3.4 Posting of Emergency Telephone Numbers

To facilitate the quick retrieval of information in the event of an emergency, a summary that includes emergency contact information and a map showing the route from the project site to the hospital has been placed at the front of this APP. A copy of this emergency information will be kept in all field vehicles and posted on bulletin boards in on-site offices (as applicable).

9.3.5 Man Overboard/Abandon Ship Plan

Not applicable. This type of work will not be performed under the current work scope.

9.3.6 Plan for Prevention of Alcohol and Drug Abuse

The Subcontractor implements a Substance Abuse Deterrence Program in support of its corporate drug-free workplace policy and will enforce the requirements of a drug-free workplace. The program is designed to maintain a safe workforce and prohibits the following:

- Engaging in any drug activity that is prohibited by federal, state, or local law. This includes, but is not limited to, the possession, use, manufacture, distribution, or sale of illegal drugs at any time or at any place.
- Working under the influence of alcohol or illegal drugs.

The deterrence program includes post-offer/pre-employment drug testing, random testing for safety-sensitive employee groups, testing for cause, and testing after an accident when it appears that the employee is under the influence.

The deterrence program includes post-offer/pre-employment drug testing, testing for cause, random testing, and post-accident testing when it appears that substance intoxication caused or contributed to the accident.

9.4 SITE SANITATION PLAN

Safe drinking water is provided at the office/office trailer(s), and provisions shall be made as necessary to provide safe drinking water at individual field locations. Individual bottles of water or disposable sanitary cups shall be provided along with receptacles for their disposal. All outlets dispensing nonpotable water at site shall be posted with appropriate warning signs. Systems furnishing nonpotable water and systems furnishing potable water shall be constructed to remain completely independent of each other.

Certain activities will include working in remote locations of RSA where access to a building with bathroom is not available. In most cases, workers will be moving around considerably along sites.

In such cases, it will be difficult to keep a portable toilet within walking distance. In those cases, workers will have immediate access to vehicles to drive to nearby toilet facilities.

At more stationary site locations, sanitary toilets will be provided at the project. Arrangements will be made for the routine servicing and cleaning of these units. All toilet facilities shall be located on the project so that clear access is provided for cleaning and servicing. Toilets shall be placed where users do not exit into roadways.

Each toilet facility shall be equipped with a toilet seat and toilet seat cover. Each toilet facility, except those specifically designed and designated for females, shall be equipped with a metal, plastic, or porcelain urinal trough. All shall be provided with an adequate supply of toilet paper and a holder for each seat.

Separate toilet rooms for each sex need not be provided if toilet rooms can only be occupied by one person at a time, can be locked from the inside, and contain at least one toilet seat.

Where it is not practical to provide running water, hand sanitizers may be used as a substitute for running water. Hand sanitizers must contain at least 60 percent ethyl alcohol as its active ingredient, and workers shall be trained to properly use the sanitizer.

Toilet facilities shall be constructed so that the occupants are protected against weather and falling objects. All cracks shall be sealed, and the door shall be tight-fitting, self-closing, and capable of being latched from the inside.

Adequate ventilation shall be provided. All windows and vents shall be screened, and seat boxes shall be vented to the outside (minimum vent size 4 inch [10.1 centimeters]) with vent intake located 1 inch (2.5 centimeters) below the seat.

Portable washing facilities are to be provided and maintained in a sanitary condition at the project near the toilet facility. Washing facilities shall consist of soap, water, and paper towels at a minimum.

Eating and drinking will be allowed only in designated areas. No employees shall be allowed to consume food or beverages in a toilet room or in any area exposed to a toxic material.

Housekeeping is not just cleanliness; it is an essential part of accident, fire, and spill prevention. Housekeeping shall be a priority at the project and includes keeping work areas neat and orderly; maintaining halls and walkways free of slip, trip, and fall hazards; and removing waste and other fire hazards from work areas. The following provisions are specified to maintain a high standard of housekeeping:

- The importance of housekeeping and the expectations that good housekeeping shall be maintained will be regular topics of the safety meetings.
- Job site and work areas shall be cleaned up on a daily basis.
- Dumpsters and adequate waste/trash receptacles shall be provided as necessary in sufficient quantities in active work areas and are to be emptied regularly. Potentially contaminated

waste shall be segregated from sanitary waste for proper characterization and/or disposal. Hazardous waste containers shall be labeled according to applicable regulations.

- Site and work areas shall be cleaned and organized regularly, not just at the end of the shift. Housekeeping is an operational/safety item, which shall be regularly considered during routine inspections. Inspection shall be conducted to ensure cleanup is complete.

9.5 MEDICAL SUPPORT PLAN

The respective occupational medical care providers will be available to provide patient-specific information in case medical treatment is needed. For injuries or illnesses requiring EMS, personnel at the scene will notify emergency response services via the 911 system or equivalent system. Emergency response personnel will determine the best course of treatment and the medical treatment facility where this will occur. Personnel may be transported to the nearest medical treatment facility as determined by EMS personnel.

Qualified first-aid and CPR providers may treat minor injuries on site. Two field team members must be trained to render both CPR and first aid. Each first-aid/CPR-certified employee is part of a Bloodborne Pathogens Exposure Control Program.

A first-aid kit (meeting American National Standards Institute Z308.1 content guidelines), including necessary protection against bloodborne pathogens, will be available on site. An adequate supply of fresh potable water for emergency eyewash purposes or portable emergency eyewash will be available.

If additional treatment beyond first aid is required, the injured personnel will be transported to the identified emergency medical care facility or designated occupational medical clinic depending on nature and extent of injury. If the injury is not serious or the ambulance response time is excessive, the injured party may be transported by the UXOSO or team member (if the UXOSO is not immediately available) to the nearest emergency room using a field vehicle. The emergency information sheet and the map and directions indicating the fastest route to the hospital emergency room will be retained in each field vehicle. In all cases, the UXOSO or delegated responsible person will accompany injured workers to the hospital or medical care facility.

All personnel performing on-site work that will result in exposure to contaminant-related H&S hazards shall be enrolled in a medical surveillance program that complies with OSHA standards 29 CFR 1910.120, 29 CFR 1926.65(f), and DA PAM 40-173 and/or DA PAM 40-8, and the “Interim Guidance on Occupational Health Practices for the Evaluation and Control of Occupational Exposures to Nerve Agents GA, GB, GD, GF and VX and Mustard Agents H, HD, and HT.”

9.6 BLOODBORNE PATHOGEN PLAN

Qualified first-aid and CPR providers may treat minor injuries on site. Two field team members must be trained to render both CPR and first aid. If first-aid response is necessary, all biological materials will be assumed to be infectious, and universal precautions will be taken. First-aid- and CPR-trained staff will wear PPE (nitrile gloves, eye protection, and masks) depending on the exposure anticipated and will wash their hands immediately after removal of gloves.

Each first-aid/CPR-certified employee is part of the Bloodborne Pathogens Program, which includes a Post-Exposure Control Plan for staff exposed to bloodborne pathogens. The Post-Exposure Control Plan includes instructions to seek medical attention within two hours of exposure and has provisions for a confidential medical examination and follow-up for the Hepatitis B vaccine series.

A first-aid kit, including necessary protection against bloodborne pathogens, will be available in each project vehicle. An adequate supply of fresh potable water for emergency eyewash purposes or a portable emergency eyewash will be available.

9.7 EXPOSURE CONTROL PLAN

The contractor employs personnel that have received first aid training and that may provide first aid to other personnel. In a worst-case scenario, these personnel could be exposed to blood and other potentially infectious body fluids as a result of a work-related incident.

As a general policy, blood and related body fluids must be assumed to be infectious and treated as such. Contact with these fluids should be prevented through the prudent implementation of “universal precaution” such as PPE and disinfection.

Wear safety glasses or goggles if there is any potential for splashing or other exposure.

Wear gloves when there is a potential for hand contact with blood or other potentially infectious material, mucous membranes, and non-intact skin and when handling or touching contaminated items or surfaces. Disposable (single use) gloves such as surgical or examination gloves should be replaced as soon as practical when contaminated or as soon as feasible if they are torn, punctured, or exposed to infectious materials. A breathing barrier or other means of preventing exposure will be used if it is necessary to perform rescue breathing. After contact with a potentially infectious material, wash hands, face, and any other body parts that may have been contaminated thoroughly with disinfectant soap or alcohol wipes as soon as possible after the incident. Disinfect all contaminated equipment or materials as soon as reasonable using a bleach solution, alcohol, or similar product. Items that cannot be disinfected must be bagged and discarded.

Immediately after an incident in which an employee may have been exposed to blood or other potentially infectious body fluids, the responsible manager or designee must do the following:

- Immediately contact the CDHS.
- Immediately investigate the exposure incident and document findings.
- Ensure involved employees understand and follow universal precautions.
- Assist H&S staff in identifying employees that may have been occupationally exposed to blood or related body fluids.

9.8 INFECTIOUS DISEASE PREPAREDNESS AND RESPONSE PLAN

This plan is developed to help identify risk levels and determine any appropriate control measures to implement when faced with infectious diseases at the project site. This plan will implement

training, engineering, administrative, and work practice controls, and PPE in order to prepare and respond to infectious diseases.

Due to rapidly changing information and recommendations associated with the COVID-19, the Contractor and/or Subcontractor will ensure infectious disease H&S processes and procedures reflect current Centers for Disease Control (CDC) recommendations at the time of field mobilization. The Contractor and/or Subcontractor will coordinate with USACE on any necessary revisions to the Infectious Disease Preparedness and Response Plan.

9.8.1 Potential Sources of Exposure for Personnel

To help employers and employees take appropriate precautions, OSHA has divided job tasks into four risk exposure levels: very high, high, medium, and lower risk. The Occupational Risk Pyramid shows the four exposure risk levels in the shape of a pyramid to represent probable distribution of risk. COVID-19 is highly contagious and is likely spread primarily by airborne droplets ejected when infected people cough, sneeze, or possibly just breathe. These droplets settle out of the air within about 6 feet.

Occupational Risk Pyramid



- **Very high** exposure risk jobs are those with high potential for exposure to known or suspected sources of infection during specific medical, postmortem, or laboratory procedures.
- **High** exposure risk jobs are those with high potential for exposure to known or suspected sources of infection.
- **Medium** exposure risk jobs include those that require frequent and/or close contact with (i.e., within 6 feet of) people who may be infected, but who are not known or suspected infectious disease patients. In areas without ongoing community transmission, workers in this risk group may have frequent contact with travelers who may return from international locations with widespread transmission. In areas where there is ongoing community transmission, workers in this category may have contact be with the general public (e.g., in schools, high-population- density work environments, and some high-volume retail settings).
- **Lower** exposure risk (caution) jobs are those that do not require contact with people known to be, or suspected of being, infected nor frequent close contact with (i.e., within

6 feet of) the general public. Workers in this category have minimal occupational contact with the public and other coworkers. **The fieldwork in support of this project falls into this lower exposure risk category.**

9.8.2 Worker's Individual Risk Factors

Workers may also have individual factors that may also impact risk levels. These factors include, but are not limited to:

- Older age
- Presence of chronic medical conditions, including immunocompromising conditions
- Pregnancy.

9.8.3 Workplace Controls and Basic Infection Prevention Measures

Attachment E3 includes the AHA for practices to prevent exposure to COVID-19. Workers will be protected though emphasis on basic infection prevention measures for Contractor and Subcontractor personnel. As appropriate, the project site will implement engineering controls (increased/improved ventilation, sanitization of equipment and frequently used surfaces), PPE, and administrative controls (COVID-19 education and training, flexible sick leave policy, social distancing, limiting number of site workers in work areas, and promoting personal hygiene and infection control practices), including:

- Maintaining 6-foot separation unless closer spacing is necessary for project tasks (and maintain this spacing during breaks and lunch). If unable to maintain 6 feet distance, personnel should wear a cloth mask. When on a DoD installation, CDC-recommended face covering are required as outlined in the latest "Use of Masks and Other Health Measures" 4-Feb-21 Secretary of Defense memorandum.
- Holding TSMs outdoors or in a space large enough to allow separation.
- Not allowing the sharing of tools, pens, or anything else without disinfecting between uses.
- Reminding site workers to avoid touching high-contact surfaces like shared pens, portable toilet handles, doorknobs, etc., with bare skin and, if unavoidable, to wash or disinfect hands afterward.
- Site personnel are required to report travel to high-risk areas, potential exposure to infected people, and symptoms of illness.
- All site personnel temperatures will be monitored at the beginning of each workday by the UXOSO. Personnel will be sent home if their temperature exceeds 100.4 degrees Fahrenheit (°F) (38.0 degrees [°C]) based upon CDC recommendations.
- Limiting vehicle occupancy to a single person, if practical. If two or more people are in a vehicle, all should wear masks.
- Discussing and following any state and local restrictions on gatherings number of people that can congregate) and closings. Site workers have been cautioned to be aware

that stores, restaurants, and coffee locations may be closed and they may have to bring their own food and drinks.

- Do not use handshakes or hugs as a greeting.
- Decontaminating equipment and vehicles twice daily.
- Packing water in personal backpacks and small coolers.
- Decontaminating equipment before shipping to home office or returning rentals.
- Cleaning boots, work clothes, and gear used at work prior to travel home to prevent further exposure and spread.
- Planning ahead for specific state travel restriction. Personnel will provide a letter stating the employee is essential personnel.

9.8.4 Policies and Procedures for Identification and Isolation of Sick Employees

Prompt identification and isolation of potentially infectious individuals is a critical step in protecting workers, customers, visitors, and others at the project site. Personnel who develop symptoms like fever, cough, or shortness of breath that might indicate infection are to self-quarantine and notify the UXOSO. The UXOSO is to notify the PM and respective Corporate entity. The UXOSO may not release the name of quarantined personnel to others without authorization from the respective Corporate lead. The UXOSO should inform and encourage employees to self-monitor for signs and symptoms of illness if they suspect possible exposure. Workers who suspects they are ill; do not feel well; or have a cough, fever, or any cold/flu like symptoms are to notify the UXOSO, stay at home or their hotel, and consult their doctor.

Any site personnel who test positive for COVID-19 or develop symptoms like fever, cough, or shortness of breath that might indicate infection should notify the UXOSO and follow guidance within their corporate HR policies.

Additional cleaning measures of equipment and the project trailer will be conducted if an infected individual is identified at the project site. This is in addition to cleaning high-contact surfaces twice daily with disinfectant.

In March, the Subcontractor's HR initiated a COVID-19 Survey to track the pandemic's impact on our company. The COVID-19 Survey was implemented so we have an accurate and complete understanding of the situation and can provide appropriate support to personnel. In the event an employee does not feel well enough to update the form, employees have been advised to communicate or have someone else communicate via email with a Supervisor and HRhelpline@hgl.com as quickly as possible.

HR receives updates to the baseline survey from staff and continue to encourage all personnel to alert HR if circumstances change and to update the survey located on the Subcontractor's WorkSmart dashboard or request a .pdf survey form from HRhelpline@hgl.com.

9.8.5 Non-Occupational Risk Factors (Home and Community)

If employees have been in contact with confirmed cases, they should also follow these same precautions and notification procedures as described in Section 9.7.4. Site personnel are required to report potential exposure to infected people.

9.8.6 Workplace Flexibilities and Protections

The Subcontractor has also implemented corporate-wide travel restrictions and teleworking to maximize social distancing, minimizing face-to-face contact. The company has authorized additional paid sick leave for employees who are infected or are caring for loved ones who are infected with the COVID-19 virus. Due to the fluidity of this evolving situation, Subcontractor management is maintaining vigilance in regard to daily changes, updating policies and procedures as necessary. Subcontractors and Government personnel are directed to follow guidance within their Corporate HR policies regarding employee leave.

9.8.7 COVID-19 Reporting Procedures

The H&S of the team is the highest priority as personnel execute the essential services provided to their clients. Based on CDC guidance and the National Emergency declaration, the Contractor and/or Subcontractor has determined that timely continuous and open communication is critical to proactively manage the COVID-19 outbreak and minimize impacts to co-workers, their families, the company, and their client community. The Contractor and/or Subcontractor has established and implemented a comprehensive communication plan including frequent email and conference calls to distribute information. On addition, a centralized SharePoint site has been made accessible to all employees providing available COVID-19 information 24/7, including all the special corporate COVID-19 policies and procedures along with all available CDC information and links to CDC and Work Health Organization websites. Subcontractors and Government personnel are directed to follow the reporting guidance below and guidance within their Corporate HR policies.

9.8.7.1 Reporting Guidance

The Subcontractor's current reporting guidance as of 20 April 2020 is provided below:

The Contractor and/or Subcontractor is requiring site workers to report the following to UXOSO as soon as practicable:

- Recent international travel, particularly to U.S. Department of State COVID-19 Level 3 or 4 global health advisory locations
- Probable exposure to someone known to be infected with COVID-19
- Symptoms that might indicate infection
- Medical recommendation to self-quarantine
- Confirmed COVID-19 infection.

The UXOSO will discuss COVID-19 symptoms and reporting procedures in TSMs.

Should site personnel report a positive response to any of the above scenarios, the Subcontractor will initiate other reporting, including:

- Contractor and/or Subcontractor will report to USACE mishaps as specified in EM 385-1-1 Section 01.D to include cases of COVID-19 that appear to be project related.
- Contractor and/or Subcontractor will comply with OSHA 29 CFR Part 1904 requirements for recording and reporting cases of COVID-19 that are determined to be work-related.
- Contractor and/or Subcontractor will also report to our clients (such as USACE) cases of COVID-19 or COVID-19 associated issues that may pose risk to project personnel or impact project execution or scheduling.

9.8.7.2 Internal Reporting Requirements and Work Restrictions:

- 1) If exhibiting symptoms (fever/cough/shortness of breath), immediately notify the UXOSO and stay home or leave the project site if you start to exhibit symptoms while at work.
- 2) Contact your personal doctor, healthcare provider, or WorkCare and follow current CDC (www.CDC.gov) or local requirements related to testing.
- 3) Contact the SUXOS and your Corporate lead entity with an update upon consulting with your doctor or healthcare provider.
- 4) If absent from the project site for 3 or more scheduled on-site days due to common flu-like symptoms, the site worker must supply documentation from a doctor with approval to return to work.
- 5) If a site worker tests positive for COVID-19, they should follow their respective Corporate requirements for sick leave, benefits, and return to work. In addition, before returning to the project site the employee must provide the UXOSO with documentation of a negative test, a note from a doctor, or a state or local testing facility.

9.8.7.3 External Reporting Requirements:

- 1) Contractor and/or Subcontractor will notify USACE if:
 - a. Any project staff (Contractor or Subcontractor personnel) is under a quarantine order (either voluntarily or by their local municipality).
 - b. Any project staff is confirmed infected with COVID-19.
 - c. Any project staff that exhibits flu-like symptoms AND has either travelled to a region that has a level 3 or higher CDC advisory, or been in contact in the last 14 days with someone who has travelled to a region that has a level 3 or higher CDC advisory.

9.9 AUTOMATIC DEFIBRILLATOR PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.10 LAYOUT PLANS

Not applicable. This type of work will not be performed under the current work scope.

9.11 ACCESS AND HAUL ROAD PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.12 HEARING CONSERVATION PROGRAM

Equipment and tools generate noise. Hearing loss resulting from occupational exposure to noise can be prevented through the use of hearing protection. Personnel will wear hearing protection when working with or around operating equipment or power tools that generate noise at 85 A-weighted decibels (dBA) or above—levels that require a person to raise his/her voice to carry on a conversation at a distance of 3 feet. Warning signs will be posted in areas where noise greater than 85 dBA necessitates the use of hearing protection. The use of headphones for entertainment purposes is prohibited.

9.13 RESPIRATORY PROTECTION PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.14 HEALTH HAZARD CONTROL PROGRAM

Chapter 2 of the SSHP lists potential contaminants that may have been used at the site and the potential routes of exposure and symptoms for each contaminant that may be encountered. Other information such as threshold limit values (TLV), Permissible Exposure Limits, Immediately Dangerous to Life or Health values, Worker Protection Limits, and physical properties are also included.

Job site operations, materials, and equipment involving potential exposure to hazardous or toxic agents or environments have been evaluated by the CDHS or the Project CIH. The Hazard Control Program for this site consists of the following:

- AHAs
- Hazard/risk analysis
- PPE
- Standard safety procedures, work practices, and engineering controls.

Since the work will be outdoors, there is very low probability for inhalation, ingestion, or skin contact with toxic munition materials.

9.15 HAZARD COMMUNICATION PROGRAM

SDSs for hazardous chemicals that may be required during site operations will be provided on site to all affected employees. The contractor will manage the SDS file and chemical inventory.

The contractor will maintain SDSs in a binder on site for reference. The SDS binder will contain applicable data on project chemicals (i.e., CWM and industrial chemicals) identified during previous investigations or environmental actions.

9.16 PROCESS SAFETY MANAGEMENT PLAN FOR HIGHLY HAZARDOUS CHEMICALS

A Process Safety Management Program is not applicable IAW 29 CFR 1910.119 and the Safety and Health Requirements Manual (USACE, 2014) under the current work scope, as no highly hazardous chemicals will be used.

9.17 LEAD ABATEMENT PLAN

Not applicable. Lead hazards are not anticipated for this project.

9.18 ASBESTOS ABATEMENT PLAN

Not applicable. Asbestos hazards are not anticipated for this project.

9.19 RADIATION SAFETY PROGRAM

Not applicable. This type of work will not be performed under the current work scope.

9.20 ABRASIVE BLASTING PLAN

Not applicable. Abrasive blasting hazards are not anticipated for this project.

9.21 HEAT STRESS MONITORING PLAN

9.21.1 Heat Stress

There is a potential for heat stress for this project because fieldwork may be conducted during the summer months. Team members must realize that extra care must be taken to observe and respond to symptoms as the weather gets warmer and humidity increases. Sweating does not cool the body unless the sweat is evaporated from the body. The use of some PPE (e.g., semi- or non-permeable clothing) can reduce the body's ability to eliminate heat because the evaporation of sweat is hampered. When this occurs, heat stress is a potential for concern. Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of potentially hazardous tasks.

9.21.2 Types of Heat Stress

Heat Rash is a red or pink rash usually found on body areas covered by clothing. It can develop when the sweat ducts become blocked and swell and often leads to discomfort and itching. It is common in hot, humid climates. To help relieve symptoms start by removing or loosening clothing and moving to a cool, shady spot. Let the skin air-dry instead of using towels. Avoid ointments or other lotions, because they can irritate the skin.

Heat Cramps are painful, brief muscle cramps that occur during or after exercise or work in a hot environment. Muscles may spasm or jerk involuntarily. Cramping may also be delayed and occur a few hours later. Heat cramps are thought to be caused by a deficiency in electrolytes. Heat cramps signs and symptoms are painful muscle spasms usually involving the legs, chest, or abdomen. Rest briefly and cool down. Drink clear juice or an electrolyte-containing sports drink. Practice gentle, range-of-motion stretching and gentle massage of the affected muscle group. Do not resume strenuous activity for several hours or longer after heat cramps go away. Call a doctor if cramps persist after one hour.

Heat Exhaustion occurs when the body gets too hot. Heat exhaustion requires immediate attention because it can progress to heat stroke, a life-threatening illness. The primary treatment for heat exhaustion is to rest in a shady spot or, better, an air-conditioned room and to drink cool (not icy) fluids. Core body temperature can be lowered by immersion in cold water or spraying with cold water and fanning. Drinking water is usually enough to reverse dehydration, but drinking a sports drink that contains electrolytes is also helpful.

The hypothalamus, the part of the brain that controls thirst and hunger, also controls the body's core temperature. Normally, the body cools itself by sweating. When a person is exposed to high temperatures for a long time (working outdoors in the summer, for example) and does not replace lost fluids, the body systems that regulate temperature become overwhelmed. As a result, the body produces more heat than it can release.

Heat Stroke occurs when the body's temperature regulatory system has failed. Skin is hot, dry, red, and spotted. These skin color changes may not be readily evident in darker skinned individuals and other signs must be relied upon. The affected person may be mentally confused and delirious, and convulsions may occur. A person exhibiting signs of heat stroke should be removed from the work area to a shaded area immediately. The person should be soaked with water and fanned to promote evaporation. Medical attention must be obtained immediately.

9.21.2.1 EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH.

9.21.3 Early Symptoms of Heat Stress

Personnel should recognize these early symptoms of heat stress:

- Reduced performance
- Lack of coordination
- Lack of alertness
- Unsteady walk
- Excessive fatigue
- Muscle cramps
- Dizziness.

9.21.4 Treatment of Heat Stress

Workers who exhibit heat stress shall seek medical attention. Those employees with more than one heat-related episode in a month will have a doctor's written release prior to returning to exposures in a potential heat stress environment. Table C-9.1 provides first aid steps suggested for victims of heat stress.

Table E-9.1
Suggested Treatment Actions for Heat Stress

Heat Rash	• Keep the affected area dry. • Use dusting powder to increase comfort.
Heat Cramps	• Stop all activity. • Sit in a cool place. • Do not return to work for a few hours after the cramps subside – further exertion may lead to heat exhaustion or stroke. • Seek medical attention if the worker has heart problems, worker is on a low-sodium diet, or the cramps do not go away in an hour
Heat Exhaustion	• Move to a cool, shaded (or air-conditioned) area. • Loosen any restrictive clothing. • Drink plenty of water. • Pat skin with a damp rag or sponge.
Heat Stroke	• CALL 911 (or designated emergency number). • Move to a cool, shaded location. • Cool by soaking clothes with water, spraying or showering them with water, or fanning body.

Adapted from Centers of Disease Control and Prevention Workplace Safety and Health Topics, www.cdc.gov/niosh/topics/heatstress

9.21.5 Heat Stress Prevention

In hot environments, the following guidelines will be followed to prevent heat-related injury.

- Drinking water will be made available to employees, and employees will be encouraged to frequently drink small amounts (for example, 1 cup every 15 to 20 minutes). The water will be kept reasonably cool.
- Initial project safety training will include training on the symptoms of heat-related problems, contributing factors to heat-related injuries, and prevention measures. These topics will be repeated during the daily tailgate safety briefings, as needed.
- When practical, work will be scheduled for cooler periods during the day.
- A buddy system will be established to encourage fluid intake and watch for symptoms of heat-related injury
- The UXOSO/SSHO will monitor those individuals who may be more susceptible to heat-related illness. This includes those individuals who have had a previous heat-related illness, are known to be on certain medications which increase the chance for

susceptibility to heat injury, or exhibit signs of possibly having consumed large amounts of alcohol in the previous 24 hours.

- f. Breaks in shaded or air-conditioned areas will be taken at intervals to prevent harmful heat stress.
- g. Individuals who are not acclimated will be allowed additional breaks. The period and number should be determined by the UXOSO/SSHO and provided to the supervisor and employee for implementation.
- h. Additional measures will be taken, as needed, to minimize heat stress. These measures may include measures such as pop-up tents over the work area and personal cooling products such as water-retentive bandanas and neck wraps.
- i. Sunscreen should be applied to prevent sunburn. Sunscreen with at least a sun protection factor of 30 will be encouraged, in addition to the use of hats, long-sleeved shirts, sunglasses, or other protective attire.

9.21.6 Heat Stress Monitoring

The UXOSO/SSHO will monitor heat stress and adjust heat stress controls to control the hazard to personnel. This monitoring will include visual monitoring of work and work site conditions as well as feedback from work crews.

When conditions at the site exceed 75°F, the UXOSO/SSHO will conduct heat stress monitoring. The preferred method of monitoring is through use of a wet bulb globe thermometer (WBGT) heat stress monitor (such as the 3M Questemp QT32 or similar) and the heat stress (TLV). The UXOSO/SSHO may also use local reports of heat index or applications such as OSHA's Heat Safety Tool.

The risk of heat-related illness among healthy workers who are acclimated to hot work is low if the WBGT value does not exceed the American Conference of Governmental Industrial Hygienists (ACGIH) "screening criteria" shown in Table E-9.2 (ACGIH, 2019). To use Table E-9.2, the UXOSO/SSHO must determine the worker's metabolic heat load (light, moderate, heavy, or very heavy) and determine if a heat stress situation may exist.

It is important to note that Table E-9.2 is intended for permeable clothing ensembles only. Non-permeable ensembles are not anticipated for work at this site; if it is determined that non-permeable clothing is required the UXOSO/SSHO will post and implement a similar table for non-permeable clothing ensembles. Table E-9.3 references the different workloads.

Note: These values are intended as an initial screening tool to evaluate whether a heat stress situation may exist and thus, the values are more protective than the TLV. Because the values are more protective, they are not intended to prescribe work and recovery periods (ACGIH, 2019).

If impermeable clothing is worn in hot environments, additional controls such as cooling vests will be implemented. Physiological monitoring will also be conducted if impermeable clothing is being worn. The following heart rate guidance should be used:

- Count the radial (wrist) pulse during a 30-second period as early as possible in the rest period.
- If the heart rate exceeds 180 beats per minute minus the person's age in years (i.e., 180-age) at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
- If the heart rate still exceeds the calculated heartrate at the next rest period, shorten the following work cycle by an additional one-third and keep the rest period the same.

Table E-9.2
ACGIH Screening Criteria and Action Limit for Heat Stress Exposure

(WBGT Values in °C/°F)

Work/Recovery Cycle (each hour)	TLV®				Action Limit			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75 - 100% work	31/87.8	28/82.4	-	-	28/82.4	25/77	-	-
50 - 75% work	31/87.8	29/82.2	27.5/81.5	-	28.5/83.3	26/78.8	24/75.2	-
25 - 50% work	32/89.6	30/86	29/84.2	28/82.4	29.5/85.1	27/80.6	25.5/77.9	24.5/76.1
0 - 25% work	32.5/90.5	31.5/88.7	30.5/86.9	30/86	30/86	29/79	28/82.4	27/80.6

Notes:

Values from the current edition of the ACGIH publication Threshold Limit Values (TLV®) and Biological Exposure Indices.

Additional physiological monitoring, such as continual pulse or core temperature, may be implemented, as needed.

Table E-9.3
Work Load Definitions, Modified ACGIH Table 3, Metabolic Rate Changes

Work Load	Examples
Rest	Sitting.
Light	Sitting with light manual work with hands or hands and arms and driving. Standing with some light arm work and occasional walking.
Moderate	Sustained moderate hand and arm work, moderate arm and leg work, moderate arm and trunk work, or light pushing and pulling. Normal walking. Examples: Scrubbing in a standing position. Walking about with moderate lifting or pushing. Walking on level ground at 3.75 miles/hour while carrying a 6-pound load.
Heavy	Intense arm and trunk work, carrying, shoveling, manual sawing, pushing and pulling heavy loads and walking at a fast pace. Examples: Intermittent heavy lifting with pushing or pulling (e.g. pick and shovel work).
Very Heavy	Very intense activity at a fast to maximum pace. Shoveling wet sand.

9.22 COLD STRESS MONITORING PLAN

9.22.1 Cold Stress

Similar to the exposure to high temperatures presented in the previous section, exposure to low temperatures also present a risk to employee safety and health through the direct effect of low temperature on the body and collateral effects such as slipping on ice, decreased dexterity, and

reduced dependability of equipment. The average low temperature in the winter months at the site can approach 18°F, with January being the coolest month on average. The effects of cold exposure include frostbite and hypothermia, with wind increasing the chances of these effects taking place.

9.22.2 Types and Symptoms of Cold Stress

Hypothermia is a life-threatening condition in which the core body temperature falls below 95°F. Hypothermia can occur at temperatures above freezing particularly when the skin or clothing becomes wet. During exposure to cold, maximum shivering occurs when the core temperature falls to 95°F. As hypothermia progresses, depression of the central nervous system becomes increasingly more severe (Table E-9.4). This accounts for the progressive signs and symptoms ranging from sluggishness and slurred speech to disorientation and eventually unconsciousness.

Table E-9.4
Symptoms of Hypothermia

Core Temperature (°F)	Symptoms
98.6	Normal body temperature
96.8	Person feels cold
95	Shivering
93.2	Clumsy, irrational, confused; may appear drunk
91.4	Muscle stiffness
89.6	Shivering stops, collapse
87.8	Semi-conscious
86	Semi-conscious; no response to painful stimulus
84.2	Slow pulse and breathing
82.4	Cardiac arrest; no obvious pulse or breathing; pupils dilated

Frostbite is a term which denotes areas of cold injury on a body. Frostbite rarely occurs unless environmental temperatures are less than freezing and usually less than 20°F. Injuries from frostbite normally occur on the distal parts of the body (nose, earlobes, hands, and feet) that are subject to intense vasoconstriction when they get cold. The three general categories of frostbite are presented in Table E-9.5.

Table E-9.5
Types and Symptoms of Frostbite

Condition	Symptoms
Frostnip	Area of skin whitened; slightly burning or painful.
Superficial Frostbite	Waxy, white skin with a firm sensation but with some resiliency. Feels “warm” to the victim with a notable cessation of pain.
Deep Frostbite	Tissue damage deeper than the skin, sometimes down to the bone. Skin is cold, numb, and hard.

9.22.2.1 Cold Stress Prevention

The potential for cold stress is determined primarily by two variables: the temperature of the air and the speed of the wind. The cooling effects of moving air on exposed flesh can be expressed as

an equivalent chill temperature (ECT), which combines temperature and air speed. At a given temperature, calm air is less dangerous.

Table E-9.6 shows values of ECT for various temperature and speed combinations. The conditions represented by Zones B and C are extremely dangerous to exposed skin. Continuous exposure of exposed skin should not be permitted if the ECT is 25°F or less. Work under conditions represented by Zone A is much less dangerous to exposed skin. However, workers can suffer frostbite injury in the less severe environment if they develop a false sense of security and fail to take precautions.

Table E-9.6
Equivalent Chill Temperature (°F) at Various Air Temperatures and Wind Speeds

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
>40 has little additional effect	LITTLE DANGER In less than 1 hour with dry skin. Maximum danger is false sense of security.				INCREASING DANGER From freezing of exposed flesh within 1 minute.			GREAT DANGER Flesh may freeze within 30 seconds.				
	Zone A				Zone B			Zone C				
	Trench foot and immersion foot may occur at any point on this chart.											

Notes:

* Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

* Equivalent chill temperature requiring dry clothing to maintain core body temperature above 96.8 °F per ACGIH cold stress TLV

At low ECT values, precautions against hypothermia are necessary, even if workers are dressed in well-insulated clothing. The danger of hypothermia is especially severe if immersion in water is possible during the work.

The UXOSO/SSHO will make an assessment of the potential for cold stress before fieldwork begins, primarily through local weather reports but also by using thermometers or wind speed measuring equipment on site as needed. When the wind chill falls below 0°F (-17°C), the air temperature and wind speed will be monitored every 2 hours or more frequently if it drops below this level.

Work rules related to the prevention of cold-related injury will be required if conditions of the type represented in Zones A, B, or C in the ECT table are anticipated. Under such conditions, the UXOSO/SSHO will measure temperature and wind speed when work commences each day and at routine intervals (at least every 4 hours) thereafter, unless he/she believes that some other means of hazard assessment is adequate. The CDHS must approve any alternative means of hazard assessment. When work is conducted under conditions represented in Zones A, B, or C, the UXOSO/SSHO will implement the work rules described below to manage the potential hazard.

- Employees will receive training on the dangers and symptoms of cold-related injury and the work rules adopted to prevent it.
- Site workers will be warned that older individuals and people with circulatory problems might be at increased risk for cold-related injury and that added precautions might be necessary to protect them.
- Each employee will be under protective observation by someone else during work (use of the “buddy system” will be required).
- Employees who experience pain in the extremities or are shivering will be removed from exposure to the cold work environment.
- Work must be halted if frostbite cannot be prevented. Continuous skin exposure will not be permitted when the ECT is -25°F or less (Zones B and C on the ECT table).
- Tasks should be scheduled to avoid long periods during which workers must sit or stand still.
- Work expectations for new employees should be adjusted downward for the first few days to permit acclimatization to the cold conditions.
- Dehydration, which decreases blood flow to the extremities, should be avoided. Employees will be encouraged to replenish water lost to perspiration and respiration. The UXOSO/SSHO will provide soups and warm sweet drinks as appropriate.
- The UXOSO/SSHO will develop procedures that reduce the likelihood of immersion in water or soaking of the clothing by other means during project work. Such precautions should apply to any work with liquids like gasoline, alcohols, solvents, or cleaning fluids.
- The UXOSO/SSHO will plan for any likely scenarios that would lead to wet clothing (through immersion in water, soaking by mist, etc.), and provide for quick changing into dry clothing and treatment for hypothermia.
- Emergency plans will give special attention to the prevention of cold-related injury (hypothermia and freezing of damaged tissues).

If continuous work must be performed at an ECT below 19.4°F, then the UXOSO/SSHO or PM will provide a heated shelter (truck, car, tent, cabin, or similar space) for warming after exposure to the cold environment. Employees should be encouraged to use the shelter at frequent intervals and upon (1) onset of pain or heavy shivering; (2) occurrence of minor frostbite; or (3) onset of feelings of excessive fatigue, drowsiness, irritability, or euphoria. For these conditions, the UXOSO/SSHO will monitor weather and environmental conditions and implement a mandatory work/warming regimen according to Table E-9.7.

The rules implemented by the UXOSO/SSHO will require that employees wear adequately insulating dry clothing if conditions of the type represented in Zones A, B, or C in the ECT table are anticipated. Workers should wear cold-protective clothing appropriate for the environmental conditions and the level of physical activity. The following considerations should guide the selection and use of protective clothing:

- Layered clothing will be used to preserve body heat. An easily removable outer windbreak garment should be worn in windy conditions.
- Inner garments and underwear will be made of fabrics that dry quickly and wick moisture away from the body.
- Outer garments will be made with provisions for easy ventilation to prevent inner layers to be wetted by sweat.

Table E-9.7
Work/Warming Schedule for a 4-Hour Shift

Air Temp. (°F)	Air Speed (mph)				
	Calm	5	10	15	20
-15 to -19	Normal Breaks (1)	Normal Breaks (1)	75 min. max. work period with 2 breaks	55 min. max. work period with 3 breaks	40 min. max. work period with 4 breaks
-20 to -24	Normal Breaks (1)	75 min. max. work period with 2 breaks	55 min. max. work period with 3 breaks	40 min. max. work period with 4 breaks	30 min. max. work period with 5 breaks
-25 to -29	75 min. max. work period with 2 breaks	55 min. max. work period with 3 breaks	40 min. max. work period with 4 breaks	30 min. max. work period with 5 breaks	
-30 to -34	55 min. max. work period with 3 breaks	40 min. max. work period with 4 breaks	30 min. max. work period with 5 breaks		
-35 to -39	40 min. max. work period with 4 breaks	30 min. max. work period with 5 breaks	Nonemergency work should cease. NOTE: The above work/warming regimens are applicable to workers in dry not wet clothing.		

Air Temp. (°F)	Air Speed (mph)				
	Calm	5	10	15	20
-40 to -44	30 min. max. work period with 5 breaks				
-45 and below					

Notes:

Break period is a 10-minute warmup time in a warm location.

Source: ACGIH TLVs and BEIs, Cincinnati, OH, 2015.

Adapted from the Occupational Health and Safety Division, Saskatchewan Department of Labor.

- An employee will not enter or remain in a cold work environment if his or her clothing is wet as a consequence of sweating. If clothing is wet, then the employee must change into dry clothing before returning to the cold environment.
- Gloves and/or mittens will be used as necessary to protect the hands, and employees will be warned not to touch very cold objects and surfaces with bare skin.
- Workers will routinely change socks and removable felt insoles to reduce moisture around the feet.
- Eye protection suitable to the type of hazard will be used. Special precautions against ultraviolet light and glare might be necessary in snow-covered terrain.
- Hardhat liners will be used. If work must be done on slippery surfaces, then shoe attachments that enhance traction shall be used.

9.23 INDOOR AIR QUALITY MANAGEMENT

Not applicable. This type of work will not be performed under the current work scope.

9.24 MOLD REMEDIATION PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.25 CHROMIUM (VI) EXPOSURE EVALUATION

Not applicable. This type of work will not be performed under the current work scope.

9.26 CRYSTALLINE SILICA ASSESSMENT

Not applicable. This type of work will not be performed under the current work scope.

9.27 LIGHTING EVALUATION

A review of the lighting requirements for the project-specific tasks or operations will be evaluated as part of the AHA.

9.28 LIGHT PLAN FOR NIGHT OPERATIONS

Not applicable. This type of work will not be performed under the current work scope.

9.29 TRAFFIC CONTROL PLAN

A Traffic Control Plan will not be required for this project.

9.30 FIRE PREVENTION PLAN

This section details fire prevention and protection procedures/resources to be used at the project site. This information is to be included in the site health and safety indoctrination.

9.30.1 Workplace Fire Hazards

The main fire hazards at the project site consist of brush and range fires, electrical fires, and those associated with flammable and combustible liquids, waste materials, combustible wastes, fueling operations, storage of fuels and other flammable liquids at the project site, and welding and cutting activities.

9.30.2 Potential Ignition Sources

The significant ignition sources at the project site include smoking materials (matches and lighters), welding/cutting equipment, vehicle/equipment exhaust, and catalytic converters.

9.30.3 Fire-Control Systems, Equipment, and Procedures

Depending on the nature and extent of a fire, the following fire-control systems and equipment will be evaluated or provided for at the project site:

- Contact information for the fire department (listed at the beginning of this APP) will be available.
- Fire extinguishers will be maintained in all vehicles and in specific areas of concern (for example, near electrical work or areas of hot work). Where flammable or combustible materials in quantities greater than 5 gallons are present and where hot work will be performed, 10-pound extinguishers rated 4A:60B:C will be present in the immediate area. At least one dry chemical fire extinguisher having a minimum UL rating of 1A5BC will be available in all vehicles and trailers.
- A hot work permit will be required before a flame- or spark-producing activity can commence. The contractor should contact the Non-Emergency Redstone Fire Department number, (256) 876-2117, prior to initiating hot work.
- Flammable wastes will be stored or disposed of in metal containers, clearly marked as containing flammable materials.
- Storage of combustible materials will be kept to a minimum.

- Flammable and oxidizing materials will be stored in marked (no smoking, matches, or open flame) areas with fire extinguishers available.
- Smoking will be permitted only in designated areas. Personnel will never discard cigarette butts into the environment while working at the site.
- Open flames will be prohibited.
- Vehicles and equipment will not be left idling or parked in areas where catalytic converters may ignite vegetation.
- Project personnel will be permitted to extinguish small fires in their incipient stages only provided that the personnel have been trained and feel comfortable doing so.

9.30.4 Fire-Control Equipment Maintenance Responsibilities

The UXOSO/SSHO will be responsible for performing the monthly inspections of portable fire extinguishers and obtaining annual service for all contractor-provided fire extinguishers used at the project site. Subcontractors will be responsible for performing the monthly inspections and obtaining annual service for all fire extinguishers that they provide for use at the project site. Vehicle and equipment operators will be responsible for the daily inspection of fire extinguishers on vehicles/equipment.

In the event of a fire, staff should only attempt to extinguish a fire if it is containable. All additional occupants will immediately evacuate the area following the posted emergency evacuation routes and go to the designated rally point. A head count will be taken by the senior person present to account for all personnel.

9.31 WILD LAND FIRE PREVENTION PLAN

Any wild land fires will be responded to as indicated in Section 9.30. More than one vehicle escape route will be plotted from the site in case the primary route is blocked by fire or smoke. An overland route also has been plotted in case all roadways are blocked. Additional fire prevention measures may be needed (for example, removing brush or wetting areas down) during some activities.

9.32 ARC FLASH HAZARD ANALYSIS

Not applicable. This type of work will not be performed under the current work scope.

9.33 ASSURED EQUIPMENT GROUNDING CONTROL PROGRAM

All portable electrical equipment and extension cords will be protected with a ground fault circuit interrupter. Only hard or extra hard outdoor usage extension cords with a rating (in watts or amps) at least equal to the sum of the connected loads will be used. Extension cords, power tools, and lighting equipment will be inspected before each use, protected from damage, and kept out of standing water.

All electrical installations will be made as required by National Fire Protection Association (NFPA) 70: National Electrical Code (NFPA, 2012) or the local code, whichever is more

protective. Only qualified electricians may work on electrical circuits. Qualified personnel will receive training on the use of the special precautionary techniques, PPE, arc flash, insulating and shielding materials, and insulated tools and test equipment.

9.34 HAZARDOUS ENERGY CONTROL PLAN (LOCKOUT/TAGOUT/TRYOUT)

Not applicable. Hazardous energy locations are not anticipated for this project.

9.35 STANDARD PRE-LIFT PLAN

Not applicable. Crane lifts are not anticipated for this project.

9.36 CRITICAL LIFT PROCEDURES

Not applicable. Critical lifts are not anticipated for this project.

9.37 NAVAL ARCHITECTURAL ANALYSIS

Not applicable. This type of work will not be performed under the current work scope.

9.38 FLOAT PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.39 SEVERE WEATHER FOR MARINE ACTIVITIES

Not applicable. This type of work will not be performed under the current work scope.

9.40 EMERGENCY PLAN FOR MARINE ACTIVITIES

Not applicable. This type of work will not be performed under the current work scope.

9.41 MAN OVERBOARD/ABANDON SHIP PROCEDURES

Not applicable. This type of work will not be performed under the current work scope.

9.42 FALL PROTECTION

Not applicable. This type of work will not be performed under the current work scope.

9.43 DEMOLITION PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.44 ROPE ACCESS PROGRAM

Not applicable. This type of work will not be performed under the current work scope.

9.45 EXCAVATION/TRENCHING PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.46 UNDERGROUND CONSTRUCTION FIRE PREVENTION AND PROTECTION PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.47 COMPRESSED AIR PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.48 FORMWORK AND SHORING ERECTION AND REMOVAL PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.49 PRECAST CONCRETE PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.50 LIFT SLAB PLANS

Not applicable. This type of work will not be performed under the current work scope.

9.51 MASONRY BRACING PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.52 STEEL ERECTION PLAN

Not applicable. Steel erection work will not be performed under the current work scope.

9.53 EXPLOSIVES SAFETY SITE PLAN

This type of work will be performed under the current work scope. An explosives safety site plan will be included as an appendix to the Corrective Measures Implementation Work Plan.

9.54 BLASTING PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.55 UNDERWATER DIVE OPERATIONS PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.56 SAFE PRACTICES MANUAL FOR DIVING ACTIVITIES

Not applicable. This type of work will not be performed under the current work scope.

9.57 TREE FELLING/MAINTENANCE PROGRAMS

Not applicable. This type of work will not be performed under the current work scope.

9.58 AIRCRAFT/AIRFIELD CONSTRUCTION SAFETY AND PHASING PLAN

Not applicable. This type of work will not be performed under the current work scope.

9.59 AIRCRAFT/AIRFIELD SAFETY PLAN COMPLIANCE DOCUMENT

Not applicable. This type of work will not be performed under the current work scope.

9.60 SITE SAFETY AND HEALTH PLAN

The SSHP is included as Attachment E3 of this APP.

9.61 CONFINED SPACE ENTRY

Not applicable. This type of work will not be performed under the current work scope.

9.62 CONFINED SPACE ENTRY PROGRAM

Not applicable. This type of work will not be performed under the current work scope.

10.0 RISK MANAGEMENT PROCESSES

Risk Management Process is the means by which project team members, both in the field and in the office, identify hazards and describe the appropriate steps to avoid mishaps. The PM will ensure that the SSHO/UXOSO and project field team reviews each field task, identifies the associated hazards, and formulates an AHA that documents the hazards and provides steps used to avoid each hazard.

The Risk Management Process starts with the development of the Work Plan and evolves throughout mobilization of the field crew and enactment of the work being conducted. The Work Plan will establish the work that needs to be accomplished to fulfill the contract and the steps required to conduct the work. The field team will mobilize and subsequently establish a Safety Committee that will include the UXOSO/SSHO, Team Leaders, and any subcontractor leads on site.

The Safety Committee will discuss and define the steps being performed within each task or DFW, identifying work sequences, specific anticipated hazards, site conditions, equipment and materials needed, personnel involved (including Competent Person or Qualified Persons), and the control methods to be implemented. These elements will be incorporated into an AHA, which will be sent first to the project team and then to the OESS for approval. Work involving new tasks will not be conducted prior to approval of the AHAs. Once the AHAs have been approved, Team Leaders will use them prior to conducting tasks specific to this contract.

It is important to note that AHAs are treated as “living documents” and can be changed throughout the project in order to address changing site conditions or operations. If the AHA has been changed in a manner which increases the RAC, it must be reviewed by the CDHS and OESS prior to conducting the activity. The change of a Competent Person or Qualified Person can be conducted as an administrative change which does not require review, provided that the new Competent Person/Qualified Person acknowledges in writing that they have reviewed the AHA and are familiar with current site safety issues.

Workers should have the accepted AHAs in their possession while conducting work. The AHAs present will represent current site conditions and work must be conducted IAW the AHA. In the event that work is not being conducted in a safe manner, all work will stop until it is in compliance with the APP.

Section 2 of the SSHP (Attachment E1) provides an outline of the identified major project steps and activities for which AHAs will be required (Attachment E3) and reviewed by the team. It is important to understand that the initial AHAs provided in Attachment E3 serve as a framework to be completed by the Field Team.

11.0 REFERENCES

American Conference of Governmental Industrial Hygienists (ACGIH), 2019. *Threshold Limit Values for Chemical Substances and Physical Agents*.

Aptim Federal Services, LLC (APTIM), 2019. *Revision 1 RCRA Facility Investigation Report, RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Operable Unit 15, U.S. Army Garrison-Redstone, Madison County, Alabama*, February.

Code of Federal Regulations (CFR) Title 29, Part 1904, Occupational Safety and Health Standards, Recordkeeping. Government Printing Office, Washington, D.C., July 1, 2003, at URL <http://www.access.gpo.gov/nara/cfr/index.html> (December 2012).

CFR Title 29, Part 1910, Occupational Safety and Health Standards, U.S. Government Printing Office, Washington, D.C., July 1, 2003, at URL <http://www.access.gpo.gov/nara/cfr/index.html> (February 2012).

CFR Title 29, Part 1926, Safety and Health Regulations for Construction, U.S. Government Printing Office, Washington, D.C., July 1, 2003, at URL <http://www.access.gpo.gov/nara/cfr/index.html> (February 2012).

National Fire Protection Association (NFPA), 2012. NFPA 70E, *Standard for Electrical Safety in the Workplace*, at URL <http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=70E&cookie%5Ftest=1>.

U.S. Army Corps of Engineers (USACE), 2014. EM 385-1-1, *Safety and Health Requirements Manual*, November.

Attachment E1
Site Safety and Health Plan

EMERGENCY CONTACT INFORMATION

In case of emergency or unplanned situation, contact the appropriate responder from the list below. This list precedes this Accident Prevention Plan for quick reference.

- In emergency situations, contact the site Point of Contact (POC) who will then contact the appropriate response teams.
- If a serious, life-threatening emergency arises, contact emergency personnel before contacting the site POC.

EMERGENCY TELEPHONE NUMBERS AND PROJECT CONTACTS

Emergency Medical Care		
Hospital:	911	
Huntsville Hospital (Emergency/Trauma Center)	(256) 265-1000	
Chemical Agent Emergencies (state that you are at Redstone)	911	
Core Health Networks	(877) 347-7429	
Occupational Health Center, Crestwood Family Practice	(256) 721-9916	
Crestwood Workers Care Madison	(256) 830-8930	
National Poison Control Center	(800) 222-1222	
National Response Center	(800) 424-8802	
Environmental Emergencies		
Federal Occupational Safety and Health Administration (OSHA) Emergency Hotline	(800) 321-6742	
Local Emergency Numbers		
Fire Department	Emergency	911
Emergency ask for Redstone Arsenal Fire Department	Nonemergency	(256) 876-2117
Law Enforcement	Emergency	911
Military Police	Nonemergency	(256) 876-2222
Installation Emergency Operations Center	Nonemergency	(256) 313-1043
Installation Operations Center	Nonemergency	(256) 313-1043
Garrison Safety Office	Nonemergency	(256) 876-2944
Safety Manager	Charlie Carter	(256) 503-0715
Safety & Occupational Health Specialist	Keith Coates	(256) 876-3383
Munitions and Explosives of Concern (MEC) support	Rusty Brands	(256) 876-3855
USACE and Army		
U.S. Army Engineering and Support Center, Huntsville (CEHNC) Contracting Officer’s Representative (COR), Project Manager (PM), and the Government Designated Authority (GDA)	Nicholas Konovodoff	(256) 201-7003 (mobile)
CEHNC-OEC, Acting Safety Chief	James Walker	O: (256) 655-0236
US Army Garrison-Redstone	Clint Howard	O: (256) 758-7084 C: (256) 842-3702
Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Analytical and Remediation Activity – Program Manager	Mark Hammond	(256) 842-2885 (office) (256)-929-9995 (cell)

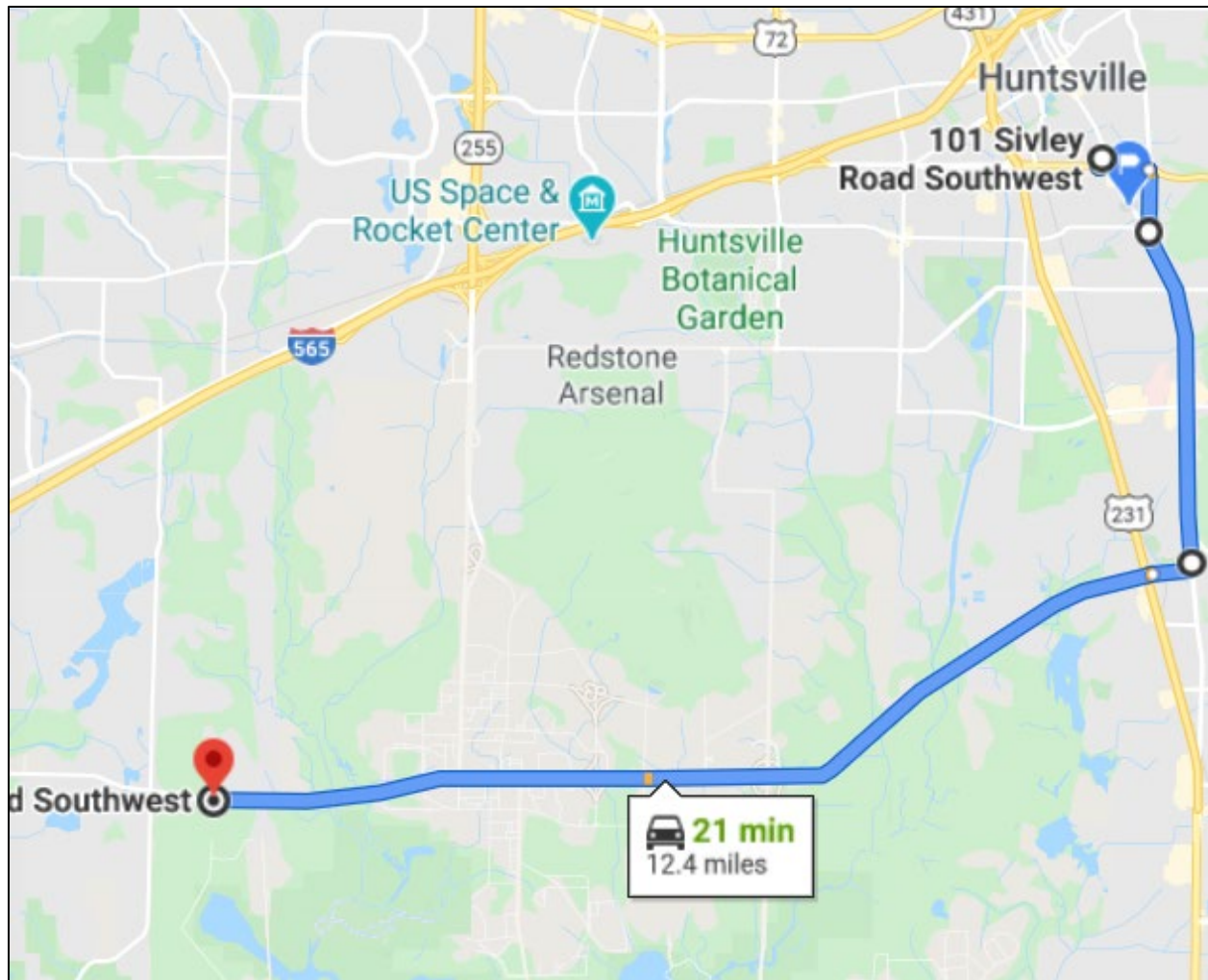
Contractor Contact Information		
Health and Safety Emergency Number		(800) 341-3647
APTIM PM	Mark Shoemaker	(865) 560-7927 (office) (865) 771-4133 (mobile)
Regional HSEQ Manager	Sean McCutcheon, PE	(256) 714-6926 (mobile)
Corporate Quality Management Director	Ken Walker	(541) 639-2000
HGL PM	Timothy Hiles	(256) 541-0944
HGL Corporate Quality Management Representative	Neil Feist	(256) 970-2103
Site Manager/Unexploded Ordnance Safety Officer (UXOSO)	William Seppala	(386) 986-7084
Senior Vice President Health, Safety, Environmental	Jeff Thompson, CSP	(303) 741-7163
Project Certified Industrial Hygienist	Larry Verdier	(513) 378-8021
Occupational Physician (APTIM) <i>Core Health</i>	Dr. William Nassetta	(225) 756-2673 (877) 347-7429
Occupational Physician (HGL/Subcontractor) <i>Work Care 24-Hour hotline nurse</i>	Dr. Peter Greaney	(714) 978-7488 (888) 449-7787
Wolf Creek (Utility Marking)	N/A	(256) 876-2801

DIRECTIONS TO THE EMERGENCY MEDICAL CENTER

The Huntsville Hospital is located at 101 Sivley Rd SW, Huntsville, AL 35801.

Directions to the hospital from RSA-313 North:

- From the eastern portion of RSA-313, take Zeirdt Road south to Martin Road.
- Head east on Martin Road 5.0 miles.
- Turn left onto Whitesburg Drive 2.8 miles.
- Turn right onto California Street 0.5 miles.
- Your destination will be on the left.



Redstone Arsenal Gate Hours

Location	Weekdays	Weekends
Gate 1	0530 - 2100*	Closed
Gate 3	0530 - 1300**	0530 - 1300
Gate 7	0530 - 2100	Closed
Gate 8	0530 - 2100	0530 - 2100
Gate 9	24/7	24/7
Gate 10	Closed	Closed
Visitor Center 1	0600 - 1430	Closed
Visitor Center 9	0600 - 1700	Closed

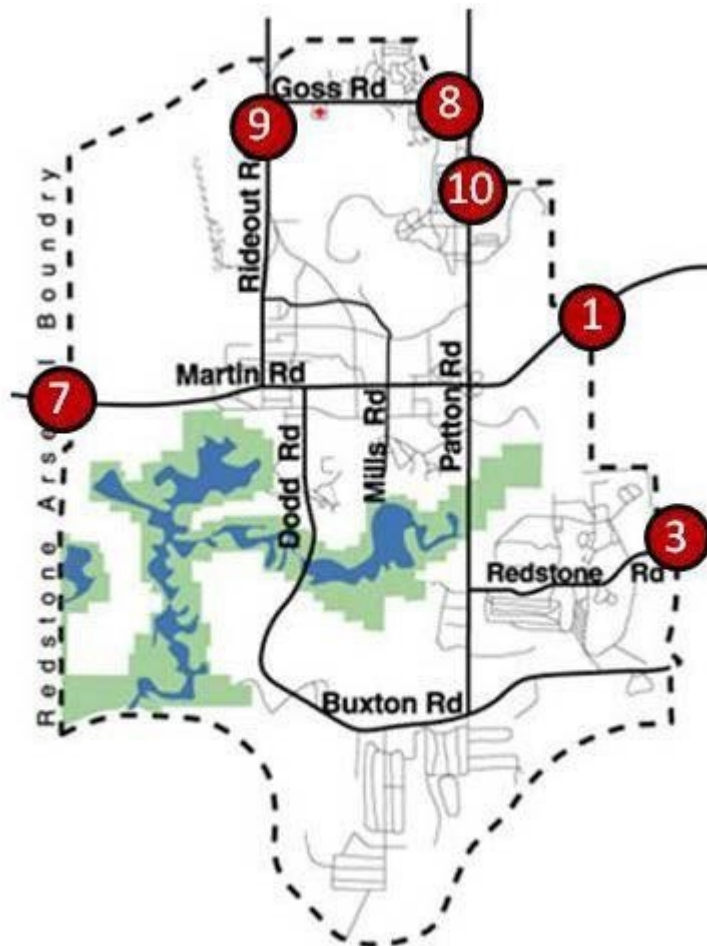
Notes:

* Truck lane at Gate 1 open 0530 - 1300, Monday - Friday

** Gate 3 outbound lanes will remain open until 1800

*** Gate 7 outbound lanes will remain open until 2100

Gate hours and conditions are subject to change because of homeland defense initiatives; therefore, the POC for the most current gate operational hours is the Provost Marshall Office at (256) 876-4195.



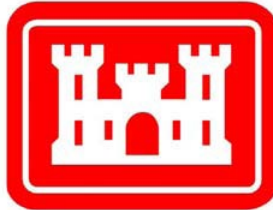
ATTACHMENT E1

CORRECTIVE MEASURES IMPLEMENTATION AT MULTIPLE (9) SITES SITE SAFETY AND HEALTH PLAN

RSA-313-R-01, WESTERN SIDE OF FORMER HIGH EXPLOSIVE DROP AREA A, OPERABLE UNIT 15

**U.S. Army Garrison-Redstone
Madison County, Alabama
U.S. EPA ID No. AL7 210 020 742**

Prepared for:



**U.S. Army Corps of Engineers, Huntsville District
U.S. Army Engineering and Support Center, Huntsville**

**Contract No. W912DY-17-D-0003
Delivery Order No. W912DY19F1116**

**Prepared by:
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**For
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Knoxville, Tennessee 37934**

June 2025

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AHA	activity hazard analysis
APP	Accident Prevention Plan
APTIM	Aptim Federal Services, LLC
bgs	below ground surface
CA	chemical agent
CDHS	Corporate Director of Health and Safety
CEHNC	U.S. Army Engineering Support Center, Huntsville
CMIP	Corrective Measures Implementation Work Plan
CPR	cardiopulmonary resuscitation
CWM	chemical warfare materiel
DAVS	detector-aided visual survey
dBA	A-weighted decibel
DEET	N,N-Diethyl-m-toluamide
DGM	digital geophysical mapping
EM	Engineer Manual
F-B	flash to bang
IAW	in accordance with
IEOC	Garrison Installation Emergency Operations Center
MDAS	material documented as safe
MEC	munitions and explosives of concern
MPPEH	material potentially presenting an explosive hazard
MRS	Munitions Response Site
OESS	Ordnance and Explosives Safety Specialist
OSHA	Occupational Safety and Health Administration
PPE	personal protective equipment
PWP	plasticized white phosphorus
RAC	risk assessment code
RFI	Resource Conservation and Recovery Act facility investigation
RP	red phosphorus
RSA	Redstone Arsenal

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

SDS	safety data sheet
SPA	single point anomaly
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TA	Test Area
TSM	tailgate safety meeting
USACE	U.S. Army Corps of Engineers
UXO	Unexploded Ordnance
UXOSO	Unexploded Ordnance Safety Officer
WP	white phosphorus

1.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.1 SITE DESCRIPTION

Redstone Arsenal (RSA) is an Army facility that encompasses approximately 38,300 acres of land in southwestern Madison County, Alabama. The location of RSA is illustrated on Accident Prevention Plan (APP) Figure 1-1. RSA is bounded by the city of Huntsville on the north and east. The city of Madison is adjacent to a very small portion of the northwest corner of RSA. RSA is bounded to the south by the Tennessee River, and Morgan County lies to the south across the river.

The installation also contains approximately 4,085 acres of Wheeler National Wildlife Refuge belonging to the U.S. Department of Interior Fish and Wildlife Service and approximately 1,250 acres belonging to the Tennessee Valley Authority. This acreage is used through land use permits. Under the permits, RSA is responsible for environmental management of the property, which includes cultural and natural resources. The George C. Marshall Space Flight Center of the National Aeronautics and Space Administration comprises approximately 1,841 acres in the central portion of RSA. Industrial areas are located in the southeast portion of RSA and family housing, commercial, recreational, and medical centers are located in the northern portion. Missile/rocket testing and munitions storage, the associated range fans, test area safety fans, and explosive safety-quantity distance arcs have been reserved for the southern portion of RSA.

Available historical information indicates that the areas within RSA-313-R-01 were not used as impact or explosives testing areas. The western boundaries of Test Area (TA) 3 and TA-6 are included in RSA-313-R-01. Current operations on TA-3 include field testing of a variety of sensor and designator systems on ground and aerial platforms under clear and simulated battlefield conditions. No conventional munitions are currently tested or expended on TA-3. Current operations on TA-6 consist of testing the same types of sensor and designator systems that are tested on TA-3. Some areas of TA-6 located well east of RSA-313-R-01 are currently used for firing small missiles and rockets. RSA-313-R-01 is located within the industrialized area of groundwater units RSA-150 and RSA-153. The northern and southern areas of the site are wooded, with limited pasture and forested areas present within the remainder of the site. The open areas of the site are mowed grassy areas. There are no delineated surface water channels within the site boundaries; however, storm water runoff flows through drainage ditches and culverts, where most infiltrates into the ground before reaching perennial streams. The topography at the site ranges from approximately 570 feet above mean sea level near Martin Road to approximately 660 feet above mean sea level in the northwest corner of the site.

1.2 CONTAMINATION CHARACTERIZATION

Based on the data collected from the Resource Conservation and Recovery Act facility investigation (RFI), which Aptim Federal Services, LLC (APTIF) prepared, the site was divided into two munitions response sites (MRS); MRS-1 or “RSA-313 South” (“Low” unexploded ordnance [UXO] probability area) and MRS-2 or “RSA-313 North” (“Moderate/High” UXO probability area). Given the nature of work at RSA, munitions and explosives of concern (MEC) considerations will be applied into processes and procedures. It is likely that additional munition-related items similar to those found during the intrusive investigation are still present within the

subsurface of this area, and each munition encountered must be individually assessed when encountered. The final phase of the field effort will involve site restoration and demobilization of the project team from the site.

1.3 PROJECT OBJECTIVE

The objective of the work to be performed under this SSHP is to excavate targets of interest within MRS-2 (northern portion of RSA-313-R-01) previously identified through the mapping of geophysical anomalies using advance geophysical classification methods, conduct baseline groundwater sampling, and initiate land-use controls.

1.4 PROJECT TASKS

The Corrective Measures at RSA-313-R-01 will include:

- Mobilization and Demobilization
- Civil Survey
- Vegetation Clearance
- MEC Subsurface Clearance/Excavation
- Material potentially posing and explosive hazard (MPPEH) Inspection and Handling
- MEC Disposal
- Material documented as safe (MDAS) Disposal
- Vehicle Operations
- Excavation and backfilling
- Site Restoration
- Coronavirus Practices and Prevention Exposure.

2.0 ACTIVITY HAZARD ANALYSIS

2.1 GENERAL SITE INFORMATION

Based on the data collected from the RFI, MRS-2 or “RSA-313 North” **has a designated UXO probability of “Moderate/High.”** It is likely that additional munition-related items similar to those found during the intrusive investigation are still present within the subsurface of this area, and each munition encountered must be individually assessed when encountered.

2.2 ANTICIPATED HAZARDS

A detector-aided visual survey (DAVS) was performed in 112 work units/grids across 100 percent of the accessible portions of the site at a 5-foot line spacing in February and March 2014 (Corrective Measures Implementation Work Plan [CMIP] Figures 2-1 and 2-2). The number of anomalies identified during the DAVS was recorded on a total number-per-grid basis (i.e., individual anomaly locations were not recorded). During the DAVS, metallic debris located on the surface of the survey area was collected for off-site disposal. These materials were removed to avoid potential interference with the geophysical instruments that were used during the subsequent digital geophysical mapping (DGM) survey. During the DAVS, 149 surface and 895 subsurface anomalies were recorded, and 338 pounds of metallic debris were removed from the surface of the site. No MEC, munitions debris, or features such as craters or disturbed ground were found on the surface in any of the accessible areas across the site during the survey.

In May 2015, a visual reconnaissance survey was completed from the southern limits of RSA-313-R-01 north to I-565 during road construction activities between Martin Road and I-565. No MEC, MPPEH, or munitions debris was observed or encountered during the survey.

A DGM survey was performed in grids established across 1.9 acres of the “moderate/high” probability area in the north end of the site in August and September 2016. No saturated response areas indicative of burial pits/trenches were detected in any of the DGM survey areas. A total of 510 single point anomalies (SPA) were present using autopick of the Geosoft Oasis montaj from the EM61 data at RSA-313 North. Removal of cultural interferences resulted in 493 SPAs.

The intrusive investigation was conducted from November 30, 2016 through January 30, 2017. Activities included anomaly reacquisition and staking (i.e., flagging), intrusive investigation, and verification. A total of 285 SPAs were intrusively investigated within RSA-313 North (includes Grid N-152 anomalies). During the intrusive investigation, two 4.2-inch mortars were recovered from Grids N-100 and N-112 in RSA-313 North. The locations at which these mortars were found are shown on CMIP Figure 1.5-1a. The mortar recovered from SPA 105 in Grid N-100 was unearthed at a depth of 26 inches bgs and identified as a sand-filled, unfuzed M2/M2A1 4.2-inch mortar. The mortar recovered from SPA 129 in Grid N-112 was unearthed at a depth of 10 inches below ground surface (bgs) and initially identified as an unfuzed, potentially liquid filled 4.2-inch mortar with a nose plug. The mortar was then packaged and transported by Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives (CBRNE) Analytical and Remediation Activity for x-ray analysis. Interpretation of the x-ray analysis indicated that the mortar contained a liquid line and mixing vanes and weighed more than an empty 4.2-inch mortar should weigh. Following this determination, the mortar was sent to the Munitions Assessment Review Board for portable

isotopic neutron spectroscopy analysis. The U.S. Army Chemical Materials Activity issued a memorandum on February 22, 2017, stating that the item, classified as item RSM-17-005, was determined to contain sand and recommended for local disposition.

Due to the discovery of the 4.2-inch mortar that was initially identified as potentially liquid filled in RSA-313 North, all further intrusive investigation activities were postponed. Therefore, 208 of the remaining anomalies selected for intrusive investigation in the remaining 4.09 acres of RSA-313 North grids could not be investigated. With the exception of SPAs 105 and 129, where the two mortars were recovered, no other munition-related items were recovered during the intrusive investigation of the remaining anomalies. The items recovered from all other anomaly excavations consisted of “hot soil,” scrap metal, wire, and fence parts, including barbed wire (likely from the former installation fence that was removed and relocated as a result of the Zierdt Road widening activities). The depths at which these items were unearthed ranged from 1 to 71 inches bgs. The combined weight of the two mortars was 30 pounds, and the total weight of all non-munitions-related debris excavated was 622 pounds.

2.3 ACTIVITY HAZARD ANALYSES

Detailed project-specific hazards and controls for each major definable feature of work/ activity will be addressed in task-specific activity hazard analyses (AHA). The AHAs define the job steps to be performed for each activity; the specific anticipated hazards associated with each job step; and the equipment, materials, and control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk. The AHAs will include site-specific training requirements, inspection schedules, and the names of competent and qualified personnel. The AHAs are to be considered living documents and are intended to be created in the field and updated by the workers as needed. A risk assessment code (RAC) associated with each activity will be determined. RACs are defined by probability and severity of occurrence.

AHAs have been developed and are provided in Attachment E3 of the APP. Each AHA sheet provides job specific steps, associated hazards, and actions necessary to eliminate or minimize the potential hazards. Section 2.9 in the APP details activities requiring AHAs.

Chapter 10 of the APP provides the Risk Management Process. Attachment E3 to the APP contains initial AHAs for each of the major tasks identified, including activity steps, potential hazards, control measures, training, and personal protective equipment (PPE) requirements. These AHAs will be reviewed and updated by the field team prior to starting work. Updates will include a list of specific equipment and the names of and, if required, certification(s) of qualified or competent persons.

If new operations or tasks are introduced, the Site Safety and Health Officer (SSHO)/Unexploded Ordnance Safety Officer (UXOSO) will perform a hazard analysis. If operations change significantly during the course of this project, the related AHA will be updated to accommodate these changes. The SSHO/UXOSO will approve any changes in PPE or operating procedures before they are implemented. Changes will be communicated to the field team(s) during daily tailgate safety meetings (TSM). The SSHO/UXOSO will be responsible for ensuring that the required controls are being properly implemented for each operation or task.

2.4 CLASSIC SAFETY HAZARDS

The most common safety hazards potentially associated with this project are expected to include:

- Slips, trips, and falls
- Motor vehicle
- Material handling and lifting.

Personnel working on site may encounter these hazards at one time or another. These hazards at the job site and methods to prevent injury resulting from them are described in the following sections. Additional physical hazards are addressed in Section 2.5 of this Site Safety and Health Plan (SSHP).

2.4.1 Slip, Trip, and Fall Hazards

2.4.1.1 Hazard Identification

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

- Holes, pits, or ditches
- Slippery surfaces
- Uneven and rough terrain
- Vegetation and debris such as fallen branches, vines, and roots
- Weather conditions that make surfaces slippery and obscure visibility, and thunderstorms and tornados.

2.4.1.2 Hazard Mitigation/Prevention

Site personnel will be instructed to look for these potential safety hazards and immediately inform the SSHO/UXOSO about any encountered or new slip, trip, or fall hazards. If the hazard cannot be immediately removed or mitigated, action will be taken to notify site personnel about the hazard. Slips, trips, and fall hazards will be a daily tailgate safety briefing item. Operations will cease if weather conditions will cause activities to become hazardous.

2.4.2 Motor Vehicles

2.4.2.1 Hazard Identification

Site tasks such as site preparation, brush clearing, and vehicle operation may present a hazard. Injuries can result from being hit or run over by a moving vehicle; from vehicles overturning; or from being struck, burned, or otherwise injured by moving parts.

2.4.2.2 Hazard Mitigation/Prevention

Before any machinery or mechanized equipment is placed into use, it will be inspected and tested to verify that it is in safe operating condition. Records of tests and inspections will be maintained

at the site. The following safety procedures will be adhered to on sites using heavy machinery and equipment:

- APTIM will designate a competent person to be responsible for the daily inspection of all machinery and equipment and during use to ensure that it is in safe operating condition. Tests will be made at the beginning of each day during which the equipment is to be used to determine that the brakes and operating systems are in proper working condition.
- Preventive maintenance procedures recommended by the manufacturer will be followed. Any machinery or equipment found to be unsafe will immediately be removed from service and its use prohibited until unsafe conditions have been corrected. A tag indicating that the equipment may not be operated will be placed in a conspicuous location on the equipment. The tag will remain until it is demonstrated to the individual tagging the equipment that it is safe to operate. Where possible, lockout procedures are the preferred method of control to use.
- Only qualified personnel will operate machinery and mechanized equipment. Equipment deficiencies observed at any time that affect safe operation will be corrected before continuing operation. Entering or exiting any equipment while it is in motion is prohibited. Machinery or equipment requiring an operator will not be permitted to run unattended. Machinery or equipment will not be operated in a manner that will endanger individuals or property, and safe operating speeds or loads will not be exceeded.
- Equipment operated on the public roads will be equipped with turn signals visible from the front and rear. Mechanized equipment will be shut down prior to and during fueling operations. Closed systems with automatic shut-off that prevent spillage if connections are broken may be used to fuel diesel-powered equipment left running.
- All towing devices used on any combination of equipment will be structurally adequate for the weight drawn and securely mounted. Persons will not be permitted to go between a towed and towing piece of equipment except to connect the equipment. All equipment with windshields will be equipped with powered wipers. Vehicles that operate under conditions that cause fogging or frosting of windshields will be equipped with operable defogging or defrosting devices.
- Whenever the equipment is parked, the parking brake will be set. Equipment parked on inclines will have the wheels chocked or track mechanism blocked and the parking brake set.
- Personnel will not work or pass underneath the loads handled by lifting or digging equipment.
- A warning device or signal person will be provided where there is danger to nearby workers from moving equipment such as swinging loads, buckets, or booms. Where manual (hand) signals are used, only one person will be designated to give signals to the operator. The signal person will be located to see the load and be clearly visible to the operator. Employees will be required to stay clear of any vehicle being loaded or unloaded to avoid being struck by any spilling or falling materials.

2.4.3 Underground Utilities

Not applicable. This type of work will not be performed under the current work scope.

2.4.4 Cumulative Trauma Disorder

Not applicable. This type of work will not be performed under the current work scope.

2.4.5 Vibration

Not applicable. This type of work will not be performed under the current work scope.

2.4.6 Material Handling and Lifting

2.4.6.1 Hazard Identification

Improper handling and lifting of materials and equipment on site can result in specific injuries to the body, most notably the back.

2.4.6.2 Hazard Mitigation/Prevention

Site personnel will exercise care in lifting and handling heavy or bulky items. No site worker will attempt to lift any item in excess of 50 pounds without assistance or use of a mechanical device. Materials being lifted either mechanically or manually will not be moved or suspended over personnel unless precautions have been made to protect the personnel from falling objects. Whenever heavy or bulky material is to be moved manually, the size, shape, and weight of the object and the distance and path of movement must be considered to prevent joint and back injuries. Adhere to the following hierarchy in selecting a means for material handling:

1. Movement of the material by mechanical device (lift truck, crane, and similar)
2. Movement by manual means using mechanical aid (dolly or cart)
3. Movement manually in a planned manner with an adequate number of personnel.

The SSHO/UXOSO will train employees in proper lifting techniques and require that they lift objects properly. The following procedures will be followed:

1. Ensure the hands and object are free of oil, grease, or water that might prevent a firm grip. A firm grip on the object is essential.
2. Keep hands, and especially the fingers, away from any points where pinching or crushing could occur, particularly when setting the object down.
3. Inspect the item for metal slivers, jagged edges, burrs, rough or slippery surfaces, and pinch points, and, if necessary, use gloves to protect the hands.
4. Place the feet far enough apart for good balance and stability.
5. Ensure that solid footing is available before lifting the object.

6. When lifting, remain as close to the load as possible, bending legs at the knees, keeping the back as straight as possible, and lifting the object with the legs while straightening from a bended position.
7. Never carry a load that cannot be seen over or around while carrying it.
8. When setting an object down, keep the stance and position identical to that for lifting, with the back straight and the legs bent at the knees while the object is lowered.
9. When two or more people are required to carry an object, distribute the load uniformly. Each person should face the direction in which the object is being carried as much as possible.

2.4.7 Pressurized Cylinders

Not applicable. This type of work will not be performed under the current work scope.

2.5 EXPLOSIVE ORDNANCE HAZARDS

It is likely that additional munition-related items similar to those found during the RFI intrusive investigation are still present within the subsurface of this area. Only Department of Defense Explosives Safety Board Technical Paper-18 qualified UXO personnel will execute munitions-related activities.

2.5.1 Material Potentially Presenting an Explosive Hazard

Based on the data collected from the RFI, the UXO probability designation of MRS-2 or “RSA-313 North” is “Moderate/High.” The tasks to be conducted under this SSHP will be located in RSA-313 North only.

Upon removal of SPAs from the excavation, they would initially be considered as MPPEH. They would undergo further inspection and be determined to be either MDAS (i.e., munitions debris) or Material Documented as an Explosive Hazard (i.e., MEC) in accordance with CMI Work Plan Appendices I and J. The tasks to be conducted under this SSHP will be located within MRS-2 at RSA-313-R-01 only.

2.5.2 MEC Hazard Safety

All site personnel will be given ordnance recognition training prior to working on the site. The training will be verified by signature on the site training form. Personnel should be alert for UXO and munitions debris.

In general, the following MEC safety precautions and protocols will be followed:

- Positively identify all MEC.
- Always remain alert at all times for MEC, UXO, and related scrap or MPPEH hazards.
- Observe the cardinal principle involving ordnance, explosives, ammunition, severe fire hazards, or toxic materials, i.e., to limit the exposure to a minimum number of personnel,

for the minimum amount of time, to a minimum amount of hazardous material consistent with a safe and efficient operation.

- Always assume MEC hazards contain a live charge until determined otherwise.
- DO NOT forget that death or injury can occur from MEC/UXO and explosive-related accidents.
- DO NOT forget that the age or condition of a MEC hazard does not decrease the effectiveness. MEC that has been exposed to the elements for an extended period of time can become more sensitive to shock, movement, and friction because the stabilizing agent in the explosives may be degraded.
- Consider MEC that has been exposed to fire as extremely hazardous. Chemical and physical changes to the contents may have occurred that render it more sensitive than it was in its original state.
- DO NOT approach leaking plasticized white phosphorus (PWP) or white phosphorus (WP) munitions. Burning PWP/WP may detonate the explosive burster charge.
- DO NOT dismantle, strip, or handle any MEC unnecessarily.
- Submerge munitions containing PWP or WP in water or cover with mud or wet sand as gently as possible if necessary, to handle or transport.
- Cover munitions containing red phosphorus (RP) with wet sand or earth as gently as possible if necessary, to handle or transport.
- PWP/WP will ignite and burn on contact with air. Handle crusted-over PWP/WP with special care—breaking the crust can cause the round to begin burning again.
- DO NOT touch crusted-over PWP/WP unnecessarily. Handling of crusted-over PWP/WP munitions will be done only at the discretion of the UXOSO.
- Additional protective clothing (long sleeves, full face shield, leather welder's gloves, and leather welder's apron) shall be worn while removing residue or attempting to submerge or cover a PWP/RP/WP item.
- DO NOT touch, move, or jar any ordnance items regardless of the markings or apparent condition. Under no circumstances will any MEC be handled during avoidance activities or moved in an attempt to make a positive identification.
- DO NOT touch, pick up, kick, or move anything that is unfamiliar or unknown.
- DO NOT roll the item over or scrape the item to identify markings.
- DO NOT approach or enter a munitions site if an electrical storm is occurring or approaching. If a storm approaches during site operations, leave the site immediately and seek shelter.
- DO NOT transmit radios or cellular phones in the vicinity of suspect MEC hazards.
- DO NOT walk across an area where the ground surface cannot be seen and that has not been cleared of MEC hazards by the UXO technician.
- DO NOT rely on color codes for positive identification of ordnance items or their contents.

- DO NOT drive vehicles into a suspected MEC area—use clearly marked lanes.
- DO NOT carry matches, cigarettes, lighters or other flame-producing devices into a MEC site.
- DO NOT be misled by markings on the MEC item stating, “practice bomb,” “dummy,” or “inert.” Practice ordnance can have explosive charges that are used to mark and/or spot the point of impact, or the item could be marked incorrectly.
- Clearly mark the location of any ordnance item found for future location and avoidance.
- Follow the procedures of the Field Sampling Plan and SSHP. Upon locating any MEC hazards, immediately notify the SSHO/UXOSO.
- Post the following warning on site:

— WARNING —

Removing or taking any munitions, explosive, UXO, or munitions-related debris from the site by any employee is strictly prohibited.

Additional MEC safety precautions will be provided during daily safety meetings and are addressed in Engineer Pamphlet 385-1-97, *Explosives Safety and Health Requirements Manual*.

2.5.3 Explosive Demolition Operations

The CMIP (Section 4.3.6.2) describes any applicable demolition operations to be conducted for conventional MEC.

2.6 CHEMICAL HAZARDS

The RSA-313-R-01 RFI concluded that no actions are warranted to address chemicals present in surface or subsurface soils at the site; constituents in soil pose no unacceptable human health or ecological risk to current or future receptors or leaching threat to groundwater. Five chemicals (2,4-dinitrotoluene, 2,6- dinitrotoluene, 2-nitrotoluene, bis[2-ethylhexyl]phthalate, and trichloroethene) in the groundwater associated with RSA-313-R-01 were identified as chemicals of concern warranting action. In addition, benzo(a)anthracene, naphthalene, dibenz(a,h)anthracene, 1,3-dinitrobenzene, nitrobenzene, and nitroglycerin are included in the ongoing groundwater monitoring program based on exceedances of their monitoring acceptance goals.

Given the nature of work at RSA, MEC considerations will be applied into processes and procedures. It is likely that additional munition-related items similar to those found during the intrusive investigation are still present within the subsurface of this area.

Chemical hazards associated with site activities also includes fuels and oils brought on site for equipment use and maintenance. All site personnel will follow the procedures and precautions outlined in the appropriate Safety Data Sheet (SDS) for the appropriate use and storage of these materials. The SDS binder will be kept in the SSHO/UXOSO site vehicle or office and will be available to all employees on request.

2.6.1 Chemical Warfare Materiel/Chemical Agent Hazards

Chemical warfare materiel (CWM) probability is listed as “Unlikely” for RSA-313-R-01. Therefore, CWM/chemical agent (CA) hazards are not expected at these sites.

2.6.2 CWM/CA Hazard Safety

CWM probability is listed as “Unlikely” for RSA-313-R-01. Therefore, CWM/CA hazards are not expected at these sites.

2.7 PHYSICAL HAZARDS

The primary physical hazards potentially associated with this project are expected to include:

- Severe weather (i.e., tornados)
- Lightning
- Hazardous noise
- Heat stress
- Cold stress.

These hazards and mitigation actions are discussed in the following sections.

2.7.1 Severe Weather

2.7.1.1 Hazard Identification

During the course of field operations, severe weather may be encountered, including thunderstorms, rainstorms, tornados, and other unsafe weather conditions (i.e., high winds). Criteria indicating that severe weather conditions may exist include:

- High winds (greater than 40 miles per hour – depending on the tree cover and other site-specific conditions)
- Tornado watch or warning in place for the area
- Visible lightning
- Extreme temperatures (e.g., greater than 100 degrees Fahrenheit [°F] or less than 32°F)
- Heavy rainfall or fog that makes footing treacherous and visibility difficult.

2.7.1.2 Hazard Mitigation/Prevention

The SSHO/UXOSO will be responsible for checking the weather conditions at a minimum of twice a day through the use of local radio and television broadcasts, internet weather sites, or a weather radio. When severe weather threatens, the SSHO/UXOSO will be responsible for deciding if site operations should cease.

If work is suspended, the SSHO/UXOSO will notify the teams and individuals via radio or cellular telephone. These individuals will be responsible for relaying the work suspension to other

personnel in their areas. All personnel will cease operations, secure equipment if time permits, and expeditiously move to designated assembly areas for further instruction. Once the severe weather hazard has passed, the SSHO/UXOSO will notify the SSHO/UXOSO that work may resume.

If a tornado is projected to impact the location of the job site, several measures will be taken. If the tornado's projected path is forecast to move through the area, the site and all equipment will be secured and personnel will evacuate to a designated safe location, if time allows. If there is not enough time, personnel will immediately evacuate to a designated storm shelter without securing the site or equipment. The specific directions from the MRS to the closest shelter will be detailed during the site-specific briefing or TSM.

If there is not enough time to get to a shelter, possible actions include:

- Immediately get into a vehicle, buckle the seat belt, and try to drive to the closest sturdy shelter. If hit by flying debris while driving, pull over and park.
- Take cover in a stationary vehicle. Put the seat belt on and cover head with arms and a blanket, coat, or other cushion if possible.
- Lie in an area noticeably lower than the level of the roadway and cover head with arms and a blanket, coat, or other cushion if possible.

In all situations:

- Do not get under an overpass or bridge. Low, flat locations are safer.
- Never try to outrun a tornado in urban or congested areas in a car or truck. Instead, leave the vehicle immediately for safe shelter.
- Watch out for flying debris. Flying debris from tornadoes causes most fatalities and injuries.

2.7.2 Lightning

2.7.2.1 Hazard Identification

Noting the time from lightning flash to the bang of the associated thunder offers a way to estimate the distance of the lightning to a given person's position. For each 5-second count from flash to bang (F-B), lightning is 1 mile away. Thus, an F-B of 10 means that lightning is 2 miles away and an F-B of 15 means that lightning is 3 miles away, and so on. The lightning safety evacuation plan will be implemented at a count of 50 (10 miles), or as soon as lightning is observed, or thunder is heard. This plan will be enacted for a minimum of 30 minutes after the last audible thunder or visible flash of lightning.

2.7.2.2 Hazard Mitigation/Prevention

If a lightning storm is observed, all outdoor site activities will cease, and personnel will seek safe shelter. A safe shelter may consist of:

- Fully enclosed metal vehicles with windows up and vehicle radio off

- Enclosed buildings
- Low ground.

Unsafe shelter areas include all nearby outdoor metallic objects such as flag poles, fences, high mast light poles, gates, etc. Trees, water, and open fields will be avoided, and personnel will avoid using the telephone.

2.7.3 Hazardous Noise

2.7.3.1 Hazard Identification

Planned activities may involve the use of noise-producing equipment such as weed trimmers, bobcats, backhoes, and other noise-producing equipment. The unprotected exposure of site workers to this noise during activities can result in noise-induced hearing loss.

A hazardous noise condition exists when communication between individuals separated by 3 feet requires shouting.

2.7.3.2 Hazard Mitigation/Prevention

Hearing protection is required any time the noise level reaches 85 a-weighted decibel (dbA) or greater or when communication between individuals separated by 3 feet requires shouting. Double protection is required any time noise levels exceed 115 dbA. The SSHO/UXOSO will ensure that either earmuffs or disposable foam earplugs are available to, and used by, all personnel near sources of hazardous noise.

Where equipment generates high levels of continuous or impact noise, the SSHO/UXOSO will conduct a noise survey to verify that appropriate PPE is being used.

2.7.4 Heat Stress

A detailed discussion of heat stress symptoms, mitigation, and prevention is provided in Section 9.21 of the APP.

2.7.5 Cold Stress

A detailed discussion of cold stress symptoms, mitigation, and prevention is provided in Section 9.22 of the APP.

2.8 IONIZING RADIATION

Ionizing radiation hazards are not likely to be encountered while performing fieldwork.

2.9 BIOLOGICAL HAZARDS

Personnel will be made aware of the various biological hazards that may be encountered while working at the sites, including ticks, poisonous insects (for example, fire ants, chiggers, and disease-bearing mosquitoes), poison ivy, and snakes, during the initial site safety orientation.

Appropriate preventative measures will be employed to minimize potential exposure to biological hazards, including designating a field member to watch for biological hazards. Table E1-2.1 shows the biological hazards for the site.

Table E1-2.1
Biological Hazards

Ticks		
		
Snakes		
		
Coral Snake	Copperhead	Timber Rattlesnake
		
Eastern Diamondback Rattlesnake	Pygmy Rattlesnake	Cottonmouth (water moccasin)

Table E1-2.1 (continued)
Biological Hazards

Spiders		
		
Black Widow	Brown Widow	
		
Red Widow	Brown Recluse	
Stinging and Biting Insects		
		
Various Bees and Wasps	Mosquitoes	
		
Ants (including Fire Ants)	Centipedes	
Poisonous Plants		
		
Poison Ivy	Poison Oak	Poison Sumac

The SSHO/UXOSO will be responsible for instructing personnel in avoiding or minimizing exposure to biological hazards. The keys to avoiding biological hazards are awareness of one's surroundings and general knowledge of the habits of various species that may present a threat. In general, the vertebrates will escape to avoid human contact when encountered. Reptiles will often seek out warm sunny locations in morning hours and during cold weather. A reconnaissance of the site work area should be conducted every morning to identify the presence of potential threat species of plants, insects, and animals. Clearings of vegetation and near burrows are activities that potentially disturb reptiles or hornet nests in proximity to personnel. Extra care and caution should be exercised in any work area that disturbs vegetation or soil or when entering any vegetated area where one cannot directly see the ground surface at all times.

The work sites may contain ticks, venomous spiders, and venomous insects. Venomous insects and spiders are generally reclusive, and the greatest potential for exposure arises when personnel are opening containers, structures, buildings, and well casings; handling idle equipment; or moving construction material stockpiles. For example, caution should be taken when opening the casing around monitoring wells.

2.9.1 Mosquitoes

Mosquitoes are bothersome and may carry diseases, such as the West Nile and Zika viruses. They are attracted by heat, sweat, body odor, and carbon dioxide. Site personnel should wear protective clothing and insect repellent containing N,N-Diethyl-m-toluamide (DEET). Insect repellent should be reapplied at least every four hours. The following suggestions should provide some protection from mosquitoes:

- Review the hazards associated with the West Nile Virus and Zika Virus through exposure to mosquito bites periodically during the TSMs. Zika virus prevention is an important issue because contracting this virus during pregnancy appears to pose a significant risk of neurological birth defects including microcephaly. Infection appears to be much less dangerous for healthy adults. Get regular updates on transmission and controls from Centers for Disease Control (nwww.cdc.gov/zika/).
- Document the briefing and the topics covered. Standard tailgate forms can be used as long as the form documents the topics covered. Have all sign attendees sign, to verify training on Zika virus has been conducted.
- Apply sunscreen first and then insect repellent.
- Take extra precautions like Thermocell units and head nets (as long as they do not interfere with visual acuity).
- Increase protective measures when working at dawn and dusk and in the early evening.
- Reduce the area of exposed skin when working outdoors. Long-sleeved shirts with sleeves rolled down are recommended; however, it should be understood that mosquitoes may bite through thin clothing. To avoid mosquitoes, personnel should evaluate the actual Level D clothing worn. For example, heavy long-sleeved work shirts and heavy dungarees/jeans may mitigate mosquito bites. The use of a disposable coverall, such as Tyvek[®], may further reduce the risk of mosquito bites.

- Use an insect repellent containing approximately 30 percent DEET. Use the repellent according to the manufacturer's directions provided on the container. Frequent reapplication or saturation is not necessary for repellent containing DEET to be effective. Avoid prolonged and excessive use of DEET. (Caution: some individuals may be sensitive to DEET—always read and follow label directions.) After returning from outdoor field activities, wash treated skin with soap and water.
- Use commercially prepared “clothing and gear” with insect repellants containing 0.5 percent permethrin when additional protection against mosquitoes is necessary. These repellants, such as Repel Permanone™, are available in the sporting goods departments at major retailers. Clothing and gear insect repellants are not for use on skin. Use the repellent according to the manufacturer's recommendations provided on the container.
- Avoid using fragrances.
- Prevent accumulation of water, which can provide breeding grounds for mosquitoes.

The Zika virus is primarily transmitted through mosquitoes but may also be spread via bloodborne (contact) transmissions and sexual transmission (partner to partner). Only one in five infected individuals develop signs and symptoms, which include fever, rash, joint and muscle pain, headaches, and red or pink eyes. Symptoms begin to occur between 2 and 7 days after exposure, are usually mild, and can last up to a week.

2.9.2 Fire Ants

Nests should not be allowed to form near structures and areas where personnel will continue to have a need for access. If bitten, personnel should wash the bite area with soap and water, apply cool compress to the area, elevate the area on a pillow, and apply a paste of baking soda and water for itching.

2.9.3 Stinging Insects

Workers should keep alert for bee and wasp activity and avoid wearing bright clothing and scented toiletries when working outside. Be wary of areas around structures where bees and wasps may live. If bee or wasp activity is noted, the area should be avoided if possible. The use of insect repellants containing DEET is not effective in preventing stings. Anyone can have an allergic reaction to a bee sting, even if they were stung before with no reaction. Allergic reactions to bee stings may include swelling around the lips and eyes, rapid development of a rash, difficulty breathing, or signs of shock (pale skin, rapid pulse, and fainting). If any of these symptoms occur, call 911 immediately. Individuals who have had a previous reaction should notify the SSHO/UXOSO before fieldwork begins and carry a “bee-sting kit,” EpiPen®, or Ana-Kit. All personnel will immediately report stings to the SSHO/UXOSO.

Nests should not be allowed to form near structures and areas where personnel will continue to have a need for access. If stung, personnel should wash the bite area with soap and water, apply a cool compress to the area, elevate the area on a pillow, and make a paste of baking soda and water for itching.

Africanized Honey Bees (“killer bees”) are more aggressive and dangerous than other types of bees. If attacked by bees, workers should cover their faces, run away from the hive, and seek shelter in an enclosed area. If stung, the stinger should be removed and first aid sought if necessary.

2.9.4 Centipedes

Centipedes are commonly found throughout Alabama and grow up to 3 inches in length. Centipedes are venomous though rarely fatal; however, if a team member is bitten, observe the individual for signs of allergic reaction for a minimum of 30 minutes. Immediately report the incident to the SSHO/UXOSO to provide first aid treatment.

2.9.5 Black, Brown, and Red Widow Spiders

Spiders of the widow family are not usually aggressive unless agitated when the female is guarding her egg sac. They live in a variety of natural and domestic habitats such as under rocks and wooden boards and in dense plant growth. The female widows typically have bulbous, glossy abdomens approximately 1 inch long and marked with a characteristic marking on the underside of the abdomen (red hourglass on black for black widows, yellow hourglass on brown for brown widows, and typically red-legs and black abdomen with yellow/red patches for red widows). The male is rarely seen and is smaller.

Widow spider venom affects the nervous system. The venom causes pain in the lymph nodes. Other symptoms of a severe bite include nausea, elevated blood pressure, sweating, tremors and increased white blood cell counts. The wound may appear as a bluish red spot, surrounded by a whitish area. Victims of a widow bite may exhibit the following signs or symptoms:

- Sensation of pinprick or minor burning at the time of the bite.
- Appearance of small punctures (sometimes none are visible).
- After 15 to 60 minutes, intense pain is felt at the site of the bite. The pain quickly spreads and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, and poor coordination, dilated pupils, and generalized swelling of the face and extremities.

2.9.6 Brown Recluse Spiders

Adult brown recluse spiders are soft bodied, yellowish tan to dark brown, about ¼ to ½ inch long, and have long, delicate grayish to dark brown legs covered with short, dark hairs. The leg span is about the size of a half-dollar.

The spider’s most distinguishing characteristic is the existence of three pairs of eyes arranged in a semicircle on the forepart of the head and a dark, violin-shaped, marking immediately behind the semicircle of eyes. Normally, all spiders have four pairs of eyes, eight altogether. The neck of the violin points toward the abdomen.

The spider may be found in sheltered corners among debris, in woodpiles, and under loose bark and stones. Hands, underarms, lower abdomen, and ankles are the areas of the body most likely to be bitten. A bite may go unnoticed for six to eight hours before a reddening, swelling, and blistering

area around the wound starts to appear. A severe bite can produce an area of dead skin tissue that may require surgery. Victims of a brown recluse bite may exhibit the following signs or symptoms:

- Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite.
- Formation of a large, red, swollen, pustule lesion with a bulls-eye appearance.
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea and vomiting.
- Pain may become severe after eight hours, with the onset of tissue necrosis.

There is no effective first-aid treatment for black widow or brown recluse bites. Except for very young, very old, or weak victims, spider bites are not considered to be life threatening. Medical treatment must be sought, however, to reduce the extent of damage caused by the injected toxins. If the spider can be retrieved, it should be taken with the patient to medical treatment. If venomous spiders are suspected or known to be on site, the SSHO/UXOSO will brief the site personnel as to their identification and avoidance. As with stinging insects, site personnel should report to the SSHO/UXOSO if they locate these spiders on site or notice any type of bite while involved in site activities.

2.9.7 Ticks

Nearly all work sites on this project may contain ticks. Working in tall grass, especially in or at the edge of wooded areas, increases the potential for ticks to bite workers. Ticks can be particularly numerous in the spring and fall. Ticks are vectors of many different diseases, including Lyme disease. Ticks attach to the skin and feed on blood, creating an opportunity for disease transmission.

The primary symptoms of tick-borne diseases are high fever, head and joint aches, nausea, and vomiting. Additionally, persons develop rashes or experience occasional coughs, chest pain, and severe pneumonia. Lyme disease usually presents a distinctive bull's eye rash at the site of the bite in addition to flu-like symptoms and swollen lymph nodes.

If ticks are prevalent, treat clothing with a permethrin-based product like Permanone as directed by the manufacturer. Use an insect repellent containing approximately 30 percent DEET on any bare skin. Insect repellent will be available to personnel. (Caution: some individuals may be sensitive to DEET – always read and follow label directions.) Close pant legs with tape or elastic bands or tuck them into socks. Tuck shirts into pants.

Periodically during the workday, employees should inspect themselves for the presence of ticks. If a tick is discovered, use the following procedure to remove it:

- Use fine-tipped tweezers to detach a tick. Do not try to detach the tick with bare fingers because bacteria from a crushed tick may penetrate even unbroken skin.
- Grip the tick as close to the skin as possible and gently pull it straight away from the skin until it releases its hold.

- Do not twist the tick as it is pulled and do not squeeze its body; this may inject bacteria into the skin.
- Place tick in a clean sealed container i.e., resealable bag, and write the time and date on the container. Preserving the tick can help with identification if necessary.
- Wash hands and the bite area thoroughly with soap and water, and then apply an antiseptic to the bite area.

2.9.8 Venomous Snakes

Alabama has a variety of snakes; however, the Coral Snake, Eastern Diamond-Backed Rattlesnake, Pygmy Rattlesnake, Timber Rattlesnake, Copperhead, and Cottonmouth (or Water Moccasin) are the venomous varieties native to the state. All except the Coral Snake are within the venomous pit viper family. The Coral Snake belongs to elapid family.

2.9.8.1 Coral Snake

The Coral Snake is typically seldom seen and tend to be nocturnal. They are small snakes, averaging approximately 20 inches in length. Coral Snakes have rings of red, yellow, and black along the length of their bodies. Their noses are always black, with a yellow ring. They do not have long fangs and would need to “chew” on a person in order to inject their venom. Many snakes mimic the Coral Snake; however, the Coral Snake is the only snake that has red and yellow stripes touching.

2.9.8.2 Eastern Diamond-Back Rattlesnake

The Eastern Diamond-Back Rattlesnake is the largest rattlesnake native to North America, with average lengths reaching 6 feet. They are characterized by their large brown, black, and beige diamond marks on their back. The snake lives in forests near palmetto bushes and makes its home typically in old animal burrows. As a precaution, it is important to note that an Eastern Diamond-Backed Rattlesnake does not always rattle before it strikes.

2.9.8.3 Pygmy Rattlesnake

The Pygmy Rattlesnake is a relatively small snake, with a length between 18 and 30 inches. They are gray with brownish round markings along the spine (top). They are typically very aggressive.

2.9.8.4 Timber Rattlesnakes

Timber Rattlesnakes are not aggressive and are sometimes reluctant to bite. If this snake is encountered, leave it alone. Its venom is highly toxic and can be fatal. Timber Rattlesnakes range in size between 3 and 5 feet. The coloration of this species is blackish, yellowish, pinkish, or grayish with dark, bent, cross bands aligned along the dorsal length of its body. A reddish dorsal stripe runs between the cross bands and it has a black tail. Timber Rattlesnakes typically inhabit forest, nearby fields, and swampy areas and may be found throughout Alabama.

2.9.8.5 Copperhead

Copperheads are usually not aggressive, and their bite is very rarely lethal. Like most members of the pit viper family, the Copperhead is a heavy-bodied snake. These snakes range between 24 and 36 inches in length and they are covered in hourglass-shaped crossbands which vary in coloration among different populations. The crossbands may be copper, pinkish, reddish brown, or orange. Copperheads are found state-wide in forests and sometimes in fields. The tips of the tails of young Copperheads are yellow and they flick them back and forth in a manner that attracts prey.

2.9.8.6 Cottonmouth

Cottonmouths are typically found near a water source, mostly in dormant water. Coloration varies according to age and habitat, but typically are black to greenish-brown. Their lengths can span up to 5 feet.

2.9.8.7 Snake Bite First Aid Treatment

If bitten, a person's physical reaction to the venom is aggravated by fear, anxiety, the amount of venom injected, and the speed of absorption of venom into the victim's circulation; the size of the victim; protection provided by clothing (including shoes and gloves); how quickly the victim receives antivenin therapy; and the location of the bite.

It should be noted that the American Red Cross does not advocate the use of snakebite kits for snakebite injuries. Experience has shown that the victim has a better chance of recovery without permanent damage when the site of the wound is immobilized and the victim rushed to the closest emergency medical facility (preferably within 30 minutes).

What to Do if Bitten by a Venomous Snake

1. According to the American Red Cross, take the following steps:
 - a) Wash the bite with soap and water.
 - b) Immobilize the bitten area and keep it lower than the heart.
 - c) Get medical help.
2. If a victim is unable to reach medical care within 30 minutes, take the following steps:
 - a) Allow bite to bleed freely for 15 to 30 seconds.
 - b) Cleanse and rapidly disinfect area.
 - c) Wrap leg/arm rapidly with 3- to 6-inch Ace bandage past the knee or elbow joint. Leave fang marks open. Apply suction cup extractor (if available) immediately. Wrap bandage no tighter than one would for a sprain.
 - d) Apply extractor until there is no more drainage from fang marks. The extractor can be left in place 30 minutes or more if necessary. It also aids in keeping the venom from spreading by applying a negative pressure against the tissue where the venom was initially deposited.

- e) If an extractor is not available, apply direct pressure over bite using a 4H4-gauze pad folded in half twice. Tape in place with adhesive tape.
 - f) Soak gauze pad in Betadine™ solution if available.
 - g) Strap gauze pad tightly in place with adhesive tape.
 - h) Overwrap dressing above and below bite area with ACE or crepe bandage.
 - i) Wrap ACE bandage as tight as one would for a sprain; not too tight.
 - j) Check for pulse above and below elastic wrap; if too tight, unpin and loosen.
 - k) Immobilize bitten extremity, using splinting if available.
 - l) Transport victim to nearest hospital or medical facility as soon as possible.
 - m) Try and identify, kill, and bring (ONLY if safe to do so) the offending snake.
3. Do NOT take the following actions if bitten by a venomous snake:
- a) DO NOT permit removal of pressure dressings or ACE bandage until at a facility that is ready and able to administer antivenin. As soon as the dressings are released the venom will spread. The hospital at this time must be prepared to administer the antidote (antivenin).
 - b) Do not eat or drink anything unless approved by medical sources.
 - c) Do not engage in strenuous physical activity.
 - d) Do not apply oral (mouth) suction to bite.
 - e) Do not cut into or incise bite marks with a blade.
 - f) Do not drink any alcohol or use any medication.
 - g) Do not apply either hot or cold packs.
 - h) Do not apply a narrow, constrictive tourniquet such as a belt, necktie, or cord.

2.9.8.8 Protective Measures for Snakes

1. Learn to identify poisonous snakes. The site-specific safety training will review this information.
2. Observe areas before being seated, placing hands and feet. Observe where to place feet when exiting a vehicle.
3. Avoid rock piles, crevices, and brushy areas. If movement of materials (such as rocks or brush) is necessary, use a remote means to initially relocate the material. Prior to entering an area, look and listen carefully.
4. Do not place hands into holes, crevices, debris, or anyplace that may hide a snake.
5. Never handle snakes that appear to be dead.
6. Do not attempt to capture or kill ANY snakes.

2.9.9 Allergenic Plants

A variety of hazardous plants may be encountered on site. The ailments associated with these plants range from mild hay fever to contact dermatitis to carcinogenic effects. The plants that present the greatest degree of risk to site personnel (i.e., potential for contact versus effect produced) are those that produce skin reactions and skin and tissue injury.

Some of the most common and severe allergic reactions resulting from contact with hazardous plants are caused by poison ivy, poison oak, and poison sumac. The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets. In certain seasons, both plants also have greenish-white flowers and berries that grow in clusters. Poison sumac is a tall shrub or small tree with 6 to 12 leaflets arranged in pairs with a single leaflet at the end. Pictures of poison ivy, poison oak, and poison sumac are shown in Table E1-2.1.

Contact with the poisonous sap (urushiol) of these plants produces a severe rash characterized by redness, blisters, swelling, and intense burning and itching. Although most cases occur in the spring and summer months, it is important to note that contact dermatitis from poison ivy, poison oak, and poison sumac is prevalent in the winter since the vines and stems of the plants also contain urushiol. In some cases, the victim may develop a high fever and may become very ill. Ordinarily, the rash begins within a few hours after exposure, but it may take as long as 24 to 48 hours to appear. The following preventive measures can prove effective for most site personnel:

- Avoid contact with any hazardous plants on site.
- Remove gloves prior to touching face, neck, or other exposed areas of the body.
- Wash hands, face, or other exposed areas at the beginning of each break period and at the end of each workday.
- Keep the skin covered as much as possible (i.e., long pants and long-sleeved shirts) in areas where these plants are known to exist.
- Wash any clothing suspected of being exposed separately in hot water with detergent.
- Be careful not to handle tools or equipment suspected of contacting these plants. Clean tools with rubbing alcohol or soap and water. Urushiol can remain active on the surface of objects for several years.

Workers who have come into contact with these plants should do the following:

- Rinse skin immediately with rubbing alcohol, specialized poison plant washes, degreasing soap (such as dishwashing soap) or detergent and lots of water. Do not use soaps with lotions, which will spread the plant oils. Rinse frequently so that wash solutions do not dry on the skin and further spread the urushiol. Scrub under the fingernails with a brush.
- Apply wet compresses, calamine lotion, or hydrocortisone cream to the skin to reduce itching and blistering.
- Take an antihistamine such as diphenhydramine (Benadryl) to help relieve itching (follow directions).

- Contact [*state name of medical incident intervention service/medical provider*] incident intervention team for guidance.

2.9.10 Bloodborne Pathogens

Bloodborne pathogens enter the human body and blood circulation system through punctures, cuts, or abrasions of the skin or mucous membranes. They are not usually transmitted through ingestion (swallowing); through the lungs (breathing); or by contact with whole, healthy skin. However, under the principle of universal precautions, all blood will be considered infectious, and all skin and mucous membranes will be considered to have possible points of entry for pathogens.

Potential bloodborne pathogen exposures include:

- Contact with contaminated medical equipment or medical waste or sharps
- Medical emergency response operations such as administering first aid or cardiopulmonary resuscitation (CPR)
- Contact with human wastes such as domestic sewage
- Accidental contact with someone's blood from cuts and scratches incurred during field operations such as brush clearing, excavation, or clearance of munitions debris.

Whenever there is a potential for exposure, personnel will wear the proper PPE (including gloves and masks, when appropriate) to prevent exposure to bloodborne pathogens. If exposure to bloodborne pathogens is suspected, the SSHO/UXOSO will be informed and immediate medical attention will be sought.

3.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

Chapter 4.0 of the APP provides details on the project team and responsibilities of the different organizations and staff involved in this project. As field personnel are identified ahead of the field mobilization date, personnel qualifications certification letter will be added to APP **Attachment E5**.

4.0 TRAINING

Personnel who participate in field activities associated with this project are subject to the site-specific training requirements presented in Chapter 6.0 of the APP.

5.0 PERSONAL PROTECTIVE EQUIPMENT

PPE used to protect workers from site-related hazards (explosive ordnance, construction safety and health and contaminant related) will comply with requirements specified in Engineer Manual (EM) 385-1-1, Section 5.

5.1 PPE SUMMARY

Hazard and risk assessment is a continuing process to be conducted through the duration of the project. Changes in specific PPE may be made in accordance with (IAW) information obtained from actual implementation of site activities. As a rule, levels of PPE or the incorporation of respiratory protection will need to be reassessed if any of the following occur:

- Appearance of previously unidentified or anticipated chemicals, conditions, or task hazards
- Change in ambient weather conditions that impact the use of assigned PPE
- Introduction of a new task or expansion in scope of a previously assigned and evaluated task.

If activities are added to the Performance Work Statement after approval of this APP, the SSHO/UXOSO will identify and assess the activity hazards and relay that information to the Corporate Director of Health and Safety (CDHS) and the U.S. Army Corps of Engineers (USACE) Ordnance and Explosives Safety Specialist (OESS). The CDHS will prepare an amendment to the APP and submit the amendment for approval from U.S. Army Engineering and Support Center, Huntsville (CEHNC). The amendment will be added to the APP upon CEHNC approval.

The SSHO/UXOSO will ensure PPE complies with all applicable Occupational Safety and Health Administration (OSHA), USACE, and Army regulations. It is the responsibility of each employee to report to work wearing proper attire and to inspect the necessary PPE.

Personnel will use the appropriate type of PPE specified in this plan for each individual task. The work activities will begin in the following levels of protection.

Task	Initial Level of PPE
<i>Utilities Identification, Locating & Civil Surveys</i>	Level D
<i>Mobilization and Equipment Staging</i>	Level D
<i>Non-Intrusive Vegetation Clearance</i>	Level D
<i>MEC Subsurface Clearance/Excavation</i>	Level D
<i>MPPEH Inspection and Handling</i>	Level D
<i>MEC/MPPEH Disposal</i>	Level D
<i>Heavy Equipment Operations</i>	Level D

5.2 SPECIAL PPE CONSIDERATIONS

The following considerations will be observed in the selection of PPE:

- Hard hats will be required when an overhead hazard exists.
- Steel toe and shank boots are not required during anomaly location and reacquisition unless a serious toe hazard exists, which requires use of a fiber safety toe. Where steel toe boots are not required for an activity, it will be noted in that activity's AHA.
- Safety glasses will be selected that provide site personnel with the best protection from not only physical hazards, such as flying objects, but that also provide adequate splash protection.
- Site tasks should continually be evaluated to identify hazards and PPE will be provided to ensure the safety and health of site personnel, regardless of the activity they perform.

5.3 TASK-SPECIFIC LEVELS OF PPE

A complete description of Level D PPE follows. Table E1-5.1 details the PPE action levels.

Level D. Level D PPE is the initial level of protection for all project areas. Level D PPE is not allowed in areas of the site where airborne hazards are known or expected to exist. Level D should also be worn only if the activity being performed does not have the potential for splash, immersion, or any other contact with hazardous substances. Level D PPE as described below will be worn during the site activities:

- Sleeved shirt and long pants.
- Leather or cut resistant gloves (when handling sharp objects and materials).
- Safety toe boots meeting ASTM Standard F2413 will be worn unless an approved AHA for that specific activity states otherwise. UXO personnel or others whose job tasks require no metal parts in their footwear will wear conductive footwear with protective caps or composite toe footwear.
- Safety glasses with side shields or goggles when an eye hazard exists.
- Hard hat (when working near/adjacent to overhead hazards).
- Hearing protection (when working near/adjacent to powered tools, or generators).
- Chainsaw chaps, hearing protection, hand and foot protection, and face shield (when operating chainsaws).

PPE as follows for dermal protection from poisonous plant species, if necessary:

- Permeable Tyvek® or its equivalent with elastic wrist and ankle cuff
- Latex boot covers (as desired by worker or directed by the UXOSO)
- Nitrile inner gloves (as desired by worker or directed by the UXOSO).

5.4 PPE INSPECTION, CLEANING, MAINTENANCE, AND STORAGE

All PPE will be inspected before being used to ensure that it is in functional order and that its structural integrity has not been compromised. Reusable PPE (such as safety glasses and hard hats) also will be inspected before being used if it has been in storage for any length of time and following any maintenance. Hard hats will be inspected for expiration dates. Site personnel finding a piece of PPE that is defective will report it to the SSHO/UXOSO, and the defective article will be repaired or replaced.

PPE will be maintained IAW the manufacturer's instructions, and only by personnel who have received proper instruction in the maintenance of the PPE. PPE will be stored in a way that does not compromise the natural shape of the equipment.

5.5 RESPIRATORY PROTECTION

Respiratory protection will not be necessary.

5.6 PERSONAL PROTECTIVE EQUIPMENT FOR VISITORS

5.6.1 An adequate supply of hard hats, safety glasses, and other basic PPE will be maintained on site for use by government personnel and other visitors. This does not apply to other government contractors, who must supply all of their own PPE.

Table E1-5.1
PPE Action Levels

Level of Protection	Activity Example	Criteria for Use	Action Taken for Upgrade Criteria
Level D	Site setup, geophysics, nonintrusive anomaly surface sweep, surveying, general construction, vegetation removal, and subsurface anomaly acquisition/removal.	Required for all work and during nonintrusive activities.	STOP WORK and retreat if unanticipated chemical hazards, soil colors, or unusual odors are encountered.

6.0 MEDICAL SURVEILLANCE

Workers exposed to site hazards, including all employees of the contractor, will participate in a program of medical surveillance of the type specified in 29 Code of Federal Regulations 1926.65, the OSHA standard on “Workplace Health and Safety in Hazardous Waste Operations and Emergency Response.” Such workers must present a physician’s statement that they are medically qualified for (1) work in hazardous waste operations and (2) the use of respirators. The SSHO/UXOSO will evaluate all physicians’ letters and refer any questions to the CDHS. Annual or biennial medical certification is required; a physician’s statement must be no older than two years.

The SSHO/UXOSO will note any restrictions stated on a physician’s statement and make arrangements to avoid any prohibited activity or condition. In addition, the SSHO/UXOSO will monitor all employees to detect early signs of exhaustion, heat stress, or other conditions that might suggest a lack of fitness for a particular task.

Medical treatment received related to a workplace injury or illness will be managed IAW the OSHA standard referenced above. The SSHO/UXOSO will notify the CDHS immediately if such an event occurs.

Personnel anticipated to safely execute the project includes contractor employees.

7.0 EXPOSURE AIR MONITORING AND AIR SAMPLING PROGRAM

The scope of work associated with this project does not include air monitoring and air sampling. Previous site investigations and analytical data do not indicate the presence of chemical or MEC constituents presenting a worker exposure concern.

8.0 HEAT STRESS AND COLD STRESS

The potential for heat stress is high due to the physical nature of the work that will be performed during the summer months. Care must be taken to control work schedules and hydration and to observe and respond to symptoms. Heat and cold stress management is addressed in Sections 9.21 and 9.22 of the APP.

9.0 STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

This chapter outlines the general hazards and safe work practices that all site personnel will follow to eliminate or reduce the risk of exposure to anticipated site hazards. These controls are presented as a guide for site personnel and do not cover all compliance issues. The UXOSO will ensure full compliance with applicable regulatory requirements.

9.1 SITE RULES/PROHIBITIONS

General safe work practices for every job site include the following:

- **Using the Buddy System.** Employees will not work alone—every employee is required to work near someone else who could offer assistance or summon help in the event of an accident or illness. At all times, an employee on a field site must be observable by at least one other person or sufficiently close to at least one other person to communicate by voice.
- **Reporting unsafe conditions.** Site personnel will immediately stop unsafe work and report to the SSHO/UXOSO any unsafe acts or conditions, including violations of this document or the APP.
- **Reporting injuries and illnesses.** All injuries or illnesses, including apparently minor ones such as insect bites, will be reported to the SSHO/UXOSO promptly.
- **Reporting pre-existing medical conditions.** Site personnel will inform the SSHO/UXOSO of any known medical conditions that may cause illness in the workplace, aggravate a possible work-related illness, or increase the likelihood of accidents. This includes hypersensitive allergic reactions to stinging and biting insects or to contact with poisonous plants; diabetes; high blood pressure; skin or eye sensitivity to sunlight and ultraviolet radiation; chronic illness; and acute illnesses such as a cold, the flu, or stomach/intestinal disorders. Persons with known hypersensitive allergic reactions to stinging/biting insects or to toxic plants will carry appropriate emergency medical antidotes on their person at all times when on site.
- **Prohibiting horseplay.** Site personnel will not engage in horseplay, running, or other irresponsible behavior or harm people, property, or the environment.
- **Avoiding skin contact with poisonous plants.** Personnel in vegetated or wooded areas will wear long-sleeve shirts with the sleeves rolled down to reduce contact with poisonous plants.
- **Eating, drinking, and smoking restrictions.** Eating, drinking, and smoking will be permitted only in areas designated by the SSHO/UXOSO and at designated break times after employees have washed their hands.
- **Prohibiting ignition sources.** Ignition of flammable materials in any work area is prohibited, unless approved in writing by the SSHO/UXOSO. Matches, lighters, or other sources of sparks will not be allowed in any decontamination area.

- **Limiting personnel exposed to potential risks.** The number of personnel in any work area will be the minimum number necessary to perform work tasks in a safe and efficient manner.
- **Reporting the location of site personnel.** Site personnel will check in with the SSHO/UXOSO before leaving the site and upon returning to the site.
- **Escorting site visitors.** Site visitors are to be escorted by the SSHO/UXOSO, or an appropriate designee, at all times.
- **Qualifying personnel for specific tasks.** Site personnel will perform only those tasks for which they are qualified by training and, when applicable, appropriate certifications. Such certifications will include those required by this document and the APP.
- **Limiting admission to work areas.** No one may enter a site work area without the approval of the SSHO/UXOSO. The SSHO/UXOSO will consider the qualifications of each entrant and the risks present in the areas into which entry is desired.
- **Housekeeping.** All work areas will be maintained in a clean, neat, and orderly fashion, free of loose debris and scrap. Any materials and equipment not being used will be stored or discarded properly. All work areas will be supplied with a trash receptacle that includes a lid. The contents of all trash receptacles either will be removed from the site daily or emptied daily into a larger trash storage container that will be tightly closed each night prior to departure of personnel from the sites.

9.2 CHEMICAL AGENT SAFETY

The CWM probability is listed as “Unlikely.” Given the nature of work at RSA, MEC considerations will be applied to processes and procedures. If MEC is encountered; work will stop and the project team will coordinate on the path forward that may include incorporating MEC planning into the remainder of the work. CA Safety is not applicable. This type of work will not be performed under the current work scope.

9.3 WORK PERMIT REQUIREMENTS

The scope of work for this project does not anticipate work requiring work permits, such as radioactive work, excavation (over 4 feet), hot work, confined space, etc.

9.4 MATERIAL HANDLING PROCEDURES

The scope of work associated with this project does not include the handling of soil in chemical environments.

9.5 DRUM CONTAINER/TANK HANDLING

The scope of work associated with this project does not include the use of drum containers/tanks.

9.6 COMPREHENSIVE ACTIVITY HAZARD ANALYSIS OF TREATMENT TECHNOLOGIES

The scope of work associated with this project does not include the use of treatment technologies.

10.0 SITE CONTROL

Based on the data collected from the RFI, which APTIM prepared, the site was divided into two MRSs: MRS-1 or “RSA-313 South” (“Low” UXO probability area) and MRS-2 or “RSA-313 North” (“Moderate/High” UXO probability area). It is likely that additional munition-related items similar to those found during the intrusive investigation are still present within the subsurface of this area, and each munition must be individually assessed when encountered.

10.1 SITE COMMUNICATIONS

Effective on-site and off-site communication will be established prior to initiation of site activities. On-site communication will be used to coordinate site operations, to maintain site control, to convey safety information, and to alert site personnel to emergency situations. Off-site communication will be available to ensure effective coordination with off-site management personnel, the USACE, and emergency response services.

All site personnel will be familiar with the different methods of both on-site and off-site communication. The methods that will be used for on-site and off-site communication will include the following:

On-site communication will consist of:

- Handheld radios issued to the field team leader, supervisors, and managers
- Cellular telephones
- Air horns, bullhorns, sirens, or hand signals, as needed.

Site personnel will use cellular telephones or other supplied communication systems for off-site communication. The SSHO/UXOSO will verify that the 911 service is available and make appropriate alternative arrangements if it is not available.

11.0 PERSONNEL HYGIENE AND DECONTAMINATION

Sanitary and washing facilities, personnel and Level D decontamination, and waste control plans are discussed below.

11.1 SANITARY FACILITIES

The contractor will ensure toilet facilities are available, with at least one unit for each 15 workers, IAW EM 385-1-1, Section 2.

11.2 WASHING FACILITIES

The contractor will provide hand-washing supplies convenient to the work area, including potable washing water and soap. All hand-washing facilities will be supplied with soap, paper towels, and trash receptacles. All washing facilities or areas will be kept clean and free of trash.

All field personnel will wash their hands and faces before eating and drinking and before leaving the site for the day.

11.3 PERSONNEL DECONTAMINATION

Given the nature of work at RSA, MEC considerations will be applied into processes and procedures. It is likely that additional munition-related items similar to those found during the intrusive investigation are still present within the subsurface of this area, and each munition must be individually assessed when encountered.

11.4 WASTE CONTROL AND DISPOSAL

Solid trash, paper towels, and other items used in the work areas will be classified as solid waste, containerized, and disposed of appropriately.

12.0 EQUIPMENT DECONTAMINATION

See Spill Plans, Section 9.3.2 of the APP.

13.0 EMERGENCY EQUIPMENT AND FIRST AID

The equipment and personnel required for first aid and CPR will comply with the requirements in the APP. Emergency equipment required to be on site will have the capacity to respond to project-specific emergencies. Site emergencies may require (but should not be limited to) PPE and equipment to control fires, leaks and spills, or chemical (contaminant or treatment process) exposure.

The emergency equipment listed in Table E1-13.1 will be on site, stored in the location indicated, and available for use during the operation specified. Emergency equipment assigned to an area or team will be maintained in proper working order by the team, as directed by the team leader. The SSHO/UXOSO will conduct an inspection of all emergency equipment at least weekly to ensure completeness and proper working order.

Table E1-13.1
Emergency Equipment Requirements

Emergency Equipment	No. Per Location	Area Where Item(s) Will Be Stored	Operation Requiring Specified Equipment
<i>Portable Eye Wash Kit*</i>	<i>2 each</i>	<i>Each vehicle</i>	<i>All operations</i>
<i>15-Minute Eye Wash*</i>	<i>1 each</i>	<i>On site</i>	<i>All operations</i>
<i>First Aid Kit</i>	<i>1 each</i>	<i>On site</i>	<i>All operations</i>
<i>Fire Extinguisher</i>	<i>1 each</i>	<i>Support vehicles, and On Site</i>	<i>All operations</i>
<i>Cellular Telephone/ Site Communication</i>	<i>1 each</i>	<i>SSHO/UXOSO</i>	<i>All operations</i>

Notes:

*For use if employees are exposed to corrosives, strong irritants, or toxic chemicals.

The size and number of first-aid kits will be sufficient to accommodate the maximum number of people (including government personnel and visitors) on site at any given time.

When required, portable eyewash bottles will be available for immediate use while the injured person is transported to the area where the 15-minute eye flushing station will be available. After flushing, the eyes will be bandaged lightly, and the person will be transported to the appropriate medical facility for further evaluation and treatment, if needed.

Personnel administering first aid and/or CPR will comply with the following:

- Personnel will wear disposable latex gloves if there is any visible body fluid.
- The CPR pocket mask will be used when performing CPR and disposed of after use.
- Personnel will immediately change clothing that becomes contaminated with body fluids as a result of performing first aid, or as soon as feasible.
- Personnel will wash their hands immediately after performing first-aid procedures.

14.0 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

The frequency and severity of emergency situations can be dramatically reduced through proper implementation of the APP. However, if an emergency does occur, quick, decisive action is required. Delays of just minutes can create or escalate life-threatening situations. In an emergency situation, site personnel involved in emergency response and rescue must be prepared to respond immediately. All required equipment must be on hand, in proper working order, and ready to use. To ensure rapid, effective response to a site emergency, the procedures and contingency plans outlined in this section must be implemented before and during any site activities involving exposure to safety and health hazards.

14.1 PRE-EMERGENCY PLANNING WITH LOCAL EMERGENCY RESPONDERS

Prior to conducting site operations, Subcontractor site representatives will meet with the appropriate local authorities to inform them of the nature of the site activities to be performed under this SSHP, and the potential hazards that the conduct of these activities pose to site personnel, the environment, and the general public. In order to evaluate the effectiveness of hazard control procedures and operational controls, a sequence of initial assessments will be performed.

14.1.1 Identification of Local Emergency Services

The contractor has obtained emergency and non-emergency telephone numbers for emergency services (Emergency Management, Police, or Fire). In the event that evacuation of the general public is required, because of either normal site operations or an emergency event, the safety point of contact, USACE OESS, and SSHO/UXOSO are responsible for contacting the appropriate local officials who execute and coordinate an evacuation.

Anyone calling for emergency medical services on RSA by dialing 911 with a cellular phone must state that he/she is located on RSA in order for the call to be directed to the proper emergency management office. MRS-1 or “RSA-313 South” is classified as a “Low” UXO probability area and MRS-2 or “RSA-313 North” is classified as a “Moderate/High” UXO probability area; in the event a medical or MEC emergency occurs, notify the Garrison Installation Emergency Operations Center (IEOC) at (256) 313-1043 after initial emergency contacts have been completed in order to update IEOC on the situation.

14.2 PERSONNEL AND LINES OF AUTHORITY FOR EMERGENCY SITUATIONS

Key personnel roles, lines of authority, and communications plan are detailed in Chapter 4.0 of the APP. Emergency response roles are discussed below.

14.2.1 Personnel On-Scene Incident Commander

If an emergency arises, the SSHO/UXOSO assumes the responsibility of the site, with the UXO Team Lead as alternate if the SSHO/UXOSO is unavailable or incapacitated. The SSHO/UXOSO has responsibility for directing all on-site and off-site response personnel and, as soon as possible, advises the USACE OESS of the emergency situation. The SSHO/UXOSO has full responsibility and commensurate authority for responding to any emergency that may occur at the work site until the contractor is relieved by the proper authorities.

14.2.2 On-Site Emergency Response Services

Contractor personnel are trained to provide first aid treatment for minor injuries. At least two people on site will be trained in first aid and CPR. The SSHO/UXOSO will determine whether any injury requires treatment in addition to first aid.

14.2.3 Off-Site Emergency Response Services

Off-site emergency response services that may be needed in the event of a site emergency include medical and law enforcement personnel. All requests for emergency services are accessible via the 911 telephone system. For emergencies, state the location as RSA when contacting 911.

14.3 EMERGENCY RECOGNITION AND PREVENTION

During the development of this SSHP, great attention has been given to identifying potential safety and health hazards associated with conducting site activities. Once identified, these hazards were assessed to determine if they could result in an emergency situation. During an emergency, all active areas will be secured and all work will stop. Field crews will return to predesignated rally points for further direction or the best place of refuge or for evacuation instructions. Emergency alerts will be broadcast on mobile and/or hand-portable field radios. The SSHO/UXOSO will inform the Project Manager and HSE Manager of emergencies, security issues, and response actions by telephone as soon as practicable, followed by a written report providing full details. The potential emergencies that may result during site activities are as follow:

- Injury or illness
- Fire/explosion
- Inclement weather.

If additional site or task hazard information becomes available during the project, the CDHS will assess this information to determine whether the contingency plans in this section need to be updated.

14.4 DECONTAMINATION

Emergency decontamination is not applicable to this project.

14.5 EVACUATION ROUTES AND PROCEDURES

Evacuation routes and procedures are discussed below.

14.5.1 Evacuation Route

The established evacuation route will be checked by the SSHO/UXOSO and then reviewed by all site personnel before the start of site activities to become familiar with the route. Emergency meeting points will vary from day to day depending on work location. The planned evacuation route will be discussed with the field crew at the daily tailgate safety briefing.

Emergency evacuation routes will be posted in the field office. All exit routes will be unobstructed and kept free of debris.

14.5.2 Medical Facilities

Huntsville Hospital is the designated Emergency/Trauma Center for the project. Contact information for the hospital and other emergency services has been placed at the front of this SSHP.

14.5.3 Directions to Hospital

To facilitate the quick retrieval of information in the event of an emergency, a summary that includes emergency contact information and a map showing the route from the project site to the hospital has been placed at the front of this SSHP.

14.5.4 Medical Evacuation

Medical evacuation requirements will be determined by the emergency first responder. Personnel requiring additional treatment will be evacuated to the hospital. Any further treatment or evacuation will be arranged by the hospital site personnel, who will receive specialized training that will be given by the SSHO/UXOSO and conducted prior to initiating site activities involving safety and health hazards. Training will be documented using the site training log and will include the subjects listed below:

- Emergency chain of command
- Communication methods and signals
- Emergency equipment and PPE
- Removing injured personnel from the site
- Emergency contacts, telephone numbers, and hospital route.

14.6 EMERGENCY ALERTING AND RESPONSE PROCEDURES

Emergency response procedures include all steps to be taken for notifying, evaluating, reacting to, documenting, and following up on a given emergency situation. To ensure all necessary elements are covered, implement the procedural steps outlined in this paragraph for each emergency, regardless of its nature.

14.6.1 Notification

Once the SSHO/UXOSO has been informed of the emergency, the SSHO/UXOSO will use radio communication to:

- Notify personnel and get their attention
- Stop work activity as required
- Lower noise levels to speed and simplify communication
- Begin emergency or evacuation procedures.

If on-site contractor personnel or off-site emergency personnel are to enter the site in response to the emergency, the SSHO/UXOSO, to the extent possible, will notify response personnel about:

- What happened and when it happened
- Where on the site the emergency situation occurred
- Who is involved and, if possible, the cause of the emergency
- The extent of damage and what hazards may be involved
- What response actions are required.

Attachment E2

AMS Health and Safety Procedures



Form Number: AMS-710-01-FM-01903

Revision: 0

Approval Date: 5/12/2021

MEDICAL FORMS – AUTHORIZATION FOR RELEASE OF PROTECTED MEDICAL INFORMATION

Printed Name: _____ Date of Birth: _____

Address: _____

Home Telephone: _____

Authority to Release Protected Health Information

I hereby authorize the release of medical information, identified in this authorization form, and provide such information to:

AND

APTIM

_____**The information to be released includes the following:**

Complete health record	Discharge summary	Progress notes
History and physical exam	Consultation reports	X-ray films / images
Laboratory test results	X-ray & Image reports	Itemized bill
Diagnosis & treatment codes	Complete billing record	

Other (specify) _____**Purpose of the Requested Disclosure of Protected Health Information****I am authorizing the release of my protected health information.**

Drug and/or Alcohol Abuse, and/or Psychiatric, and/or Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) Records Release

I understand if my medical or billing record contains information in reference to, psychiatric care, sexually transmitted disease, hepatitis B or C testing, previous drug and/or alcohol abuse and/or other sensitive information, I agree to its release.

Check One: ☐ Yes ☐ No

I understand if my medical or billing record contains information in reference to HIV/AIDS testing and/or treatment I agree to its release.

Check One: ☐ Yes ☐ No**Right to Revoke Authorization**Except to the extent that action has already been taken in reliance on this authorization, the authorization may be revoked at any time by submitting a written notice to **The Corporate Claims Dept. at 4171 Essen Lane, Baton Rouge, LA 70809**. Unless revoked, this authorization will expire at which time completion of treatment for the injury or illness has been accomplished.**Re-disclosure**

I understand the information disclosed by this authorization may be subject to re-disclosure by the recipient and no longer be protected by the Health Insurance Portability and Accountability Act of 1996.

Signature of Patient or Personal Representative Who May Request DisclosureI understand that I do not have to sign this authorization. However, if health care services are being provided to me for the purpose of providing information to a third-party (e.g., fitness-for-work test), I understand that services may be denied if I do not authorize the release of information related to such health care services to the third-party. I can inspect or copy the protected health information to be used or disclosed. **I hereby release and discharge APTIM of any liability and the undersigned will hold APTIM harmless for complying with this Authorization.**

Signature: _____ Date: _____

Description of relationship if not patient: _____

Parent Document: AMS-710-01-PR-01900 Care of Injured and Ill Employees

Page 1 of 1

PRINTED BLANK FORM IS AN UNCONTROLLED COPY, FORM WITH DATA ENTERED IS CONTROLLED
IN ACCORDANCE WITH PROJECT/SITE DOCUMENT MANAGEMENT REQUIREMENTS



APTIM COVID-19 WORKPLACE PLAYBOOK FOR [WORKSITE]

Please read AMS-710-01-PR-04001- APTIM COVID-19 Control Plan, for safety precautions applicable to all APTIM work locations. This Playbook is an addendum to the CCP and contains site-specific requirements based on community status, local guidance, and customer directives.

Vaccination:

We encourage employees who are eligible to receive the vaccine to get vaccinated if medically able to do so. Please see CDC vaccination resources: COVID-19 Vaccines and FAQs about COVID-19 Vaccination for additional information.

This site requires or does not require vaccination? (Please complete if needed to meet site-specific guidance)

Screening Requirements: If needed

1. Stay home, if feeling symptoms of ANY illness and communicate with your supervisors.
2. Entry to work area:
 - Temperature should be checked at home before entering the office
 - When possible, keep a minimum of 6ft. distance from others.
 - Contact tracing is based on who you had "close contact" with. Limiting close contact will reduce those quarantined in a suspected or confirmed COVID case.
3. Be for one another by speaking straight when guidelines designed to protect us all are not being adhered to. This includes visitors.

Precautions Specific to [location Name]: (complete as applicable to your facility)

4. Social Distancing Protocols: [insert per location requirements]
 - a. Please ask for permission prior to entering another's workspace.
5. Mask Requirements: see [COVID-19 by County | CDC](#) to check community levels and use the appropriate requirement.
 - a. If our COVID-19 Community Level¹ is high:
 - Wear a mask when not in your office, cubicle, or eating/drinking. (Required)
 - If you forget or need a mask, please contact (Name) who can supply masks when asked.
6. Sanitation Protocols:
 - a. Offices are professionally cleaned on a routine schedule kept by Facilities
 - b. Employees are asked to wipe down counters after eating in the breakrooms

¹ Note: This policy refers to Community Level and not to Community Transmission Level. County Link. [COVID-19 by County | CDC](#)

**APTIM COVID-19 WORKPLACE PLAYBOOK FOR [WORKSITE]**

- c. [Insert any other information about the availability of wipes and expectations for cleaning copiers, phones, etc.]

More information can be found on the AptNet Resource Page.

Office Director	XXXX
HSE Representative	XXXXXX
HR Representative	XXXX

*Upon completion, please post in your work location in communal areas

PROCEDURE

Procedure Number:

AMS-710-01-PR-00300

Revision:

2

Procedure Owner:

HSE

Issuing Authority:

HSE Education & Training Manager

Approval Date:

12/20/2022



BLOODBORNE PATHOGENS

2	Added Exceptions and Recordkeeping sections, Moved Record Retention section under 7.0 Recordkeeping. Updated medical records to include date of birth, updated recordkeeping language and moved to new section.	M. Dotson	12/20/2022
1	Transferred information to new APTIM procedure template, added the Hepatitis B Vaccination Declination Form as a reference and corrected incorrect reference in text.	M. Karr	3/16/2020
0	Added 4.3.4.5 "Hand-washing Facilities"	M. Hetzler	2/1/2018
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

BLOODBORNE PATHOGENS

1.0 PURPOSE

The purpose of this Procedure is to establish the minimum requirements for the control of Bloodborne Pathogens on APTIM sites.

2.0 SCOPE

This procedure applies to all APTIM employees, contractors, subcontractors and visitors associated with APTIM site.

2.1 Exceptions

Deviations from this procedure must follow AMS-710-05-PR-01300 HSE Request for Variances.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Managers
- Supervisors
- Employees
- Contractors
- Subcontractors
- Visitors

4.0 PROCEDURE

APTIM sites shall use this procedure as the minimum requirements for their site specific Bloodborne Pathogens Standard.

4.1 Program Development

The Bloodborne Pathogens Program Coordinator/Site HSE Manager shall ensure that the exposure determination is conducted during the mobilization stages of the project and that the Exposure Control Plan (ECP) is completed.

4.2 Exposure Determination

Exposure Determination includes:

- Attachment 8.1 - List I - list of job classifications in which all employees have occupational exposure.
- Attachment 8.2 - List II - list of job classifications in which some employees have occupational exposure.

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- Attachment 8.3 - List III - list all tasks and Practices in which occupational exposure occurs and that are performed by employees in job classifications included in the lists above.

4.3 Exposure Control Plan

- 4.3.1 The Site HSE Manager completes the APTIM ECP.
- 4.3.2 The ECP is a template which includes the information as listed in 4.3.4, 4.3.5, 4.3.6, and 4.4. This Plan provides the overall requirements for compliance with this Practice, and instructs each project to include site specific information for disposal of contaminated waste, care of Personal Protection Equipment (PPE), laundering materials, personal hygiene, decontamination etc.
- 4.3.3 The Site HSE Manager implements the elements of the APTIM ECP and uses the template to develop the specific procedures and practices.
- 4.3.4 The ECP shall address the following Methods of Compliance at a minimum:
 - 4.3.4.1 Engineering and Work Practice Controls
 - 4.3.4.2 Universal Precautions
 - 4.3.4.3 Personal Protective Equipment (PPE)
 - 4.3.4.4 Housekeeping:
 - Decontamination
 - Handling of Regulated Waste
 - Laundry
 - 4.3.4.5 Hand-washing Facilities - If provision of handwashing facilities are not feasible, then an appropriate antiseptic hand cleanser in conjunction with cloth/paper towels or antiseptic towelettes must be provided.
- 4.3.5 The ECP shall address the following Medical Management at a minimum:
 - 4.3.5.1 Hepatitis B Vaccination
 - 4.3.5.2 Post-Exposure Evaluation and Follow-up
- 4.3.6 The ECP shall address the following training elements at a minimum:
 - 4.3.6.1 Bloodborne Pathogen Training for employees included in the plan
 - 4.3.6.2 Awareness training for all employees

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- 4.3.6.3 Employees covered under this plan due to reasonably anticipated exposure shall be provided training that includes at least:
- A copy of APTIM's reference standard and any additional country or regional specific standards.
 - A general explanation of epidemiology and symptoms of bloodborne diseases
 - An explanation of modes of transmission
 - An explanation of the ECP
 - Appropriate methods of identifying tasks that may involve exposure
 - An explanation of use and limitations of methods to prevent or reduce exposure
 - PPE information
 - Selection basis for PPE
 - Hepatitis B vaccination information
 - Actions and notification in emergency situation
 - Practices to follow in event of exposure
 - Post-exposure evaluation and follow-up
 - Signs and labels or color-coding system
 - Opportunity for interactive questions and answers
- 4.3.6.4 Training shall be done at the time of initial assignment and at least annually thereafter, within one year of their previous training.
- 4.3.6.5 Employees who are not expected to contact blood or Other Potentially Infectious Materials (OPIM) shall be informed of the existence of the ECP and the responsible individuals on site.
- 4.3.7 The ECP shall address the communication of hazards to employees, recordkeeping and the procedure for the evaluation of circumstances surrounding exposure incidents.
- 4.3.8 The ECP shall be accessible to employees so they can have the opportunity to examine and copy the plan.
- 4.3.9 The ECP shall be reviewed and updated at least annually and whenever necessary to reflect new or modified task and procedures which affect occupational exposure and to reflect new or revised employee positions with occupational exposure. The revisions to the ECP will also reflect changes in technology that eliminate or reduce exposure to bloodborne pathogens.
- 4.3.10 The Site HSE Manager will solicit input from non-managerial employees responsible for direct patient care who are potentially exposed to injuries from contaminated

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sharps in the identification, evaluation, and selection of effective engineering and work practice controls and shall document the solicitation in the ECP, as applicable.

4.4 Medical Management

4.4.1 Hepatitis B Vaccination Series

4.4.1.1 All employees who, due to the nature of their assignment are at risk of occupational exposure (those are the employees included in List I and List II above) shall be offered the Hepatitis B vaccination series. The offer shall be made following training and within 10 days of initial assignment. The employee need not accept the offer of the vaccination; however, the declining employee must complete the Hepatitis B Vaccination Declination Form AMS-710-01-FM-00302 prior to performing any assigned duties.

4.4.1.2 If an employee initially declines HBV vaccination but at a later date, while still covered under the program decides to accept the HBV vaccine, APTIM will provide the vaccine at that time. Should a booster dose be recommended at a future date, such booster dose(s) shall be provided.

4.4.2 Post-Exposure Evaluation and Follow-Up

4.4.2.1 Following an exposure incident, APTIM will make available to each potentially exposed employee, a confidential medical evaluation and follow-up. This follow-up will include documentation of the route(s) of exposure and the circumstances under which the exposure incident occurred, identification and documentation of the source individual (unless the identification cannot be established or it is prohibited by a local law), appropriate testing, prophylaxis for Hepatitis B virus, illness reporting, evaluation of reported illnesses, and counselling following a report of an occupational exposure incident to blood or other potentially infectious materials.

4.4.2.2 Employees covered in the ECP (those included in List I and List II) who are exposed to blood or other potentially infectious materials shall be offered the post exposure evaluation and follow-up within 24 hours of the exposure.

4.4.2.3 If an employee, who was not included in the program, has an occupational exposure through a "Good Samaritan" act, the employee will be offered the post-exposure evaluation and follow-up in addition to the Hepatitis B vaccination at no charge and at a reasonable time and place (within 24 hours of the exposure).

4.4.2.4 The site HSE Manager shall ensure that the healthcare professional evaluating an employee after an exposure incident is provided the following information:

- A copy of any applicable regulation;
- A description of the exposed employee's duties as they relate to the exposure incident;

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- Documentation of the route(s) of exposure and circumstances under which exposure occurred;
- Results of the source individual's blood testing, if available; and
- All medical records relevant to the appropriate treatment of the employee including vaccination status.

4.5 Regulated Waste Handling and Disposal

Each site shall make arrangements for the proper disposal of medical wastes (i.e., bandages, gauze, sharps, etc.) in accordance with AMS-710-04-PR-04123 Medical Waste Management.

5.0 TERMINOLOGY

Term	Definition
Bloodborne Pathogens	Pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).
Engineering Controls	Controls (e.g., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) that isolate or remove the bloodborne pathogens hazard from the workplace.
Other Potentially Infectious Materials (OPIM)	(1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV
Regulated Wastes	Liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.
Site	Any location, facility or project where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities and/or project sites.

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Universal Precautions	An approach to infection control. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens.
Work Practice Controls	Controls that reduce the likelihood of exposure by altering the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-01-FM-00301	Bloodborne Pathogens Plan Template
AMS-710-01-FM-00302	Hepatitis B Vaccination Declination

6.2 Other Internal References

AMS-710-04-PR-04123	Medical Waste Management

6.3 Other External References

None

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
Medical Records	Length of employment plus 30 years.	Employee HR file
Training Records	7 years	AMS Learning Management System
Sharps Injury Log	1 year	Project site

7.1 Record Retention

The following records shall be maintained in each respective employee's medical file for the duration of his/her employment plus thirty (30) years.

7.1.1 Medical Records. The medical records shall include:

- Name, date of birth, and social security number, as applicable, of the employee;

BLOODBORNE PATHOGENS

- A copy of the employee's hepatitis B vaccination status including dates of all the hepatitis B vaccinations and any medical records relative to the employee's ability to receive vaccination;
- A copy of all results of examinations, medical testing, and follow up procedures;
- Healthcare written opinion; and
- A copy of the information provided to the healthcare professional.

7.1.2 Training. Training records shall include the following:

- Dates of training sessions;
- Contents or a summary of the training sessions;
- Names and qualifications of persons conducting the training; and
- Names and job titles of all persons attending the training session.

7.1.3 Sharps Injury Log. The Sharp Injury Log shall contain:

- Type and brand of device involved in the incident;
- Department or work area where the exposure incident occurred; and
- Explanation of how the incident occurred.
- Data will be entered into APTIM's HSE Data Management System for use as the Sharps Injury Log.

8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	List I – Job Classifications with Regular Exposure
Attachment 8.2	List II – Job Classifications with Some Exposure
Attachment 8.3	List III – Tasks and Practices With Exposure



Procedure Number: AMS-710-01-PR-00300

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BLOODBORNE PATHOGENS

ATTACHMENT 8.1 LIST I – JOB CLASSIFICATIONS WITH REGULAR EXPOSURE



Procedure Number: AMS-710-01-PR-00300

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BLOODBORNE PATHOGENS

List I – Job Classifications with Regular Exposure

JOB CLASSIFICATION	REGULAR EXPOSURE	SOME EXPOSURE	NO EXPOSURE
Staff Physician	X		
Registered Nurse	X		
Licensed Practical Nurse	X		
Emergency Medical Technician	X		



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BLOODBORNE PATHOGENS

ATTACHMENT 8.2 LIST II JOB CLASSIFICATIONS WITH SOME EXPOSURE

**BLOODBORNE PATHOGENS****List II Job Classifications with Some Exposure**

JOB CLASSIFICATION	REGULAR EXPOSURE	SOME EXPOSURE	NO EXPOSURE
First Aid/CPR Certified Personnel		X	
Safety Representative		X	
Security Representative		X	
Custodian		X	
Non-Designated EMT and First Aid/CPR Certified Personnel (Good Samaritans)			X
All Other APTIM Personnel (Good Samaritans)			X



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BLOODBORNE PATHOGENS

ATTACHMENT 8.3 LIST III TASKS AND PRACTICES WITH EXPOSURE

BLOODBORNE PATHOGENS

List III Tasks and Practices with Exposure

TASKS AND PROCEDURES
Bleeding Control With Spurting Blood
Bleeding Control With Minimal Bleeding
Emergency Childbirth
Blood Drawing (Phlebotomy, Needle sticks, Etc.)
Starting An Intravenous (IV) Line
Endotracheal Intubation, Esophageal Obturator Use
Oral/Nasal Suctioning, Manually Cleaning Airway
Handling And Cleaning Instruments With Microbial Contamination
Giving Injections
Rendering First Aid
Rendering Cardiopulmonary Resuscitation (CPR)
Decontamination Following Accidents/Injuries
Vehicle/Equipment Accidents Where There Is Presence Of Blood
Rescue Of Bleeding Employee
Medical Procedures With Blood (Suturing And Suture Removal)
Handling Of Regulated Waste Containers
Laboratory Blood Processing
Wound Care
Epistaxis (Nosebleed) Control
Handling Of Contaminated Waste
Handling Of Contaminated Personal Protective Clothing & Equipment
Handling Of Contaminated Laundry And Personal Clothing
Housekeeping/Custodial Duties Where There Is Presence Of Blood

PROCEDURE

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AMS-710-01-PR-00400

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HSE Education & Training Manager

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10/18/2022



HAZARD COMMUNICATION

1	Added AMS-710-01-FM-00408 as an attachment. Updated MSDS to SDS, content updates to meet client requirements in ISNet World.	M. Dotson	10/18/2022
0	Changed all references of "Material Safety Data Sheet" to "Safety Data Sheet"	M. Hetzler	12/20/2017
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

HAZARD COMMUNICATION

1.0 PURPOSE

To establish the minimum requirements for the use of Hazard Communication on APTIM sites.

2.0 SCOPE

This procedure, along with any associated guidance identified applies to and shall be followed by all subsidiaries and affiliates of APTIM at all worksites and locations, foreign and domestic, for the public (government) and private (commercial) contracts.

2.1 Exceptions

No Exceptions.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Managers
- Supervisors
- Employees
- Contractors
- Subcontractors
- Visitors

4.0 PROCEDURE

APTIM sites shall make every attempt to prevent the possibility of incidents and injury to employees due to hazardous chemical and materials in the work environment when performing work activities through compliance with safety regulations, training of employees to properly perform their job activities and through employee involvement in safe work behaviors.

4.1 Project Hazard Communication Plan

- 4.1.1 Each project site develops and implements a site-specific Hazard Communication Plan tailored to the workplace.
- 4.1.2 Project Hazard Communication Plan templates are found in AMS-710-01-FM-00403 Hazard Communication Written Program – Projects and AMS-710-01-FM-00404, Hazard Communication Written Program – Fixed Facilities, respectively.

4.2 The plan describes how projects:

- 4.2.1 Maintain labels and other forms of warnings on hazardous chemicals in the workplace.

HAZARD COMMUNICATION

4.2.2 Obtain Safety Data Sheets (SDS's) train employees on the information and how to access, communicate information, and how the SDS file will be maintained.

4.2.3 Provide information and training to employees concerning the Hazard Communication Program and the chemical hazards in their workplace.

4.2.4 Communicate information and training for non-English speaking employees, if the location Site Manager or HSE Manager deems it necessary then a Hazardous Communication program shall be created for the non-English speaking employees.

4.3 The plan shall also contain:

4.3.1 A chemical inventory/list of all the hazardous chemicals known to be present in the workplace using an identity that is referenced on the appropriate SDS. (AMS-710-01-FM-00401, Chemical Inventory Report)

4.3.2 Methods used to inform employees of the hazards of non-routine tasks and the hazards associated with chemicals contained in unlabeled pipes and vessels in their work areas.

4.3.3 Detailed methods for making information available to other employers and their employees on multi-employer work sites, including:

4.3.3.1 Methods used to make sure SDS's are either stored in a central location or copied and provided to other employers:

- How do we inform the other employers of any precautionary measures that need to be taken to protect employees during the workplace's normal operating condition and in foreseeable emergencies?
- How do we inform the other employers of the labeling system used in the workplace?

4.3.4 Every three (3) years a general review of hazardous chemicals or substances used at the facility must be made to determine if less hazardous chemicals or substances can be substituted for those in use.

4.4 General Requirements

4.4.1 In areas where employees are handling or exposed to hazardous or corrosive chemicals, there shall be immediate access to a safety shower / eye wash station. In remote areas, portable safety showers / eye wash stations may be required.

4.4.2 The disposal of any Hazardous Waste must be coordinated with the appropriate Environmental Manager.

4.4.3 Materials Exempt from Hazard Communication Program

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4.4.3.1 There are some types of chemicals that are specifically exempt from this procedure. These materials include:

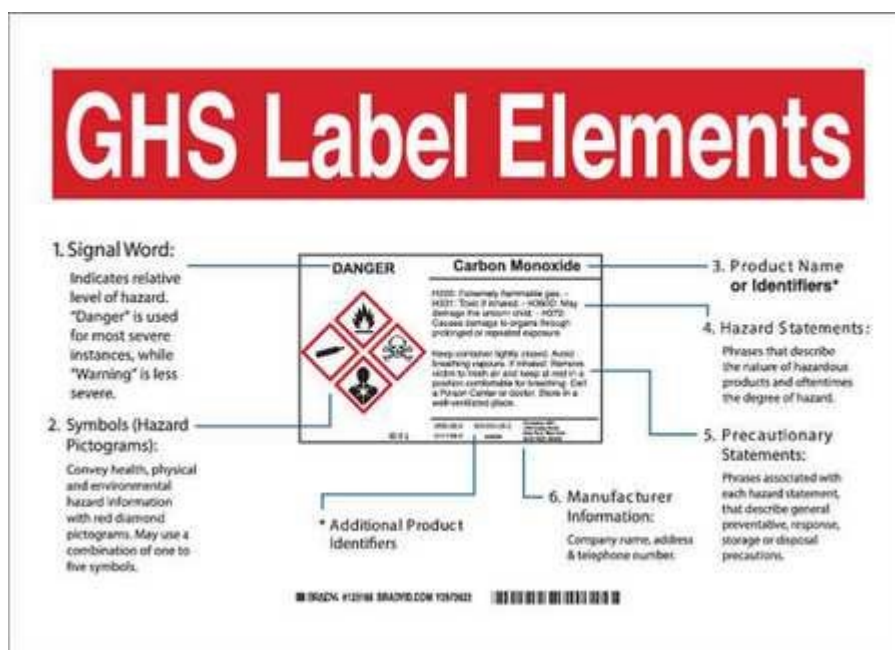
- Any hazardous waste as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1967, as amended (42 U.S. Code 6901 et seq.), when subject to regulations issued under that Act by the U.S. Environmental Protection Agency.
- Any hazardous chemical as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) when the hazardous chemical is the focus of remedial or removal actions being conducted under CERCLA in accordance with U.S. Environmental Protection Agency regulations.
- Tobacco or tobacco products.
- Wood or wood products, including lumber, which will not be processed, where the manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility. Wood or wood products that have been treated with a hazardous chemical are covered by this procedure, and wood which may be subsequently sawed or cut, generating dust.
- Articles.
- Food or alcoholic beverages which are sold, used, or prepared in a retail establishment, or foods intended for personal consumption by employees while in the workplace.
- Any drug, as defined by the Federal Food, Drug, and Cosmetic Act, when it is in solid, final form for direct administration to patient; drugs which are packaged by the manufacturer for sale to consumers in a retail establishment; and drugs intended for personal consumption by employees while in the workplace.
- Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace.
- Any consumer product or hazardous chemical, as defined by Consumer Product Safety Act and Federal Hazardous Chemicals Act, where the employer can show that it is used in the workplace for the purpose intended by the manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended.
- Nuisance particulates where the manufacturer, distributor, or importer can establish that they do not pose any physical or health hazard covered under this procedure.
- Ionizing and nonionizing radiation.
- Biological hazards.

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4.5 Labeling

4.5.1 Containers of hazardous chemicals in the workplace shall be labeled, tagged, or marked with the following information:

4.5.1.1 APTIM has adopted the OSHA HazCom 2012 labeling for identification of hazardous materials. Containers of materials with hazardous components are to be labeled using HazCom 2012 labels identifying those hazardous components and any applicable warnings.



The identity of the hazardous chemicals contained therein; and,

4.5.1.2 The appropriate hazard warnings.

4.5.2 The manufacturer's labels and warning symbols shall not be removed or defaced unless a new label with the appropriate information is immediately affixed to the container (AMS-710-01-FM-00405 Hazardous Substance Emergency Information and AMS-710-01-FM-00406 Hazardous Substance Emergency Information—Spanish).

4.5.3 All containers being shipped from one location to another must meet the Department of Transportation (DOT) requirements. The person initiating the shipment of hazardous chemicals or substances must:

4.5.3.1 Prepare a "Request for Shipping" form

4.5.3.2 Ensure shipping containers are in good condition

4.5.3.3 Attach the proper SDS to each container

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- 4.5.3.4 Provide additional SDS's for the truck driver and the shipping records
- 4.5.4 Hazardous materials received at the site without proper labels shall be set aside and not distributed for use until properly labeled.
- 4.5.5 Labels shall be prominently located on the container in its upright position when the container is in its usual position for use, so as to be legible
- 4.5.6 Labels on containers exposed to the weather shall be such that the reading material is clear and conspicuous at all times and shall not be defaced or obliterated by rain, snow, or other adverse elements of the weather.
- 4.5.7 If a labeled container is covered by a secondary container or a covering that remains in place while the contents of the container are withdrawn or used, the required labels shall also appear on the secondary container or covering.
- 4.5.8 Containers of mixtures shall be labeled with the chemical name listed on the SDS for each toxic or hazardous substance in the mixture. It is recommended that containers of mixtures also be labeled with the common name of the mixture.
- 4.5.9 All portable containers into which hazardous chemicals are transferred and which are intended only for the immediate use of the employee who performs the transfer should also be identified as to their contents. (Examples: acetone, gasoline, etc.)
- 4.5.10 Unlabeled containers found in the workplace shall be tested and labeled accordingly or disposed of properly.
- 4.5.11 Labels shall be legible, in English. However, for non-English speaking employees, information shall be presented in their language as well.
- 4.5.12 Secondary containers (those filled from a large container and taken to a work area or job site) must have an extra copy of the manufacturer's label or a generic label that lists the contents and appropriate hazard warnings. This is the responsibility of the person filling the secondary container
- 4.5.13 The person receiving the shipment is responsible to ensure that each container of hazardous chemical(s) has been provided with this labeling information. Hazardous chemicals that do not contain adequate labeling will not be accepted by the receiving person. If hazardous chemicals that do not contain adequate labeling are inadvertently received, they are not to be handled until the identity of the material and appropriate hazard warnings are provided. If the hazardous chemical is regulated by a chemical-specific health standard, then it must be labeled in accordance with the requirements of that standard.
- 4.5.14 If the hazardous chemicals are kept in their original, properly labeled container and their composition is not altered, there is no need for additional labeling. If the chemical is transferred from a labeled container to an unlabeled portable container, the user must label this secondary container unless the container is intended for immediate use

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of the employee who performs the transfer. In this case, the container must be labeled with the identity of the chemical and the appropriate hazard warnings, as described above.

4.6 SDS (Safety Data Sheet) File

- 4.6.1 An SDS shall be requested from the manufacturer or distributor prior to ordering a chemical product. The purchasing agent (or individual responsible for ordering a material) shall forward a copy of the SDS to the Location HSE Manager (if there is no Location HSE Manager on site, the SDS shall be forwarded to the Area HSE Manager for review). The purchasing agent (or receiving department) shall also maintain a copy of the SDS in a binder or file of SDS's being reviewed.
- 4.6.2 The Location HSE Manager (or HSE representative if project scope does not require an HSE Manager) shall review the SDS prior to the material being ordered.
- 4.6.3 If the Location HSE Manager provides approval for the material, then the material shall be ordered. The Location HSE Manager will supply the SDS product evaluation form AMS-710-01-FM-00402 SDS/Product Evaluation to the purchasing agent stating that the material has been approved and the Location HSE Manager shall place the SDS in a file or binder of approved SDS's.
- 4.6.4 If, based on the information in the SDS, the Location HSE Manager feels the product should not be used on the site, Site Management shall be advised to find an alternative material. If an alternative material is selected, then the rejected SDS shall be placed in a file or binder for rejected SDS's. If no suitable alternative is available, then the Location HSE Manager shall provide conditional approval for the material with the understanding that the material will require special training, engineering controls, protective equipment, etc. as appropriate.
- 4.6.5 A request for an SDS shall also appear on the purchase order for any hazardous chemicals other than those excluded by Title 29 CFR Part 1926.59 (b)(6) (i-xii).
- 4.6.6 When a material arrives on site, the SDS shall be reviewed to ensure that it is the most recent issue. The SDS shall be marked with the date that the material was received. A copy of the SDS shall be maintained in the Location HSE Manager's master SDS file.
- 4.6.7 Chemical products ordered/received shall be accompanied by and SDS and Purchasing shall ensure all products/chemicals that are received shall include SDS when they take delivery or order products/chemicals.
- 4.6.8 SDS's shall be reviewed to ensure that they contain the required information:
 - 4.6.8.1 The identity used on the label, except as provided for in trade secret exemptions; and,

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- 4.6.8.2 The chemical and common name of the hazardous components which comprise 1% or greater of the composition except that chemicals identified as carcinogens shall be listed if the concentrations are 0.1% or greater.
- 4.6.8.3 Chemical and common names of ingredients which have been determined to be health hazards and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredients may be released from the mixture in concentrations which would exceed OSHA PEL's or ACGIH TLV's or could present a health hazard to employees.
- 4.6.8.4 The chemical and common names of ingredients which have been determined to present a physical hazard when present in the mixture.
- 4.6.8.5 Physical and chemical characteristics of the hazardous chemical.
- 4.6.8.6 Physical hazards of the hazardous chemical.
- 4.6.8.7 The health hazards of the hazardous chemical.
- 4.6.8.8 The primary routes of entry.
- 4.6.8.9 The OSHA PEL and/or the most current ACGIH TLV and any other exposure limits established.
- 4.6.8.10 Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs or by OSHA.
- 4.6.8.11 Any generally applicable precautions for safe handling and use.
- 4.6.8.12 Any generally applicable control measures.
- 4.6.8.13 Emergency and first aid procedures.
- 4.6.8.14 Date of preparation of the SDS or when it was changed.
- 4.6.8.15 The name, address, and telephone number of the chemical manufacturer, importer, employer, or other responsible party preparing or distributing the SDS, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
- 4.6.8.16 If the material is no longer being used on the site, the SDS shall be marked with the date the material was removed from service and filed or bound with other "SDS's for materials no longer in use". These SDS's are viewed as a type of exposure records and shall be maintained for 30 years following completion of a project.
- 4.6.8.17 SDS quality review: If an SDS is illegible or has pages or portions of pages missing, the SDS shall be replaced.

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4.6.8.18 Definitions for terms used in SDS are contained in Attachment 8.1 Definitions and Glossary of Terms for Safety Data Sheets.

4.6.8.19 Materials shall not be used at the site unless an SDS is available on site and has been included in the chemical inventory.

4.6.8.20 Employees may request a personal copy of an SDS through the local Site HSE Manager (AMS-710-01-FM-00407).

4.7 Trade Secret

Manufacturers can withhold some information concerning the identity of chemicals on the SDS if that information is classified as a Trade Secret. However, medical personnel and health care professionals have steps by which they may request the information for emergency or evaluation purposes. If assistance is required due to the trade secret provision being used on an SDS, contact Corporate HSE.

4.8 Training

Employees shall be provided training on hazardous chemicals in their work area at the time of their initial assignment and whenever a new hazard is introduced into their work area. This shall include all new employees, employees transferred to new areas, and employees assigned non-routine tasks. In addition, each supervisor must review any significant incidents involving hazardous substances in safety meetings.

Employees shall be informed of:

- The requirements of the Hazard Communication standard
- Any operation in their work area where hazardous chemicals are present; and
- The location and availability of the written Hazard Communication Program, including the required list of hazardous chemicals and SDS's.

4.8.1 Supervision shall continue on-the-job instruction to employees on Hazard Communication as necessary to ensure proper compliance with these procedures.

4.8.2 Employee training shall include at least:

4.8.2.1 Methods and observations that may be used to detect the presence or release of a hazardous chemical in the workplace (this may include the use of monitoring devices, visual appearance, or odor, etc.);

4.8.2.2 The physical and health hazards of the chemicals in the work area;

4.8.2.3 The measures employees can take to protect themselves from these hazards including specific procedures implemented to protect employees from exposure to hazardous chemicals,

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- 4.8.2.4 Specific details from the site's written Hazard Communication plan, including labeling information, SDS's, and how to use the appropriate hazard information; and
- 4.8.2.5 Safe work practices, emergency responses and the use of personal protective equipment.
- 4.8.2.6 When new information about the hazards of a chemical is discovered.
- 4.8.2.7 Whenever a new physical or health hazard that the employees have not previously been informed of is introduced into the workplace.
- 4.8.3 Training shall be documented.
- 4.8.4 A written examination following the training shall serve as documentation that the employee understood the information provided during the training session.
- 4.8.5 Visitors shall be provided the following information:
- Hazardous chemicals to which they may be exposed
 - Precautions the employees may take to lessen the possibility of exposure
 - Location of SDS
 - An explanation of the labelling system used at the facility / site

4.9 Subcontractor

- 4.9.1 All Sub-contractors using products requiring an SDS, are required to provide the SDS to the APTIM Site Management within one (1) week prior to their arrival. In an emergency, the SDS will be provided to APTIM Site Management before any work begins.
- 4.9.2 The APTIM Site Management will provide the sub-contractors with the SDS's for the company's products or materials in the vicinity where the Sub-contractors will be performing their work functions.
- 4.9.3 It will be the Sub-contractor's responsibility to ensure that their employees are aware of the hazards associated with the materials in the area.
- 4.9.4 All Sub-contractors will be required to abide by all EPA, OSHA, state and local labor and environmental regulations, in addition to the policies of APTIM whichever is more stringent.
- 4.9.5 In no event will a Sub-contractor jeopardize their employees or the employees of APTIM by utilizing hazardous materials or work operations that are not safely handled or administered.

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4.10 Non-Routine Tasks

- 4.10.1 Prior to performance of non-routine tasks, a hazard assessment shall be conducted. Management personnel are responsible for contacting the Site HSE Manager before any non-routine task is undertaken in their respective work area or anywhere else that employees have the potential for exposure to a hazardous material. This is necessary to evaluate and communicate hazards to the affected employees.
- 4.10.2 Non-routine tasks will vary from site to site; therefore, the details of the hazard assessment to be conducted shall be specified in the site-specific written program. The written program shall also indicate the method of transmitting the information concerning the hazards to the employees, vendors, subcontractors, and client personnel affected.

4.11 Coordination with Other Contractors

- 4.11.1 Arrangements shall be established with contractors on multi-employer sites for the transfer of information concerning chemicals. The details of this arrangement shall be specified in the site-specific written Hazard Communication program.
- 4.11.2 During Construction Management, subcontractors will be required to prepare and implement their own Hazard Communication Program that meets the requirements of Title 29 CFR (Code of Federal Regulation) Part 1926.59. In addition, a copy of each contractor's chemical inventory and the SDS for each material or chemical on the inventory shall be submitted to the managing contractors HSE Office. This will provide a centralized location from which an SDS may be obtained. Subcontractors shall maintain their own SDS files as required by Title 29 CFR (Code of Federal Regulation) Part 1926.59

4.12 Auditing

- 4.12.1 To ensure compliance with the Hazard Communication Procedure the following is conducted;
- Daily observations by Supervision to ensure adherence to requirements
 - Annual audits conducted by the HSE Manager. A copy of these audits will be sent to HSE Management. If necessary, corrective action will be implemented.
- 4.12.2 A review of this procedure is conducted and documented by HSE management every three years or when new regulations are issued.

5.0 TERMINOLOGY

Term	Definition
ACGIH – American Conference of Governmental Industrial Hygienists	An organization devoted to the administrative and technical aspects of occupational and environmental health. Each year, ACGIH publishes the Threshold Limit Values for Chemical

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	Substances and Physical Agents and Biological Exposure Indices.
Carcinogen	A substance or agent producing or inciting cancer. These substances are listed by the National Toxicology Program (NTP) in its Annual Report on Carcinogens, the International Agency for Research on Cancer (IARC) in its Monographs, and by the Occupational Safety and Health Administration in 29 CFR Part 1926 Subpart Z, Toxic and Hazardous Substances.
Chemical	Any element, chemical compound or mixture of elements and/or compounds. Examples: cleaning compounds, lubricants, paints, fuels, welding rods, and base metals.
Consumer Products	Any product or hazardous substance meeting the definition of the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 11261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended.
Hazardous Chemical	Any chemical that is a physical hazard or a health hazard.
OSHA – Occupational Safety and Health Administration	A division within the Department of Labor charged with implementing the provisions of The Occupational Safety and Health Act of 1970.
PEL – Permissible Exposure Limit	Limit established by the Occupational Safety and Health Administration (OSHA) concerning the airborne concentration of a contaminant to which an employee may be exposed legally during the work shift or some portion of that shift.
SDS – Safety Data Sheet	A document required by the Hazard Communication Standard by which information concerning the hazards of materials and chemicals is supplied to employees who may encounter those materials. The content of the SDS is specified in section (g) (2) of Title 29 CFR Part 1926.59.
Site	Any location, facility or project where APTIM is performing work. May include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities and/or project sites.
TLV – Threshold Limit Values	Refer to airborne concentrations of substances, and it is believed represent conditions under which workers may be repeatedly exposed, day after day, without adverse effect.

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-01-FM-00401	Chemical Inventory Report

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AMS-710-01-FM-00402	SDS/Product Evaluation
AMS-710-01-FM-00403	Hazard Communication Written Program—Projects
AMS-710-01-FM-00404	Hazard Communication Written Program—Fixed Facilities
AMS-710-01-FM-00405	Hazardous Substance Emergency Information
AMS-710-01-FM-00406	Hazardous Substance Emergency Information—Spanish
AMS-710-01-FM-00407	Employee Request for Safety Data Sheet

6.2 Other Internal References

AMS-710-05-PR-01900	HSE Education and Training

6.3 Other External References

NIOSH, The Registry of Toxic Effects of chemical Substances
Resource Conservation and Recovery Act of 1967, as amended (42 U.S. Code 6901 et seq.)
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
Federal Food, Drug, and Cosmetic Act
Consumer Product Safety Act and Federal Hazardous Chemicals Act
National Fire Protection Association (NFPA) Standard 704
Department of Transportation (DOT) requirements
Title 29 CFR Part 1926.59 (b)(6) (i-xii)
National Toxicology Program (NTP) Annual Report on Carcinogens
International Agency for Research on Cancer (IARC) Monographs
Permissible Exposure Limit (PEL) Occupational Safety and Health Administration (OSHA)
40 CFR 261.22

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
HSE Education and Training (AMS-710-05-PR-01900)	Seven Years	Project Location – APTIM LMS System



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8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	Definitions and Glossary of Terms for Safety Data Sheets (SDS)

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**ATTACHMENT 8.1
DEFINITIONS AND GLOSSARY OF TERMS FOR SAFETY DATA
SHEETS (SDS)**

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Acid Concentration - A measure of the amount of acid in solution. Sulfuric acid is sold in 98% solution - it is 98% acid and 2% water. Other acids are so strong they are commonly packaged in solutions that are 5 - 10%. The First Responder is concerned with the concentration of the acid. This determines how much material must be controlled.

Acid Strength - Refers to the amount of hydrogen ions in a solution. Ions are electrically charged atoms or molecular particles which break away from one molecule and attach to another molecule. Acids have a corrosive effect because of their ability to ionize in solution and chemically attack other substances. The stronger the acid the more damage it will do upon contact with other substances. Example - Hydrochloric Acid (HCl) - all the hydrogen ions separate in solution.

Acute Effect - An adverse effect on a human or animal body, with symptoms that develop immediately or rapidly. Also, see "Chronic."

Acute Toxicity - The adverse effects resulting from a single dose of or exposure to a substance. Ordinarily used to denote effects in experimental animals.

ACGIH - American Conference of Governmental Industrial Hygienists; an organization of professional industrial hygienists in governmental agencies or educational institutions engaged in occupational safety and health programs. ACGIH develops and publishes recommended occupational exposure limits (see TLV) for hundreds of chemical substances and physical agents.

Allergic Reaction - A hyperactive response to a chemical by the immune system.

Anesthetic - Chemical-induced loss of sensation.

ANSI - American National Standards Institute; a privately funded, voluntary membership organization that identifies industrial and public needs for national consensus standards and coordinates development of such standards. Many ANSI standards relate to safe design / performance of equipment -- such as safety shoes, eyeglasses, smoke detectors, fire pumps, household appliances -- and safe practices or procedures -- such as noise measurement, testing of fire extinguishers and flame arrestors, industrial lighting practices, and the use of abrasive wheels.

Antidote - A remedy to relieve, prevent or counteract the effects of a poison. Eliminating the poison, neutralizing it or absorbing it are effective. Document Number: FMD-SP-15 Current

API - American Petroleum Institute; voluntary membership organization of the petroleum industry. Among its services, API assists member committees in developing -- by the consensus process -- and publishing recommended practices for drilling and well servicing, storage tank installation, tank cleaning, piping and fittings, other industry-related design, installation, and operating practices; also funds and publishes basic reference books and manuals (example: "Industrial Hygiene Monitoring Manual for Petroleum Refineries and Selected Petrochemical Operations").

Aspiration Hazard - The danger of drawing material into the lungs with an inflammatory response.

Asphyxiant - A vapor of gas which can cause unconsciousness or death by suffocation (lack of oxygen). Most simple asphyxiants are harmful to the body only when they become so concentrated that they reduce oxygen in the air (normally about 21 percent) to dangerous levels (18 percent or lower). Some are chemical asphyxiants like carbon monoxide (CO) or cyanide, which reduce the

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blood's ability to carry or utilize oxygen. Asphyxiation is one of the principal potential hazards of working in confined spaces.

ASTM - American Society for Testing and Materials; voluntary membership organization with members from broad spectrum of individuals, agencies, and industries concerned with materials. The world's largest source of voluntary consensus standards for materials, products, systems, and services. ASTM is a resource for sampling and testing methods, health, and safety aspects of materials, safe performance guidelines, effects of physical and biological agents, and chemicals.

Autoignition Temperature - The minimum temperature required to initiate or cause self-sustained combustion in any substance in the absence of a flame or spark.

Boiling Point - The temperature at which a liquid change to vapor state, at a given pressure; usually expressed in degrees Fahrenheit at sea level pressure (760 mmHg, or one atmosphere). For mixtures, the initial boiling point or boiling range may be given. Flammable materials with low boiling points generally present special fire hazards. Some approximate boiling points:

- Propane - 440F (-410C)
- Anhydrous Ammonia -280F (-330C)
- Butane - 310F (-0.50C)
- Gasoline - 1000F (380C)
- Allyl Chloride - 1130F (450C)
- Ethylene Glycol - 3870F (1970C)

"C," or Ceiling - The maximum allowable human exposure limit for an airborne substance; not to be exceeded even momentarily. Also see "PEL" and "TLV."

CAA - Clean Air Act; federal law enacted to regulate / reduce air pollution. Administered by EPA.

Carcinogen - A substance or agent capable of causing or producing cancer in animals and / or humans. A material can be classified a carcinogen by the International Agency for Research in Cancer (IARC), the National Toxicology Program (NTP), or Occupational Safety and Health Administration (OSHA).

C.A.S. - Chemical Abstracts Service; a Columbus, Ohio, organization which indexes information published in "Chemical Abstracts" by the American Chemical Society and provides index guides by which information about particular substances may be located in the "Abstracts" when needed. "C.A.S. Numbers" identify specific chemicals.

cc, cm³ - Cubic centimeter; a volume measurement in the metric system, equal in capacity to one milliliter (ml). One quart is about 946 cubic centimeters.

CFR - Code of Federal Regulations. A collection of the regulations established by law of federal agencies, such as OSHA, DOT, EPA.

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Chemical Family - A group of single elements or compounds with a common general name. Examples: acetone, methyl ethyl ketone (MEK), and methyl isobutyl ketone (MIBK) are of the "ketone" family; acrolein, furfural, and acetaldehyde are of the "aldehyde" family.

Chemical Name - The scientific designation of a chemical as a name that will clearly identify the chemical for hazard evaluation purposes.

CHEMTREC - Chemical Transportation Emergency Center; a national center established by the Chemical Manufacturers Association (CMA) in Washington, D.C., in 1970, to relay pertinent emergency information concerning specific chemicals on request. CHEMTREC has a 24-hour toll free telephone number ((800) 424-9300), intended primarily for use by those who respond to chemical transportation emergencies.

Chronic Effect - An adverse effect on a human or animal body, with symptoms which develop slowly over a long period of time or which recur frequently. Also see "Acute."

Chronic Toxicity - Adverse effects resulting from repeated doses of a substance or repeated exposures over a prolonged period. Ordinarily used to denote effects in experimental animals.

CWA - Clean Water Act; federal law that regulates / reduces water pollution. Administered by EPA.

CO - Carbon monoxide, a colorless, odorless, flammable and very toxic gas produced by incomplete combustion, also a by-product of many chemical processes.

CO₂ - Carbon dioxide, a colorless gas, produced by the combustion and decomposition of organic substances and as a by-product of many chemical processes. CO₂ will not burn, and is relatively nontoxic (although high concentrations, especially in confined spaces, can create hazardous oxygen deficient environments).

COC - Cleveland Open Cup; a flash point test method.

Combustible - A term used by NFPA, DOT, OSHA, and others to classify certain liquids that will burn, based on flash points. NFPA, DOT, and OSHA generally define "combustible liquids" as having a flash point above 1000F (37.80C) and below 2000F (93.30C). Also see "flammable." Nonliquid substances such as wood and paper, are classified as "ordinary combustibles" by NFPA.

Compressed Gas - A gas or mixture of gases in a closed container under pressure greater than that of the atmosphere.

Concentration - The relative amount of a substance when combined or mixed with other substances. Examples: 2 ppm hydrogen sulfide in air, or a 50 percent caustic solution.

Confined Space - Any area which has limited openings for entry and exit that would make escape difficult in an emergency, has a lack of ventilation, contains known or potential hazards, and is not intended nor designated for continuous human occupancy.

Corrosive (physiological) - As defined by OSHA, a corrosive material is a chemical that causes visible destruction or irreversible alterations in human skin tissue at the site of contact.

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Corrosive (physical / chemical) - A solid or liquid waste which exhibits a "characteristic corrosivity," (40 CFR 261.22) as defined by RCRA, may be regulated (by EPA) as a hazardous waste. A liquid that has a severe corrosion rate on steel may be regulated by DOT.

Cutaneous Toxicity - See "Dermal Toxicity."

Decomposition - Breakdown of a material or substance (by heat, chemical reaction, electrolysis, decay or other processes) into parts or elements or simpler compounds.

Dermal - Used on or applied to the skin.

Dermal Toxicity - Adverse effects resulting from skin exposure to a substance.

Dike - A barrier constructed to control or confine hazardous substances and prevent them from entering sewers, ditches, streams or other flowing waters.

DOT - U. S. Department of Transportation; regulates transportation of chemicals and other substances to aid in the protection of the public as well as fire, law enforcement, and other emergency response personnel, particularly when transportation incidents occur involving hazardous materials. Detailed DOT classification lists specify appropriate warnings - such as Oxidizing Agent or Flammable Liquid - which must be used for various substances.

Dust - Solid particles suspended in air produced by some mechanical process such as crushing, grinding, abrading or blasting. Most dusts are an inhalation, fire, and dust-explosion hazard.

EPA - U. S. Environmental Protection Agency; federal agency with environmental protection, regulatory, and enforcement authority. Administers Clean Air Act, Clean Water Act, FIFRA, RCRA, TSCA, and other federal environmental laws.

Epidemiology - The science that deals with the study of disease in a general population. Determination of the incidence (rate of occurrence) and distribution of a particular disease (as by age, sex, or occupation) may provide information about the cause of the disease.

Etiologic Agents - Living microorganisms, like germs, that can cause human disease.

Evaporation Rate - The rate at which a particular material will vaporize (evaporate) when compared to the rate of vaporization of a known material. The evaporation rate can be useful in evaluating the health and fire hazards of a material. The known material is usually normal butyl acetate (NBUAC or n-BuAc), with a vaporization rate designated as 1.0. Vaporization rates of other solvents or materials are then classified as:

- **FAST** evaporating if greater than 3.0. Examples: Methyl Ethyl Ketone (MEK) = 3.8, Acetone = 5.6, Hexane = 8.3
- **MEDIUM** evaporating if 0.8 to 3.0. Examples 190 proof (95 percent) Ethyl Alcohol = 1.4, VM&P Naphtha = 1.4, MIBK = 1.6
- **SLOW** evaporating if less than 0.8. Examples: Xylene = 0.6, Isobutyl Alcohol = 0.6, Normal Butyl Alcohol = 0.4, Water = 0.3, Mineral Spirits = 0.1.

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Expansion Ratio - The volume of a gas produced by the vaporization of a given volume of liquid. Example: One cubic foot of anhydrous ammonia liquid will produce approximately 400 cubic feet of gas. (400:1)

Explosive - A material that produces a sudden instantaneous release of pressure, gas or dust when subjected to abrupt shock, pressure or high temperature.

Exposure Limits - Limit set to minimize occupational exposure to a hazardous substance. Recommended exposure limits used are ACGIH TLVs and OSHA PELs.

Extinguishing Media - The type of fire extinguisher or extinguishing method appropriate for use on a specific material.

FDA - The U. S. Food and Drug Administration; under the provisions of the Federal Food, Drug, and Cosmetic Act, the FDA establishes requirements for the use and labeling of foods and drugs to protect consumers from misbranded, unwholesome, ineffective and hazardous products. FDA also regulates the conditions under which materials are used for potential food contact.

FIFRA - Federal Insecticide, Fungicide, and Rodenticide Act; regulations administered by EPA under this Act require that certain useful poisons, such as chemical pesticides, sold to the public contain labels that carry health hazard warnings to protect users.

Fire Point - The temperature at which a liquid fuel will produce vapors sufficient to support combustion once ignited. The fire point is usually a few degrees above the flash point.

Flash Point - The temperature at which a liquid will give off enough flammable vapor to ignite. There are several flash point test methods, and flash points may vary for the same material depending on the method used, so the test method is indicated when the flash point is given (1500F PMCC, 2000F TCC, etc.)

Flammable - A "flammable liquid" is defined by OSHA as a liquid with a flash point below 100°F (37.8°C). Solids that will ignite readily or are liable to cause fires under ordinary conditions of transportation through friction or retained heat from manufacturing or processing, and which burn so vigorously and persistently as to create a serious transportation hazard, are classified by DOT as "flammable solids." "Flammable gas" is a gas that at ambient temperature and pressure from a flammable mixture with air at a concentration of 13 percent by volume or less; or a gas that at ambient temperature and pressure forms a range of flammable mixtures with air greater than 12 percent volume, regardless of the lower limit. Also see "Combustible."

Flammable Limits (Explosive Limits) - The minimum and maximum concentrations of a flammable gas or vapor between which ignition can occur. Concentrations below the lower explosive limit (LEL) are too lean to burn, while concentrations above the upper explosive limit (UEL) are too rich. All concentrations between LEL and UEL are in the flammable range and special precautions are needed to prevent ignition or explosion.

Formula - The conventional scientific designation for a material (water is H₂O, sulfuric acid is H₂SO₄, sulfur dioxide is SO₂, etc.).

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General Exhaust - A system for exhausting air containing contaminants from a general work area by an air circulation or exchange system. Also see "Local Exhaust."

g - Gram; a metric unit of weight. One ounce U. S. (avoir-dupois) is about 28.4 grams.

g / kg - Grams per kilogram; an expression of dose used in oral and dermal toxicology testing to indicate the grams of substance dosed per kilogram of animal body weight. Also see "kg" (kilogram).

Hazardous Decomposition - A breaking down or separation of a substance into its constituent parts, elements, or into simpler compounds accompanied by the release of heat, gas or hazardous materials.

HCS - Hazard Communication Standard, OSHA Act. Requires chemical manufacturers and importers to assess hazards associated with the materials in their workplace (29 CFR 1910.1200). SDS, labeling, and training are all the result of this law.

HMIS - The Hazardous Material Identification System, developed by NPCA to provide information on health hazards, reactivity, and flammability that are encountered in the workplace. (See NFPA).

Hazardous Chemical - Any substance or mixture of substances having properties capable of producing adverse effects on the health or safety of a human. Specific criteria for hazard classification are contained in the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Health Hazard - As defined by OSHA, "a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur."

Hygroscopic - The ability of a substance to absorb moisture from the air.

Hypergolic - Substances that spontaneously ignite on contact with another. Many hypergolics are used as rocket fuels.

IARC - International Agency for Research on Cancer; one of the three sources that OSHA refers to for data on whether a material is a carcinogen.

IMDG / IMO Classification - International transportation code which assigns divisions, classes, and UN numbers to materials in shipment.

Ignitable - A solid, liquid or compressed gas waste which exhibits a "characteristic of ignitability," as defined by RCRA, may be regulated (by EPA) as a hazardous waste.

Ignition Temperature - The minimum temperature to which a fuel in air must be heated in order to start self-sustained combustion independent of the heating source.

Impervious - A material that does not allow another substance to penetrate or pass through it.

Incompatible - Materials which could cause dangerous reactions from direct contact with one another are described as incompatible.

Ingestion - The swallowing of a substance.

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Inhibitor - A chemical which is added to another substance to prevent an unwanted chemical change from occurring.

Irritant - A chemical, which is not corrosive, but which causes reversible inflammatory effect on living tissue by chemical action at the site of contact.

kg - Kilogram; a metric unit of weight, about 2.2 U. S. pounds. Also see "g / kg," "g," and "mg."

l - Liter; a metric unit of capacity. A U. S. quart is about 9 / 10 of a liter.

LC - Lethal Concentration; a concentration of a substance being tested that will kill a test animal.

LC50 - Lethal Concentration; the concentration of a material in air which based on laboratory test has been shown to kill 50 percent of a group of test animals when administered as a single exposure (usually 1 or 4 hours). The LC50 is expressed as parts of material per million parts of air, by volume (ppm) for gases and vapors, or as micrograms of material per liter of air (mg / l) or milligrams or material per cubic meter of air (mg / m³) for dusts and mists, as well as for gases and vapors.

LD - Lethal Dose; a concentration of a substance being tested that will kill a test animal.

LD50 - Lethal Dose; a single dose of a material which on the basis of laboratory tests has been shown to kill 50 percent of a group of test animals. The LD50 dose is usually expressed as milligrams or grams of material per kilogram of animal body weight (mg / kg or g / kg). The material may be administered by mouth (oral) or applied to the skin (dermal or cutaneous).

LEL, or LFL - Lower Explosive Limit or Lower Flammable Limit of a vapor or gas; the lowest concentration (lowest percentage of the substance in air) that will produce a flash of fire when an ignition source (heat, arc or flame) is present. At concentrations lower than the LEL, the mixture is too "lean" to burn. Also see "UEL."

Local Exhaust - A system for capturing and exhausting contaminants from the air at the point where the contaminants are produced (welding, grinding, sanding, other processes or operations). Also see "General Exhaust."

m³ - Cubic meter; a metric measure of volume, about 35.3 cubic feet or 1.3 cubic yards.

Melting Point - The temperature at which a solid substance changes to a liquid state. For mixtures, the melting range may be given.

Mechanical Ventilation - A powered device, such as a motor-driven fan or air / stream venturi tube, for exhausting contaminants from a workplace, vessel, or enclosure.

mg - Milligram; a metric unit of weight. There are 1,000 milligrams in one gram (g) of a substance.

mg / kg - Milligrams per kilogram, an expression of toxicological dose. See "g / kg."

mg / m³ - Milligrams per cubic meter; unit for measuring concentrations of dust, gas or mist in air.

Mist - Suspended liquid droplets in the air generated by condensation from the gaseous to the liquid state or by mechanically breaking up a liquid by splashing or atomizing.

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Mixture - A heterogeneous association of materials that cannot be represented by a chemical formula.

ml - Milliliter; a metric unit of capacity, equal in volume to one cubic centimeter (cc), or about 1 / 16 of a cubic inch. There are 1,000 milliliters in one liter (l).

mmHg - Millimeters (mm) of mercury (Hg); a unit of measurement for low pressures or partial vacuums.

Million Particles Per Cubic Foot; a unit for measuring particles of a substance suspended in air. Exposure limits for mineral dusts (silica, graphite, Portland cement, nuisance dusts, and others), formerly expressed as mppcf, are now more commonly quoted in mg / m³.

MSHA - The Mine Safety and Health Administration of the U. S. Department of the Interior; federal agency with safety and health regulatory and enforcement authorities for the mining industry. Also see "OSHA."

Mutagen - A substance or agent capable of altering the genetic material in a living cell.

N₂ - Nitrogen; a colorless, odorless, and tasteless gas that will not burn and will not support combustion. The earth's atmosphere (air) is about 78 percent nitrogen; at higher concentrations, nitrogen can displace oxygen and become a lethal asphyxiant. See "Asphyxiant."

NaOH - Sodium hydroxide, or caustic soda.

Narcosis - Depression of the central nervous system which is characterized by dizziness, incoordination, and stupor.

NRC - National Response Center; a notification center in the Coast Guard Building in Washington, D. C., with a toll-free telephone number (1-800-424-8802) which must be called when significant oil or chemical spills or other environmentally related accidents occur.

NBUAC, or n-BuAc - Normal butyl acetate. See "Evaporation Rate."

NFPA - National Fire Protection Association; an international voluntary membership organization to promote / improve fire protection and prevention and establish safeguards against loss of life and property by fire. Best known on the industrial scene for the National Fire Codes - 16 volumes of codes, standards, recommended practices, and manuals developed (and periodically updated) by NFPA technical committees. Among these is NFPA 704M, the code for showing hazards of materials using the familiar diamond-shaped label or placard with appropriate numbers or symbols. The brief explanation below illustrates the NFPA principle of using scales of 0 to 4 (low to high) to classify material hazards:

- Fire Hazard (Red)
 - 0 - Will not burn
 - 1 - Will ignite if preheated
 - 2 - Will ignite if moderately heated

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- 3 - Will ignite at most ambient conditions
- 4 - Burns readily at ambient conditions
- Health Hazard (Blue)
 - 0 - Ordinary combustible
 - 1 - Slightly hazardous
 - 2 - Hazardous
 - 3 - Extreme danger
 - 4 – Deadly
- Reactivity (Yellow)
 - 0 - Stable and not reactive hazards in a fire with water
 - 1 - Unstable if heated
 - 2 - Violent chemical change
 - 3 - Shock, and heat, may detonate
 - 4 - May detonate
- Specific Hazard
 - OXY Oxidizer
 - ACID Acid
 - ALK Alkali
 - COR Corrosive
 - W Use No Water
 - Radiation Hazard

NIOSH - National Institute for Occupational Safety and Health of the Public Health Service, U. S. Department of Health and Human Services (DHHS), federal agency which -- among other activities - tests and certifies respiratory protective devices and air sampling detector tubes, recommends occupational exposure limits for various substances and assists OSHA and MSHA in occupational safety and health investigations and research.

NOX - Oxides of nitrogen; undesirable air pollutants. NOx emissions are EPA regulated under the Clean Air Act.

N.O.S. - Abbreviation for "Not Otherwise Specified." Used in shipping regulations for classes of substances to which a restriction applies. Individual members of this class are not listed in the DOT regulations.

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NTP - National Toxicology Program. One of the sources of information on the carcinogenicity of materials. Publishes an annual report on carcinogens.

Nuisance Particulates - Dusts that do not produce significant organic disease or toxic effect from "reasonable" concentrations and exposures. ACGIH TLV is 10 mg / m³.

Olfactory - Relating to the sense of smell. The olfactory organ in the nasal cavity is the sensing element that detects odors and transmits information to the brain through the olfactory nerves.

Oral - Used in or taken into the body through the mouth.

Oral Toxicity - Adverse effects resulting from taking a substance into the body via the mouth. Ordinarily used to denote effects in experimental animals.

OSHA - Occupational Safety and Health Administration of the U. S. Department of Labor; federal agency with safety and health regulatory and enforcement authorities for most U. S. industry and business. Also, see "MSHA."

Oxidation - In a literal sense, oxidation is a reaction in which a substance combines with oxygen provided by an oxidizer or oxidizing agent (see definitions below). In a broader sense, based on modern atomic theory, science today defines oxidation as a reaction -- brought about by an oxidizing agent -- in which atoms, molecules or ions lose electrons. In this broader sense, an oxidation reaction may occur even when oxygen is not present. However, it may be defined, an oxidizing reaction is always accompanied by an offsetting (balancing) reduction reaction in which (1) oxygen is removed from a compound, or (2) atoms, molecules or ions gain electrons.

Oxidizer - As defined by OSHA, a chemical other than a blasting agent or explosive that initiates or promotes combustion in other materials; thereby, causing fire of itself or through the release of oxygen or other gases.

Oxidizing Agent - A chemical or substance which brings about an oxidation reaction. The agent may (1) provide the oxygen to the substance being oxidized (in which case the agent has to be oxygen or contain oxygen), or (2) it may receive electrons being transferred from the substance undergoing oxidation (chlorine is a good oxidizing agent for electron-transfer purposes, even though it contains no oxygen).

PEL - Permissible Exposure Limit; an exposure limit established by OSHA regulatory authority. OSHA may establish PEL's for an eight-hour time weighted average (TWA), a Short Term Exposure Limit (STEL) or a maximum concentration or Ceiling Value (C).

Percent Volatile - Percent volatile by volume; the percentage of a liquid or solid (by volume) that will evaporate at an ambient temperature of 700F (210C). (Unless some other temperature is stated.) Examples: butane, gasoline, and paint thinner (mineral spirits) are 100 percent volatile; their individual evaporation rates vary, but over a period each will evaporate completely. EPON® solutions, however, may be only 10 percent to 60 percent volatile; only the solvent evaporates, leaving the resin as non-volatile residue.

PMCC - Pensky-Martens Closed Cup; a flash point test method.

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pH - The value that represents the acidity or alkalinity of an aqueous solution. A pH of 7 is neutral. Numbers increasing from 7 to 14 indicate increasing alkalinity. Numbers decreasing from 7 to 0 indicate increasing acidity.

Physical Hazard - An OSHA term for a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

Poison, Class A - A DOT term for extremely dangerous poisons, that is, poisonous gases or liquids of such nature that a very small amount of the gas, or vapor of the liquid, mixed with air is dangerous to life. Some examples: phosgene, cyanogen, hydrocyanic acid, nitrogen peroxide.

Poison, Class B - A DOT term for liquid, solid, paste or semisolid substances -- other than Class A poisons or irritating materials -- which are known (or presumed on the basis of animal tests) to be so toxic to man as to afford a hazard to health during transportation.

Polymerization - A chemical reaction in which one or more small molecules combine to form larger molecules. A hazardous polymerization is such a reaction which takes place at a rate which releases large amounts of energy. If hazardous polymerization can occur with a given material, the SDS usually will list conditions which could start the reaction and -- since the material usually contains a polymerization inhibitor -- the expected time period before the inhibitor is used up.

ppm - Parts Per Million; a unit for measuring the concentration of a gas or vapor in air - parts (by volume) of the gas or vapor in a million parts of air. Also used to indicate the concentration of a particular substance in a liquid or solid.

ppb - Parts Per Billion; a unit for measuring the concentration of a gas or vapor in air - parts (by volume) of the gas or vapor in a billion parts of air. Usually used to express measurements of extremely low concentration. Also used to indicate the concentration of a particular substance in a liquid or solid.

psi - Pounds Per Square Inch; for MSDS purposes, a unit for measuring the pressure a material exerts on the walls of a confining vessel or enclosure. For technical accuracy, pressure must be expressed as psig (pounds per square inch gauge) or psia (pounds per square inch absolute; that is, gauge pressure, plus sea level atmospheric pressure, or psig, plus about 14.7 pounds per square inch). Also see "mmHg."

Pyrophoric Liquids - Liquids that ignite spontaneously in dry or moist air at or below 130° F (54° C)

Reaction - A chemical transformation or change; the interaction of two or more substances to form new substances.

Reactivity - A description of the tendency of a substance to undergo chemical reaction with the release of energy. Undesirable effects -- such as pressure buildup, temperature increase, formation of noxious, toxic, or corrosive by-products -- may occur because of the reactivity of a substance to heating, burning, direct contact with other materials, or other conditions in use or in storage. A solid waste which exhibits a "characteristic of reactivity," as defined by RCRA, may be regulated (by EPA) as hazardous waste.

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Reducing Agent - In a reduction reaction (which always occurs simultaneously with an oxidation reaction) the reducing agent is the chemical or substance which (1) combines with oxygen, or (2) loses electrons to the reaction. See "Oxidation."

Respiratory Sensitizer - See "Sensitizer."

Respiratory System - The breathing system; includes the lungs and the air passages (trachea or "windpipe," larynx, mouth, and nose).

Routes of Entry - The means by which material may gain access to the body; for example, inhalation, ingestion and skin contact.

RCRA - Resource Conservation and Recovery Act; federal environmental legislation, administered by EPA, aimed at controlling the generation, treating, storage, transportation, and disposal of hazardous wastes.

RQ - Reportable Quantity. The quantity of material that when spilled must be reported to the DOT.

SARA - Superfund Amendments and Reauthorization Act. Title III of SARA is known as the Emergency Planning and Community Right to Know Act. It provides citizens and local governments with information about potential chemical hazards in their communities. The SDS includes information on the following sections:

- Section 302 - Reportable Quantities (RQ) and Threshold Planning Quantities (TPQ) of Extremely Hazardous Materials
- Section 311, 312 - Hazard categories for Tier I, Tier II reporting
- Section 313 - Toxic chemicals for release reporting

Sensitizer - A substance which on repeated exposure may cause a hyperactive (abnormally increased) response by the immune system. Skin sensitization is the most common form of sensitization in the industrial setting, although respiratory sensitization to a few chemicals is also known to occur.

SETA - Setaflash Closed Tester; a flash point test method.

"Skin" - A notation, sometimes used with PEL or TLV exposure data; indicates that the stated substance may be absorbed by the skin, mucous membranes, and eyes -- either airborne or by direct contact -- and that this additional exposure must be considered part of the total exposure to avoid exceeding the PEL or TLV for that substance.

Skin Sensitizer - See "Sensitizer."

Skin Toxicity - See "Dermal Toxicity."

Solubility in Water - A term expressing the percentage of a material (by weight) that will dissolve in water at ambient temperature. Solubility information can be useful in determining spill cleanup methods and fire extinguishing agents and methods for a material. Terms used to express solubility are:

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- Negligible Less than 0.1 percent
- Slight 0.1 to 1.0 percent
- Moderate 1 to 10 percent
- Appreciable More than 10 percent
- Complete Soluble in all proportions

SOX - Oxides of sulfur; undesirable air pollutants. SOx emissions are regulated by EPA under the Clean Air Act.

Species - A biological type; on SDSs, species refer to the test animals -- usually rats, mice or rabbits -- which were used to obtain the toxicity test data reported.

Specific Gravity - The weight of a material compared to the weight of an equal volume of water; an expression of the density (or heaviness) of the material. Example: If a volume of a material weighs six pounds, and an equal volume of water weighs ten pounds, the material is said to have a specific gravity of 0.6.

$$\frac{6lbs}{10lbs} = 0.6$$

Insoluble materials with specific gravity of less than 1.0 will float in (or on) water. Insoluble materials with specific gravity greater than 1.0 will sink (or go to the bottom) in water. Most (but not all) flammable liquids have a specific gravity less than 1.0 and, if not soluble, will float on water -- an important consideration for fire suppression.

Stability - An expression of the ability of a material to remain unchanged. For SDS purposes, a material is stable if it remains in the same form under expected and reasonable conditions of storage or use. Conditions which may cause instability (dangerous change) are stated - examples: temperatures above 1500F, shock from dropping.

SUS - Saybolt Universal Seconds. A unit measure of viscosity.

STEL - Short-Term Exposure Limit; ACGIH terminology. See "TLV-STEL."

Synonym - Another name or names by which material is known. Methyl alcohol, for example, is also known as methanol, or wood alcohol.

Systemic Effects - Effects from exposure to a chemical which occur at a site removed from the entry location (e.g., skin exposure which results in liver toxicity).

Target Organ Effects - Chemically caused effects from exposure to a material upon specifically listed organs and systems, such as the liver, kidneys, nervous system, lungs, skin and eyes.

TCC - Tag (Tagliabue) Closed Cup; a flash point test method.

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Teratogen - A substance or agent which causes malformations in the embryo or fetus following exposure of a pregnant female.

TLV - Threshold Limit Value; a term used by ACGIH to express the airborne concentration of a material to which nearly all persons can be exposed day after day, without adverse effects. ACGIH expresses TLVs in three ways:

- **TLV-TWA**: The allowable Time Weighted Average concentration for a normal 8 hour workday or 40-hour work week.
- **TLV-STEL**: Short-Term Exposure Limit, or maximum concentration for a continuous 15-minute exposure period (maximum for 4 such periods per day, with at least 60 minutes between exposure periods, and provided that the daily TLV-TWA is not exceeded).
- **TLV-C**: The Ceiling Exposure Limit - the concentration that should not be exceeded even instantaneously.
- Also see "Skin" in the glossary relative to TLVs.

TOC - TAG Open Cup; a flash point test method.

Toxicity - The sum of adverse effects resulting from exposure to a material, generally by the mouth, skin or respiratory tract. For RCRA purposes, solid or liquid wastes which exhibit certain specified "characteristics of toxicity" may be regulated by EPA as hazardous wastes.

Trade Name - The trademark name or commercial trade name for a material.

Trade Secret - Any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it.

TSCA - Toxic Substances Control Act; federal environmental legislation, administered by EPA, for regulating the manufacture, handling, and use of materials classified as "toxic substances."

TWA - Time Weighted Average exposure; the airborne concentration of a material to which a person is exposed, averaged over the total exposure time -- generally the total workday (8 to 12 hours). Also see "TLV."

UEL or UFL - Upper Explosive Limit or Upper Flammable Limit of a vapor or gas; the highest concentration (highest percentage of a substance in air) that will produce a flash of fire when an ignition source (heat, arc or flame) is present. At higher concentrations, the mixture is too "rich" to burn. Also see "LEL."

Unstable - Tending toward decomposition or other unwanted chemical change during normal handling or storage.

USDA - U. S. Department of Agriculture; USDA regulates the authorization of products intended for use in any type of food processing plant, or which may contact food.

Vapor Density - The weight of a vapor or gas compared to the weight of an equal volume of air; an expression of the density of the vapor or gas. Materials lighter than air have vapor densities less

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than 1.0 (examples: acetylene, methane, hydrogen). Materials heavier than air (examples: propane, hydrogen sulfide, ethane, butane, chlorine, sulfur dioxide) have vapor densities greater than 1.0. All vapors and gases will mix with air, but the lighter materials will tend to rise and dissipate (unless confined). Heavier vapors and gasses are likely to concentrate in low places - along or under floors, in sumps, sewers, and manholes, in trenches, and ditches - where they may create fire or health hazards.

Vapor Pressure - The pressure exerted by a saturated vapor above its own liquid in a closed container. When quality control tests are performed on products, the test temperature is usually 1000F (380C), and the vapor pressure is expressed as pounds per square inch (psig or psia), but vapor pressures reported in SDSs are in millimeters of mercury (mmHg) at 680F (200C), unless otherwise stated. Three facts are important to remember:

1. Vapor pressure of a substance at 1000F (380C) will always be higher than the vapor pressure of the substance at 680F (200C).
2. Vapor pressure reported in MSDSs in mmHg are usually very low pressures; 760 mmHg is equivalent to 14.7 pounds per square inch.
3. The lower the boiling point of a substance, the higher its vapor pressure.

Ventilation - See "General Exhaust," "Local Exhaust," and "Mechanical Ventilation."

Viscosity - Measurement of the flow properties of a material expressed as its resistance to flow. Unit of measurement and temperature are included.

Volatility - Measure of a material's tendency to vaporize or evaporate at ambient conditions.

PROCEDURE

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FATIGUE MANAGEMENT

3	Added rest breaks and use of ergonomic equipment. Added exceptions, recordkeeping sections. Moved Request for Variance section under "exceptions". Re-arranged some sections.	M. Dotson	10/19/2022
2	Added section 4.6 Review for Effectiveness	M. Karr	2/18/2020
1	Adjusted Maximum Allowed Unscheduled Shift	M. Karr	8/16/2019
0	Initial Issue	M. Karr	8/5/2019
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FATIGUE MANAGEMENT

1.0 PURPOSE

The purpose of this Procedure is to establish the minimum requirements for APTIM sites for managing fatigue. More stringent regulations or client requirements may supersede these. Each project is responsible for identifying the most stringent requirement and including those requirements in the site-specific safety plan. The most stringent of the requirements shall be adhered to.

Deliverables are listed in the table below:

Deliverable	Producer	Customer
Compliant Work Schedule	Management	Employee

2.0 SCOPE

This procedure applies to all APTIM employees, contractors, subcontractors, and visitors associated with an APTIM site.

2.1 Exceptions

2.1.1 Request for Variance

If any of the mandatory requirements (i.e., those indicated in “shall” statements) specified in the hours of service limits are expected to be exceeded, AMS-710-05-PR-01300 HSE Request for Variance) shall initiate the variance review process. This process should document the following:

- The reason requiring the additional work hours or work days in excess of the hours of service limits.
- Planned mitigation steps.
- The tasks and work to be completed and the timeframe involved.
- An evaluation of the tasks and work to include identifying the following:
 - the types of errors for which fatigue may increase the probability of occurring;
 - potential consequences of errors from increased fatigue;
 - control measures to minimize errors and consequences.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Managers
- Supervisors
- Employees
- Contractors

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- Subcontractors

4.0 PROCEDURE

Working prolonged or excessive work hours is recognized as contributing to an increased risk of workplace accidents and injuries.

4.1 Hours of Service Limits

4.1.1 Employees shall not be routinely scheduled for workdays longer than twelve (12) hours. The workday includes;

- All time spent at an APTIM site
- All time spent operating a motor vehicle at the direction of APTIM
- All time spent performing work on or off location at the direction of APTIM

4.1.2 Approval to work greater than an 84-hour work week, or greater than the requirements listed must be granted by the business unit President and the HSE Director.

4.1.3 Employees required to transition from day or night shifts shall be provided at least fourteen (14) hours of rest in a designated rest area before the next shift begins.

4.2 Twelve Hour Shifts

4.2.1 Normal Operations

- Work sets shall not exceed 7 consecutive day or night shifts
- To permit 2 consecutive nights of sleep after a work set, there shall be a minimum of 36 hours off after a work set, a minimum of 48 hours after a work set containing 4 or more night shifts, or a minimum of 48 hours off after a total of 84 or more hours worked regardless of day or night shift.
- Rest breaks during normal operations shall be provided.

4.2.2 Outages

- Work sets shall not exceed 14 day or night shifts.
- There shall be a minimum of 36 hours off after a work set. Time off beyond 36 hours shall be addressed at the company or plant level.
- Rest breaks during outages will be provided based on the work activities being performed.

4.2.3 Extended Shifts

- Extended Shifts (greater than 14 hours) shall occur only when necessary to avoid an unplanned open safety critical position or accomplish an unplanned safety critical task.

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- A minimum of 8 hours off shall be provided before returning to the next shift.
- The extended hour shifts shall not exceed 16 hours.
- No more than 1 extended shift longer than 14 hours should occur in a work set, or no more than 2 extended 12 hours shifts should occur in a work set.
- Rest breaks during extended shift operations shall be provided.

4.3 Ten Hour Shifts

4.3.1 Normal Operations

- Work sets shall not exceed 9 consecutive day or night shifts,
- There shall be a minimum of 36 hours off after a work set, or 48 hours after a work set containing 4 or more night shifts.
- Rest breaks during normal operations shall be provided.

4.3.2 Outages

- Work sets shall not exceed 14 calendar days.
- There shall be a minimum of 36 hours off after a work set.
- Rest breaks during outages will be provided based on the work activities being performed.

4.3.3 Extended Shifts

- Extended shifts (greater than 14 hours) shall occur only when necessary to avoid an unplanned open safety critical position or accomplish an unplanned safety critical task.
- A minimum of 8 hours off shall be provided before returning to the next shift.
- The extended hour shifts shall not exceed 16 hours.
- No more than 1 extended shift longer than 14 hours shall occur in a work set.
- No more than 2 extended 12-hour shifts should occur in a work set.
- If 3 or more 12-hour shifts occurs in a work set, follow the guidelines for the 12-hour shift in section 4.2.
- Rest breaks during extended shift operations shall be provided.

4.4 Eight Hour Shifts

4.4.1 Normal Operations

- Work sets shall not exceed 10 consecutive day, evening, or night shifts.
- There shall be a minimum of 36 hours off after a work set, or 48 hours after a work set containing 4 or more night shifts.

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- Rest breaks during normal operations shall be provided.

4.4.2 Outages

- Work sets shall not exceed 19 consecutive calendar days
- There shall be a minimum of 36 hours off after a work set.
- Rest breaks during outages will be provided based on the work activities being performed.

4.4.3 Extended Shifts

- Extended shifts (greater than 14 hours) shall occur only when necessary to avoid an unplanned open safety critical position or accomplish an unplanned safety critical task.
- A minimum of 8 hours off shall be provided before returning for the next shift.
- The extended hour shifts shall not exceed 16 hours.
- No more than 2 non-consecutive extended shifts greater than 14 hours should occur in a work set, or no more than 2 extended shifts of 12 hours or greater should occur in a work set. These extended shifts may be consecutive.
- If 3 or more 12 hours shifts occurs in a work set, follow the requirements in section 4.2, Twelve Hour Shifts.
- Rest breaks during extended shift operations shall be provided.

4.5 Call Outs

Because call-outs by their nature involve unpredictable patterns of work and rest, attention should be given to call-out practices to ensure adequate rest prior to returning to work. The following factors should be considered:

- call-outs during nocturnal hours will likely results in sleep disruption;
- multiple call-outs during a day may provide little opportunity for consolidated, restorative sleep;
- call-outs that end shortly before the next scheduled shift or shortly after a shift effectively results in extended shift, and should conform to those guidelines;
- call-outs occurring on the day prior to or immediately after a work set may contribute to cumulative sleep debt.

Table 1 – Hours of Service Guidelines for 8-, 10-, and 12-hour Shifts.

Operational Situation	12-Hour Shift	10-Hour Shift	8-Hour Shift
Maximum Consecutive Shifts (Day or Night) In a Work Set			
A) <i>Normal Operations</i>	<i>7 shifts</i>	<i>9 shifts</i>	<i>10 shifts</i>

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<i>B) Outages</i>	<i>14 shifts</i>	<i>14 shifts</i>	<i>19 shifts</i>
Minimum Time Off After a Work Set			
<i>A) Normal Operations</i>	<i>36 hours</i>	<i>36 hours</i>	<i>36 hours</i>
- <i>Work set of 4 or more night shifts</i>	<i>48 hours</i>	<i>48 hours</i>	<i>48 hours</i>
- <i>After 84 hours or more regardless of day or night</i>	<i>48 hours</i>	<i>48 hours</i>	<i>48 hours</i>
<i>B) Outages</i>	<i>36 hours</i>	<i>36 hours</i>	<i>36 hours</i>
Extended Shifts			
<i>A) Unscheduled maximum shift</i>	<i>16 hours</i>	<i>16 hours</i>	<i>16 hours</i>
<i>B) Time off after shift</i>			
- <i>10 to 16 hour shift</i>	<i>N/A</i>	<i>N/A</i>	<i>8 hours</i>
- <i>12 to 16 hour shift</i>	<i>N/A</i>	<i>8 hours</i>	<i>N/A</i>
- <i>14 to 16 hour shift</i>	<i>8 hours</i>	<i>8 hours</i>	<i>N/A</i>
- <i>>16 to 18 hour shift</i>	<i>10 hours</i>	<i>N/A</i>	<i>N/A</i>
<i>Maximum Number of Extended Shifts per Work Set</i>	<i>1</i>	<i>1 for 14-hour shift or 2 for 12 hour shifts or for 3 or more 12-hour shifts, follow 12-hour normal operations guidelines above</i>	<i>2 if greater than 12 hours in duration; extended shifts must be non-consecutive. If >2, follow 12-hour normal operations guidelines above</i>

4.6 Disaster Work Schedules

In the event of a disaster, the following parameters shall be followed:

- During the initial emergency response phase of a disaster clean-up, employees shall not work in excess of 84 hours per week or twelve (12) hours per day, seven (7) days a week.
 - After working this schedule for fourteen (14) days, employees shall be provided the opportunity to receive 48 hours of rest.
 - If travel time to and from work exceeds ninety (90) minutes one way, work hours shall be shortened by the travel time in excess of the 180-minute round trip travel time.
- After completion of the emergency response phase, work schedules shall not extend beyond the requirement outlined in this procedure.

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- Further reduction in work hours may be required when employees are assigned to on-going disaster activities without designated rest areas or eating facilities.

4.7 Equipment

Ergonomic equipment will be used to improve workstation conditions such as anti-fatigue mats for standing, lift assist devices for repetitive lifting, proper lighting and control of temperature, and other ergonomic devices as appropriate.

4.8 Training

- 4.8.1 Training shall be provided to all safety-sensitive employees, as well as operational supervision and management prior to assignment, and upon changes to this procedure.
- 4.8.2 Training shall include recognizing fatigue and how to control fatigue through work and personal habits.
- 4.8.3 Training shall include informing personnel that they must not chronically use over-the-counter, prescription drugs, and any other products which may affect an employee's ability to perform their work safely.

4.9 Evaluating and Reporting Fatigue

Employees shall report fatigue/tiredness, lack of mental acuity, or other concerns for their fitness for duty to their supervisors, and exercise their stop work authority if necessary.

4.10 Review for Effectiveness

The effectiveness of this plan is to be reviewed periodically, considering any identified trends, contributing factors, challenges or better practices for improvement.

5.0 TERMINOLOGY

Term	Definition
Call-Out	Summoning an employee to the work site to perform work that they were not scheduled to perform
Designated Rest Area	This term refers to rest an employee receives after leaving the project site and seeking undisturbed rest in an air-conditioned area with access to sanitary facilities necessary for showering and other bodily functions. When the definition of a "designated rest area" cannot be met, the Project or Program Health and Safety Manager may recommend an additional amount of rest hours or a reduced rotation schedule.
Extended Shift	Time an employee is assigned to work that extends outside their regularly scheduled shift hours and into other shifts.
Fatigue	Reduced mental and physical functioning caused by sleep deprivation and/or being awake during normal sleep hours. This may result from extended work hours, insufficient

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	opportunities for sleep, failure to use available sleep opportunities, or the effects of sleep disorders, medical conditions or pharmaceuticals which reduce sleep or increase sleepiness.
Fitness for Duty	The employee's physical, mental, and medical qualifications to perform his or her job duties
Normal Operations	Operations that are not during outages.
Outages	Planned or unplanned interruption in the normal operations of a unit or plant, including mobilizing and de-mobilizing. Outages include, but are not limited to, such things as turnarounds, unit shutdowns, operational responses, etc.
Work Sets	Consecutive shifts with a minimum of 36 hours off before starting another work set.

6.0 REFERENCES

6.1 Required Forms/Checklists

None	

6.2 Other Internal References

AMS-710-05-PR-01300	HSE Request for Variance
AMS-710-05-PR-01900	HSE Education and Training

6.3 Other External References

U.S. Navy Response Team Technical Assistance Document, Volume I, "Guidance for Managing Worker Fatigue during Disaster Operations."
United States Coast Guard, Boat Operations and Training Manual, COMDTINST M16114.32A
United States Coast Guard, Crew Endurance Management, COMDTINST 3500.2
ANSI/API, Recommended Practice 755 (2010) "Fatigue Risk Management Systems in the Refining and Petrochemical Industries"

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
HSE Education and Training (AMS-710-05-PR-01900)	Seven Years	Project Location/APTIM LMS System



Procedure Number: AMS-710-01-PR-00500

Revision: 3

Approval Date: 10/19/2022

FATIGUE MANAGEMENT

8.0 ATTACHMENTS

Attachment	Attachment Title
None	

PROCEDURE

Procedure Number:

AMS-710-01-PR-00600

Revision:

3

Procedure Owner:

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Issuing Authority:

Talent Development Specialist

Approval Date:

6/26/2022



HEAT STRESS PREVENTION AND CONTROL

3	Added additional ACGIH tables and updates for physiological monitoring.	M. Dotson	6/26/2022
2	Complete re-write, updated to reflect ACGIH requirements.	J. Thompson	6/20/2022
1	Transferred information to new APTIM procedure template, updated reference and attachment sections, created attachments from reference forms Heat Stress Index and Urine Color Test Chart, removed reference to Evaporative Cooling Index, added reference in section 4.2.4.1 to Urine Color Test Chart	M. Karr	3/16/2020
0	Added section 4.3.2	M. Hetzler	12/20/2017
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

HEAT STRESS PREVENTION AND CONTROL

1.0 PURPOSE

This procedure has been developed to regulate tasks at APTIM's projects with regard to minimizing adverse effects of overexposure to heat.

2.0 SCOPE

This document is applicable to all APTIM project sites. It is the responsibility of those carrying out APTIM work to understand and comply with legal and regulatory requirements, clients' requirements and APTIM practices.

The application of regulatory requirements and this procedure will follow from an initial hazard assessment conducted. In the event of a discrepancy between regulatory requirements, and client/facility requirements, the more stringent standards will prevail.

2.1 Exceptions

No exceptions.

3.0 RESPONSIBILITIES

The following personnel have responsibilities defined in this procedure:

- All APTIM Management
- APTIM employees, contractors and visitors.

3.1 APTIM Management

APTIM Management is responsible for the following:

- Recognizing the warm environment
- Understanding heat exposure limits and measurements
- Identifying at-risk employees
- Recognizing the hazard of working in warm environments
- Developing a plan for mitigating the effects of warm environments
- Assuring that the workforce is complying with heat stress mitigation plans

3.2 APTIM Employees, Contractors and Visitors

All APTIM employees, contractors and visitors are responsible for the following:

- Recognizing the hazards working in a warm environment
- Understanding the signs and effects of heat stress
- Watching for signs of heat stress to prevent further adverse effects
- Following mitigation plan work practices (See Attachment 8.4).

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- Reporting any health conditions that may affect working in heat.
- Reporting ANY adverse health effects while working in the heat

4.0 PROCEDURE

4.1 Description and Requirements

When the air temperature is greater than 81 degrees F, or the humidity is higher than 60%, most people can feel uncomfortable. (See Attachment 8.1) As the environment warms up, the body tends to warm as well. The human body's "internal thermostat" maintains a constant temperature by pumping more blood to the skin, which is cooled by evaporation from increased perspiration production. In extremes of heat or humidity, or when heat loss through perspiration is limited by impervious clothing, the body's coping mechanism can be overwhelmed, resulting in heat illness and a range of serious and possibly fatal consequences. See Attachment 8.3 for Information on Heat Disorders and Health Effects.

4.2 General Requirements

4.2.1 APTIM project specific heat stress controls will be established based on a risk assessment done by following this procedure and be added as a section or an appendix in the HASP as a site-specific control plan. This plan will include emergency response procedures to be followed for heat related emergency procedures. If a project-specific plan is required for Heat Stress, the content of this procedure shall be used as the minimum requirements to develop the plan.

4.2.2 Training

All site personnel shall be trained in the hazards and controls of heat stress annually prior to the onset of hot weather. Training will include heat stress fundamentals, the use of heat stress monitoring equipment such as a pulse-ox meter and thermometer and how to properly take a carotid or radial pulse. Training usually begins in April and awareness is continued in tailgate meetings, Plan of the day (POD), posters and handouts through September.

4.2.3 Acclimatization

Personnel become acclimatized in about 7 to 10 days (and lose acclimatization in about the same period of time). Extra attention should be given during transitional weather and to new employees that are not acclimated to heat stressful conditions.

4.2.4 Fluids

Workers shall be encouraged to increase consumption of water. Cool or cold water shall be used to enhance palatability and consumption. Electrolyte-containing, low sugar, and caffeine free beverages may also be used to encourage consumption but should be limited.

4.2.5 Shelter

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Shelter from radiant heat (i.e., shade) shall be available for workers exposed to direct sunlight (i.e., radiant heat loading) during conditions of heat stress. Shelter does not necessarily require air conditioning, and air conditioning may actually be uncomfortable for employees working in heat stressful conditions.

4.2.6 Clothing

Clean dry undergarments help prevent some heat stress related problems. Provisions should be made for changing PPE garments that may become sweaty and dirty. Showering if available also helps to rehab personnel that show signs of high stress. Every effort should be made to minimize PPE requirements which may increase the heat stress of personnel without a commensurate gain in personal protection.

4.2.7 Other Control Options

Other heat stress control options are described in Attachment 8.4, Control Options

4.2.8 Monitoring

4.2.8.1 One of the most important aspects of monitoring for heat stress is the buddy system. Employees, through their training must be sensitive to early warning signs of heat related illnesses. Self/buddy checks of pulse are a simple method of extending this principle.

4.2.8.2 At the discretion of the APTIM Site Safety/Site Supervisor one of two monitoring programs may be employed during program implementation. A program of personal stress monitoring is appropriate for personnel wearing PPE (e.g., level C workers) and for most other situations. A program of WBGT & work/rest regimen is appropriate for personnel not wearing chemical resistant PPE which fully encloses the body and prevents evaporative cooling of skin surfaces (e.g., level D workers and workers using certain modified level D or C ensembles). Employees that must be monitored in either program shall include at a minimum:

- Exposed personnel (e.g., those not working in air-conditioned spaces) conducting ground labor tasks in any ensembles;
- Exposed personnel (e.g., those not working in air-conditioned spaces) wearing whole body, chemical protective clothing PPE; and
- Any additional personnel considered to be at particular risk by the Site Safety Officer or Project Manager.
- Heat, temperature and humidity data loggers are available and have downloadable apps for smart phones such as Kestrel Drop, OSHA-NOISH heat app, Temp Stick, ThermoPro, etc.

4.3 Area Monitoring and Work-Rest Regimens-WBGT Based

The following Area Monitoring and Work Rest Regimens are most appropriate when working without PPE:

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4.3.1 WBGT Area Monitoring

4.3.1.1 The use of WBGT (wet bulb globe temperature) area monitoring may be used in conjunction with an established work/rest regimen. WBGT monitoring and the work/rest regimen shall be in accordance with the latest edition of the American Conference of Governmental Industrial Hygienists' (ACGIH) "Threshold Limit Values for Chemical Substances and Physical Agents" also referred to as the "TLV booklet."

4.3.1.2 In general, this procedure should only be applied to personnel in breathable work clothing with PPE which allows for evaporative cooling (e.g., level D workers or modified level D workers where PPE does not prevent evaporative cooling of the skin). If this monitoring program is used for personnel in PPE, then WBGT correction factors for clothing in Table 2 below shall be used.

4.3.1.3 Use AMS-710-01-FM-00604, Area Monitoring Log, to document WBGT readings and work load.

4.3.2 Work Rest Regimen

The TLVs specified on Table 1 refer to heat stress conditions under which it is believed that nearly all heat acclimatized, adequately hydrated, un-medicated, healthy workers wearing light-weight summer clothing may be repeatedly exposed without adverse health effects. The work areas are assumed to have at least some air movement.

Table 1: ACGIH Screening Criteria for Heat Stress Exposure

Hourly Activity	WBGT for Work Rates that are:							
	Light		Moderate		Heavy		Very Heavy	
	°C	°F	°C	°F	°C	°F	°C	°F
100%	31.0	87.8	28.0	82.4				
75%	31.5	88.7	29.0	84.2	27.5	81.5		
50%	32.0	89.6	30.0	86.0	29.0	84.2		
25%	32.5	90.5	31.5	88.7	30.5	86.9	28.0	82.4
0 Work	33.0	91.4	32.0	89.6	31.0	87.8	30.0	86.0
Notes: Based on 5-day week and 8-hour workdays with conventional breaks. Conventional breaks include a 15-minute break in a four-hour period and a half-hour lunch in an 8-hour period.								

Examples of work load intensity:

- Rest: sitting quietly

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- Light work: sitting or standing to control machines, light arm or hand work, occasional walking, driving.
- Moderate work: walking about with moderate pushing and pulling, walking at a moderate pace.
- Heavy work: digging, carrying, pushing/pulling heavy loads, walking at a fast pace, pick and shovel work

4.3.3 Heat Stress and Clothing Guidelines

If heavy coveralls clothing is worn, ACGIH guidelines must be corrected according to the following table:

Table 2. Clothing-Adjustment Factors for Some Clothing Ensembles*		
Clothing Type	Addition to WBGT °C	Addition to WBGT °F
Work clothes (long sleeve shirt and pants)	0	32
Cloth (woven material) coveralls	0	32
Double-layer woven clothing	3	37.4
SMS polypropylene coveralls	0.5	32.9
Polyolefin coveralls	1	33.8
Limited-use-barrier coveralls	11	51.8
*These values must not be used for completely encapsulating suits, often called Level A. Clothing Adjustment Factors cannot be added for multiple layers. The coveralls assume that only modesty clothing is worn, underneath, not a second layer of clothing.		

4.3.3.1 These values are not to be used for completely encapsulating (level A) suits. In addition, the assumption is that coveralls are worn with only modesty clothing underneath, not street clothes.

4.3.3.2 For Fire Retardant Clothing (FRC) there is no WBGT correction: the lightest weight available should be worn during work in hot environments, in conjunction with modesty cotton undergarments.

4.4 Personal Monitoring and Work-Rest Regimens

4.4.1 Personal Monitoring Programs

A program of personal stress monitoring shall be used when wearing semi-permeable or impermeable clothing at temperatures above 70 degrees F or with heavy work rates. It may also be used in place of the WBGT monitoring for workers in Level D PPE.

A minimum of two leading indicators as described below shall be used for personal monitoring:

4.4.1.1 Pulse

1. Pulse is the primary means of personal monitoring for heat stress.

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2. Finger or wrist cuffs are a simple and objective measuring device which can be used by employees to monitor their own crews. If employees are used as part of a monitoring program these devices should be available to ensure objective observations. Training in such case should include: signs and symptoms, this procedure, and thorough reading of the instructions provided for the monitoring device(s) that will be used.
3. A baseline Resting Heart Rate (HR_{rest}) and body temperature will be taken each morning and recorded as a daily baseline on the individuals daily heat stress monitoring log (AMS-710-01-FM-00605) before the worker goes to the field.
4. Take readings at the beginning of a break whenever heat stress conditions exist, (The resting radial or carotid pulse should be taken seated or standing if necessary).
5. Pulse should be less than 110 bpm. (It is important to verify that the worker's resting heart rate is <110 bpm).
6. Use AMS-710-01-FM-00605, Heat Stress Monitoring Log, to record workers' readings including their HR_{rest} and HR_{max}.

Where: HR_{max} = Maximum Heart Rate (Use the chart below to find the HR_{max} based on worker's age)

HR_{rest} = Resting Heart Rate (HR_{rest} to be taken before starting back to work after a break)

7. The following chart is developed based on the ACGIH TLV equation: HR_{max} = 180 - Worker's age

Maximum Heart Rate Chart							
AGE	HR _{max}	AGE	HR _{max}	AGE	HR _{max}	AGE	HR _{max}
16	164	31	149	46	134	61	119
17	163	32	148	47	133	62	118
18	162	33	147	48	132	63	117
19	161	34	146	49	131	64	116
20	160	35	145	50	130	65	115
21	159	36	144	51	129	66	114
22	158	37	143	52	128	67	113
23	157	38	142	53	127	68	112
24	156	39	141	54	126	69	111
25	155	40	140	55	125	70	110
26	154	41	139	56	124	71	109
27	153	42	138	57	123	72	108

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28	152	43	137	58	122	73	107
29	151	44	136	59	121	74	106
30	150	45	135	60	120	75	105

8. Workers should be rehabbed until the pulse returns below 100 bpm.
9. The Site Safety /Site Supervisor is responsible for establishing a schedule for monitoring and should include the following minimum requirements (additional monitoring may be required on certain days or for more sensitive individuals).

Pulse Monitoring Schedule			
Conditions	8 am to 11 am	11 am to 3 pm	3 pm to shift end
Personnel do not show any signs or symptoms and monitoring is negative.	• Monitor for signs and symptoms	• 2 hr interval	• 1 hr interval
Personnel show any signs or symptoms and monitoring is negative.	• Monitor for signs and symptoms	• 1 hr interval	• 1 hr interval
Monitoring shows employee stress	• 2 hr interval	• 1 hr interval	• half hour interval
For ANY employee that has already removed for stress and is being returned	• Interval should be cut in half for any individual that has been removed from work for rehab earlier in the shift and is now returning to work. Additional monitoring should also be performed on the following days until employee becomes acclimatized and is no longer showing symptoms or positive monitoring results.		

4.4.1.2 Ear or Oral temperature

Ear temperature may also be used. Ear temperature should be taken when full face respirators and/or hoods are being worn (i.e., the head may become overheated before the rest of the body shows signs of stress). Workers should be removed if ear temperature increases by more than 1.5 °F. Workers should be rehabbed until the temperature returns to normal. It should be noted that some employees may have a "normal" temperature which is different than 98.5 °F (Individual employees should be monitored for one week prior to the beginning of heat stress conditions in order to establish if they have a different normal baseline temperature). Workers should not be allowed to enter the zone if they are already having an elevated temperature. Body core temperature greater than 101.30 F for medically selected and acclimatized personnel or greater than 100.40 F in unselected, unacclimatized workers requires removal from exposure to heat stress.

4.4.1.3 Body weight

Body weight change may also be used for personal monitoring for heat stress. Body weight loss of more than 1.5% shall not be exceeded.

4.4.1.4 Rehab

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Rehabilitation should include at a minimum: seated rest in a shady location; removal of some/all outer garments; fluids; observation; reduction in the ratio of work/rest periods; and increased monitoring after return to work.

4.4.1.5 Action level for personal monitoring

An action level for personal heat stress monitoring has been established at 70° F ambient temperature when site personnel are wearing chemical protective clothing during the performance of field activities.

At temperatures exceeding 100° F ambient temperature, all ground laborers, regardless of PPE, shall be monitored.

4.4.1.6 Work/rest regimen

The following work/rest schedule guideline Table may be used to help control heat stress when monitoring removals dictate the need. Ground labor and PPE labor should also be scheduled for early morning or evening if possible.

Ambient Temperature (° F)	Work Period (minutes)	Rest Period (minutes)
72-80	120	15
80-85	90	15
85-90	60	15
90-95	30	15
95-100	15	15

When physiological monitoring is selected the following guidelines are recommended:

If the heart rate of any individual exceeds 75 percent of their calculated maximum heart rate (MHR = 180 - age) at the beginning of the rest period, then the work cycle should be decreased by one-third. The rest period will remain the same.

If the temperature exceeds 99.6 degrees F at the beginning of the rest period, then the work cycle should be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work if his/her temperature exceeds 100.4 degrees F.

4.5 Guidelines for Limiting Heat Strain

One or more of the following measures may mark excessive heat strain, and an individual's exposure to heat stress should be discontinued when any of the following occur:

- Sustained (several minutes) heart rate is in excess of 180 bpm minus the individuals age in years for individuals with assessed normal cardiac performance; or

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- Body core temperature is greater than 101.3 degrees F for medically selected and acclimatized personnel; or greater than 100.4 degrees F in unselected, unacclimatized workers; or
- Recovery heart rate at one minute after peak work effort is greater than 120 bpm; or
- There are symptoms of sudden and severe fatigue, nausea, dizziness, or lightheadedness.
- Exposure should stop with signs or symptoms of heat exhaustion or heat stroke or with a request to stop regardless of what physiological monitoring may dictate.

4.6 Identification of At-Risk Employees

How a person functions under conditions of heat stress will be unique to that person and will depend on:

- Age
- Weight
- Metabolism
- Alcohol or drug use
- Pre-existing medical conditions
- Level of physical fitness
- Use of medications
- Individual sensitivity to heat
- Possibility of hypertension.

Employees with any “at-risk” conditions shall have more stringent work/rest regimens or controls.

4.7 Urine Chart

Urine charts can be implemented as a training tool to demonstrate the concept of color change between the urine of a well-hydrated worker and that of a dehydrated worker. When conducting an investigation to evaluate the validity and sensitivity of urine color, Armstrong et al. [1998] found that urine color was as good an index as urine osmolality, urine specific gravity, urine volume, plasma osmolality, plasma sodium, and plasma total protein for tracking changes in body water and hydration status. In an earlier study, the author suggested that urine color could be used in workplace settings where close estimates of urine specific gravity or urine osmolality are acceptable [Armstrong et al. 1994, 2010]. Although the urine chart is a good indicator of hydration status for most workers with normal pale yellow to deep amber urine, urine color can also be affected by diet, medications, and illnesses or disorders. See Attachment 8.2

Heat Standards in Specific States

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Many U.S. states run their own [OSHA-approved State Plans](#). Some states have adopted standards that cover hazards not addressed by federal OSHA standards. The following states have standards for heat exposure:

- **California.** California's Heat Illness Prevention Standard requires employers to provide training, water, shade, and planning. A temperature of 80°F triggers the requirements. See [CalOSHA's website](#). See the full text of the [California heat standard](#).
- **Minnesota.** The standard applies to indoor places of employment. See the [full text of the regulation](#).
- **Washington.** See Washington State's [Outdoor Heat Exposure Rule](#). See the [full text of the regulation](#).

5.0 TERMINOLOGY

Term	Definition
Acclimatization	the physiological adaptation to heat exposure that allows the body to continue to function normally despite higher temperatures
ACGIH	American Congress of Government Industrial Hygienists
At risk employee	a person with conditions or risk factors that can contribute to heat stress
HASP	Health and Safety Plan
Heat stress	a physiological condition induced when high temperatures and humidity compromise the body's ability to cool itself, resulting in heat-related illness
HRmax	Maximum Heart Rate
HRrest	Resting Heart Rate
Threshold Limit Value (TLV)	a limit of heat stress conditions, under which it is believed nearly all workers can be repeatedly exposed without adverse effects. (Developed by the ACGIH)
Wet Bulb Globe Temperature (WBGT)	a measure used to indicate environmental heat taking into account the effects of temperature, humidity and radiant energy

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-01-FM-00604	Area Monitoring Log
AMS-710-01-FM-00605	Employee Heat Stress Monitoring Log

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6.2 Internal References

None	

6.3 External References

NIOSH Occupational Exposure to Heat and Hot Environments
OSHA Related Standards; 29 CFR 1910.132(d), 29 CFR 1915.152, 29 CFR 1917.95, 29 CFR 1926.28 and 1926.95
Kestrel Drop Data Logger
OSHA-NOISH Heat Safety App
TLVs and BEIs for Chemical Substances and Physical Agents (ACGIH 2022)

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
Heat Stress Records (e.g., Pulse Oxygen Readings, Temperature)	Duration of Project	Project Location

8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	Heat Stress Index Charts
Attachment 8.2	Urine Color Test Chart
Attachment 8.3	Heat Disorders and Health Effects and First Aid
Attachment 8.4	Control Options



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HEAT STRESS PREVENTION AND CONTROL

ATTACHMENT 8.1 HEAT STRESS INDEX CHARTS

HEAT STRESS PREVENTION AND CONTROL

HEAT STRESS INDEX CHARTS

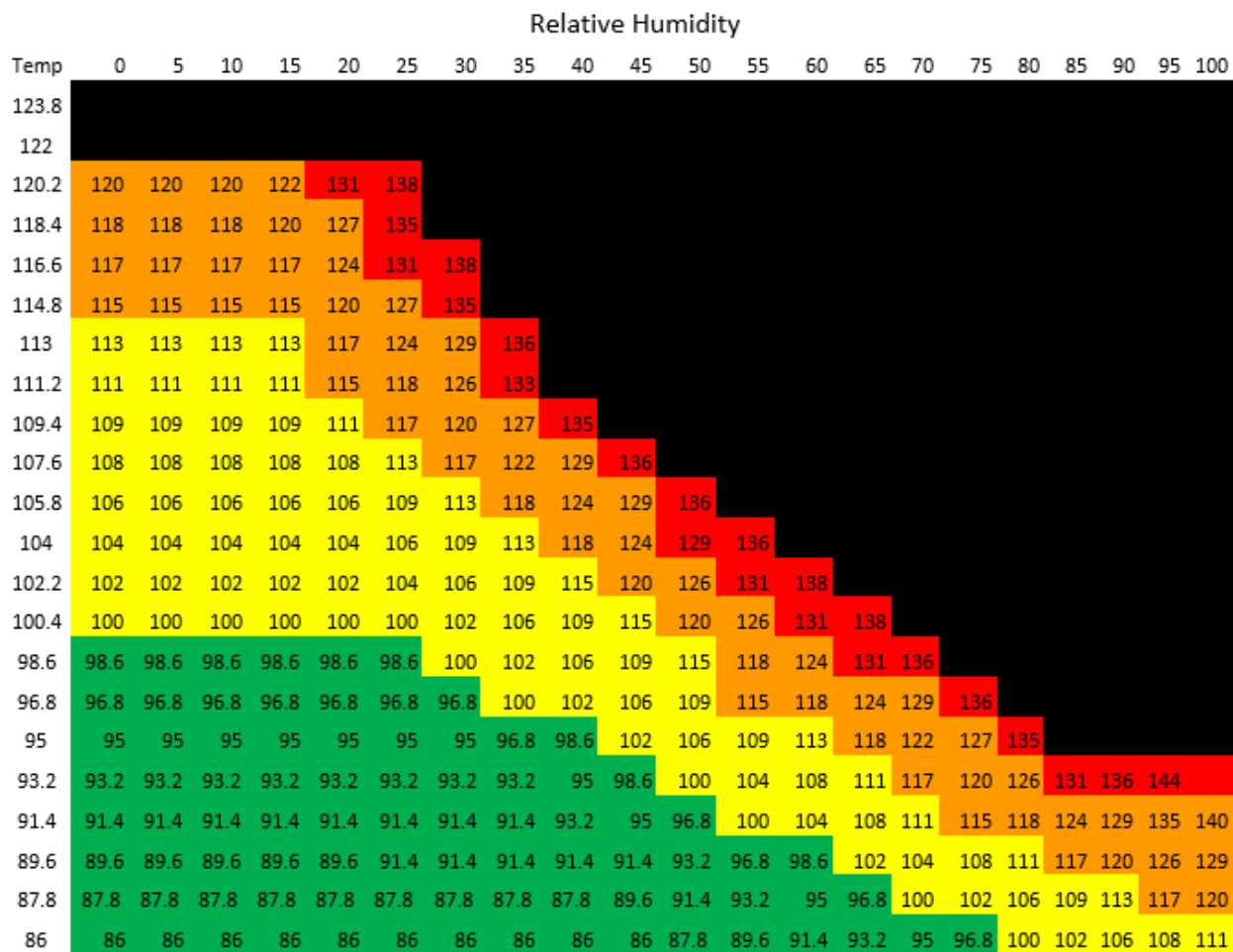


Figure 1 - Fahrenheit

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		Relative Humidity																			
Temp	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
51	STOP ALL WORK																				
50																					
49	48.9	48.9	48.9	50	55	58.9															
48	47.8	47.8	47.8	48.9	52.8	57.2															
47	47.2	47.2	47.2	47.2	51.1	55	58.9														
46	46.1	46.1	46.1	46.1	48.9	52.8	57.2														
45	45	45	45	45	47.2	51.1	53.9	57.8													
44	43.9	43.9	43.9	43.9	46.1	47.8	52.2	56.1													
43	42.8	42.8	42.8	42.8	43.9	47.2	48.9	52.8	57.2												
42	42.2	42.2	42.2	42.2	42.2	45	47.2	50	53.9	57.8											
41	41.1	41.1	41.1	41.1	41.1	42.8	45	47.8	51.1	53.9	57.8										
40	40	40	40	40	40	41.1	42.8	45	47.8	51.1	53.9	57.8									
39	38.9	38.9	38.9	38.9	38.9	40	41.1	42.8	46.1	48.9	52.2	55	58.9								
38	37.8	37.8	37.8	37.8	37.8	37.8	38.9	41.1	42.8	46.1	48.9	52.2	55	58.9							
37	37	37	37	37	37	37	37.8	38.9	41.1	42.8	46.1	47.8	51.1	55	58						
36	36	36	36	36	36	36	36	37.8	38.9	41.1	42.8	46.1	47.8	51.1	54	57.8					
35	35	35	35	35	35	35	35	36	37	38.9	41.1	42.8	45	47.8	50	52.8	57				
34	34	34	34	34	34	34	34	34	35	37	37.8	40	42.2	43.9	47	48.9	52	55	58	62	-18
33	33	33	33	33	33	33	33	33	34	35	36	37.8	40	42.2	44	46.1	48	51	54	57	60
32	32	32	32	32	32	33	33	33	33	33	34	36	37	38.9	40	42.2	44	47	49	52	54
31	31	31	31	31	31	31	31	31	31	32	33	34	35	36	38	38.9	41	43	45	47	49
30	30	30	30	30	30	30	30	30	30	30	31	32	33	34	35	36	38	39	41	42	44

Figure 2 – Celsius

HEAT STRESS PREVENTION AND CONTROL

APTIM Heat Stress Guideline					
Heat Stress Index					
Danger Category	Heat Index		Heat Syndrome	Resting Time	Water Needed
	°C	°F			
Extreme Danger	55-59	129.3-138.2	Sun stroke imminent without following rest and water intake requirements	15 minutes / hour	250 ml (8.5 oz) / 10 minutes
Danger	46-54	114.8-129.2	Heat Cramps or Heat Exhaustion likely. Heat Stroke possible with prolonged exposure and physical activity.	10 minutes / hour	250 ml (8.5 oz) / 10 minutes
Extreme Caution	38-45	98.7-113	Heat Cramps or Heat Exhaustion possible with prolonged exposure and physical activity.	5 minutes / hour	250 ml (8.5 oz) / 20 minutes
Caution	<37	<98.6	Fatigue possible with prolonged exposure and physical activity.	Normal / Scheduled	250 ml (8.5 oz) / 30 minutes
Do not drink more than 1.5 liters (33.8 oz) per hour (maximum water absorption rate of human body)					



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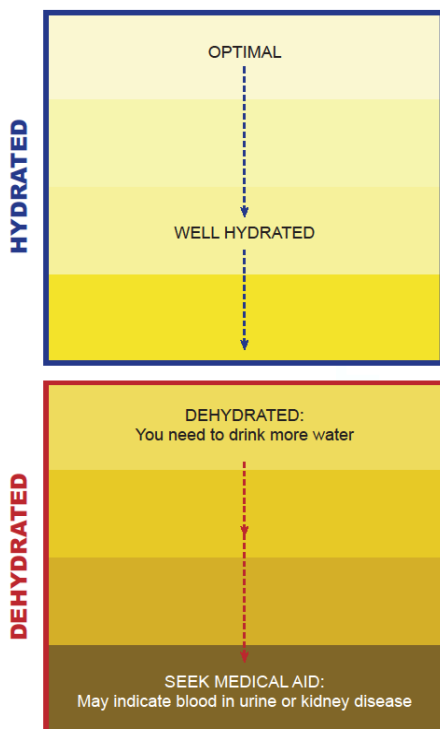
HEAT STRESS PREVENTION AND CONTROL

ATTACHMENT 8.2 URINE COLOR TEST CHART

HEAT STRESS PREVENTION AND CONTROL

Are You Hydrated? Take the Urine Color Test

Urine Color Chart*



*This color chart is not for clinical use.

Water Consumption Table

Heat Category	WBGT Index, °F	Easy Work Water Intake (Quart/Hour)	Moderate Work Water Intake (Quart/Hour)	Hard Work Water Intake (Quart/Hour)
1	78° - 81.9°	½	¾	1
2	82° - 84.9°	¾	1	1½
3	85° - 87.9°	1	1½	2
4	88° - 89.9°	1½	2	2½
5	> 90°	2	2½	3
Body Armor + 45° MOPP 4 + 10° Rest - sitting or standing in the shade if possible				
		Easy Work - walking on a hard surface at less than 2 mph with less than a 35 pound load, weapon maintenance, marksmanship training, drill and ceremony	Moderate Work - patrolling, walking in the sand at 2.5 mph with no load, calisthenics, patrolling, individual movement techniques (e.g. high/low crawl)	Hard Work - walking in the sand at 2.5 mph with a load, field assaults

The fluid replacement volume will sustain performance and hydration for at least 4 HOURS of work in the specified heat category. Fluid needs can vary based on individual differences and exposure to full sun or full shade.
CAUTION: Hourly fluid intake should not exceed 1.5 quarts. Daily fluid intake should not exceed 12 quarts.

Purpose

- With normal kidney function, your level of hydration is indicated by the color of your urine. Some vitamins and supplements may cause a darkening of the urine unrelated to dehydration.
- Since heat-related illness often follows dehydration, this simple test will help protect your health.
- Dehydration also increases your risk for kidney stones.

How does it work?

- Match your urine color to closest color in the chart and read the hydration level on the chart.
- Watch the urine stream not the toilet water, as the water in the toilet will dilute your urine color.
- In response to dehydration, the kidneys conserve water and excrete more concentrated urine; the more concentrated the urine the darker the color.

Prevent Dehydration

- No amount of training or acclimatization can reduce the body's requirement for water.
- Follow the water consumption guidelines in the water consumption table.

<http://usachppm.apgea.army.mil>

CP-070-0408 (Also available as a tip card.)





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HEAT STRESS PREVENTION AND CONTROL

ATTACHMENT 8.3 HEAT DISORDERS AND HEALTH EFFECTS AND FIRST AID

HEAT STRESS PREVENTION AND CONTROL

HEAT DISORDERS AND HEALTH EFFECTS AND FIRST AID

HEAT STROKE: occurs when the body's system of temperature regulation fails, and body temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of work load and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

TREATMENT: If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

HEAT EXHAUSTION: The signs and symptoms of heat exhaustion are headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a medical emergency.

TREATMENT: Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should also be encouraged to get adequate rest.

HEAT CRAMPS: are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused by both too much and too little salt. Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution ($\pm 0.3\%$ NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Recent studies have shown that drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

HEAT COLLAPSE: ("Fainting"). In heat collapse, the brain does not receive enough oxygen because blood pools in the extremities. As a result, the exposed individual may lose consciousness. This

HEAT STRESS PREVENTION AND CONTROL

reaction is similar to that of heat exhaustion and does not affect the body's heat balance. However, the onset of heat collapse is rapid and unpredictable. To prevent heat collapse, the worker should gradually become acclimatized to the hot environment.

HEAT RASHES: are the most common problem in hot work environments. Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

HEAT FATIGUE: A factor that predisposes an individual to heat fatigue is lack of acclimatization. The use of a program of acclimatization and training for work in hot environments is advisable. The signs and symptoms of heat fatigue include impaired performance of skilled sensorimotor, mental, or vigilance jobs. There is no treatment for heat fatigue except to remove the heat stress before a more serious heat-related condition develops.

SUNBURN: When out in the sun, you are exposed to ultraviolet radiation (UVR), which can burn and damage the skin. UVR is made up of a combination of UVA and UVB rays. Only broad-spectrum sunscreens filter out 96.7% of UVR and protect the skin from both UVA and UVB rays. Sunscreens work by either absorbing UVR (chemical filters) or reflecting UVR (physical blockers). Skin Cancer is a potential outcome of sun exposure and is a serious disease that can cause disfigurement and death.

HEAT STRESS PREVENTION AND CONTROL



Protecting Workers from Heat Stress

Heat Illness

Exposure to heat can cause illness and death. The most serious heat illness is heat stroke. Other heat illnesses, such as heat exhaustion, heat cramps and heat rash, should also be avoided.

There are precautions that can be taken any time temperatures are high and the job involves physical work.

Risk Factors for Heat Illness

- High temperature and humidity, direct sun exposure, no breeze or wind
- Heavy physical labor
- No recent exposure to hot workplaces
- Low liquid intake
- Waterproof clothing

Symptoms of Heat Exhaustion

- Headache, dizziness, or fainting
- Weakness and wet skin
- Irritability or confusion
- Thirst, nausea, or vomiting

Symptoms of Heat Stroke

- May be confused, unable to think clearly, pass out, collapse, or have seizures (fits)
- May stop sweating

To Prevent Heat Illness:

- Establish a complete heat illness prevention program.
- Provide training about the hazards leading to heat stress and how to prevent them.
- Provide a lot of cool water to workers close to the work area. At least one pint of water per hour is needed.



OSHA 3154-982 2013

For more information:

Occupational
Safety and Health
Administration

www.osha.gov (800) 321-OSHA (6742)



- Modify work schedules and arrange frequent rest periods with water breaks in shaded or air-conditioned areas.
- Gradually increase workloads and allow more frequent breaks for workers new to the heat or those that have been away from work to adapt to working in the heat (acclimatization).
- Designate a responsible person to monitor conditions and protect workers who are at risk of heat stress.
- Consider protective clothing that provides cooling.

How to Protect Workers

- Know signs/symptoms of heat illnesses; monitor yourself; use a buddy system.
- Block out direct sun and other heat sources.
- Drink plenty of fluids. Drink often and BEFORE you are thirsty. Drink water every 15 minutes.
- Avoid beverages containing alcohol or caffeine.
- Wear lightweight, light colored, loose-fitting clothes.



What to Do When a Worker is Ill from the Heat

- Call a supervisor for help. If the supervisor is not available, call 911.
- Have someone stay with the worker until help arrives.
- Move the worker to a cooler/shaded area.
- Remove outer clothing.
- Fan and mist the worker with water; apply ice (ice bags or ice towels).
- Provide cool drinking water, if able to drink.

IF THE WORKER IS NOT ALERT or seems confused, this may be a heat stroke. CALL 911 IMMEDIATELY and apply ice as soon as possible.

For more information:

Occupational
Safety and Health
Administration

www.osha.gov (800) 321-OSHA (6742)



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HEAT STRESS PREVENTION AND CONTROL

ATTACHMENT 8.4 CONTROL OPTIONS

HEAT STRESS PREVENTION AND CONTROL

CONTROL OPTIONS**Engineering Controls****Ventilation**

General ventilation is used to dilute hot air with cooler air (generally cooler air that is introduced from the outside). This technique clearly works better in cooler climates than in hot ones. A permanently installed ventilation system usually handles large areas or entire buildings. Portable or local exhaust systems may be more effective or practical in smaller areas.

Air Cooling/Air Treatment

Air cooling and treatment differs from ventilation because it reduces the temperature of the air by removing heat (and sometimes humidity) from the air.

Air conditioning is a method of air cooling, but it is expensive to install and operate. An alternative is the use of chillers to circulate cool water through heat exchangers over which air from the ventilation system is then passed. Chillers, like general dilution ventilation, are more efficient in cooler climates than in warmer ones. Local air cooling can be effective in reducing air temperature in specific areas. Two methods have been used successfully in industrial settings. One type, cool rooms, can be used to enclose a specific work place or to offer a recovery area near hot jobs. The second type is a portable blower with built-in air chiller. The main advantage of a blower, aside from portability, is its minimal set-up time.

Convection

Another way to reduce heat stress is to increase the air flow or convection using fans, etc. in the work area (as long as the air temperature is less than skin temperature). Changes in air speed can help workers stay cooler by increasing both the convective heat exchange (the exchange between the skin surface and the surrounding air) and the rate of evaporation. Because this method does not actually cool the air, any increases in air speed must impact the worker directly to be effective.

If the temperature is higher than 95° F, the hot air passing over the skin may actually make the worker hotter and offset any increase gained in evaporative cooling. Increases in air speed have no effect on workers wearing vapor-barrier clothing.

Heat Conduction

Heat conduction solutions include insulating the hot surface(s) that generate(s) the heat and changing the surface itself.

Radiant Heat

Simple engineering controls, such as shields or barriers, can be used to reduce the problem of radiant heat - heat coming from hot surfaces within the worker's line of sight. Any shield, whether temporary or permanent, should be situated so as not to interfere with the air flow. The reflective

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surface of the shield should be kept clean to maintain its effectiveness. Contact the Industrial Hygiene Group for additional guidance as appropriate.

Administrative Controls and Work Practices

- Hot jobs should be scheduled for the cooler part of the day, and routine maintenance and repair work in hot areas should be scheduled for the cooler seasons of the year.
- Reduce the physical demands of work, e.g., excessive lifting or digging with heavy objects;
- Provide recovery areas, e.g., air-conditioned enclosures and rooms;
- Use shifts, e.g., early morning, cool part of the day, or night work;
- Use intermittent rest periods with water breaks based on work rest calculations as described in Table 1 on page 5.
- Use relief workers;
- Use worker pacing; and
- Assign extra workers and limit worker occupancy, or the number of workers present, especially in confined or enclosed spaces.
- Make water and electrolyte drinks available at the workplace and encourage workers to drink as often as possible as the standard practice of potential heat stress situations. In high heat stress environments, an employee can lose as much as one quart of liquid per hour. See section 4.6 of the procedure.

Personal Protective Equipment

Reflective Clothing

Reflective clothing, which can vary from aprons and jackets to suits that completely enclose the worker from neck to feet, can stop the skin from absorbing radiant heat. However, since most reflective clothing does not allow air exchange through the garment, the reduction of radiant heat exposure must more than offset the corresponding loss in evaporative cooling. For this reason, reflective clothing should be worn as loosely as possible. In extreme situations where radiant heat is high, auxiliary cooling systems can be used under the reflective clothing.

Ice Vests

Commercially available ice vests, though heavy, may accommodate numerous ice packets, which are usually filled with water. Carbon dioxide, dry ice, can also be used as a coolant. The cooling offered by ice packets lasts only two to four or less hours at moderate to heavy heat loads, making frequent replacement necessary. However, ice vests do not encumber the worker with air supply or power cords, therefore permitting maximum mobility. Cooling with ice is also relatively inexpensive.

Sunscreen

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The 'sun protection factor' (SPF) measures the protection provided by sunscreens. The higher the SPF, the better the protection from UVR. The minimum SPF that should be used is SPF 30+. No sunscreen offers complete protection from UVR.

Sunscreen shall be applied liberally and evenly to all exposed skin areas. Allow sunscreen to be slowly absorbed into the skin, rather than rubbing it in completely. Apply sunscreen at least 20 minutes before going outside. Put it on whenever you are outside or travelling in the car. You should even use sunscreen in the winter months and on cloudy days.

If using a new sunscreen for the first time, test it first on a small area of skin before applying.

Reapply sunscreen at least every two hours when outdoors, and more frequently if you are sweating.

Use lip balms containing sunscreen.

Wetted Clothing

Another simple and inexpensive personal cooling technique that is effective when reflective or other impermeable protective clothing is worn is the use of wetted terry cloth coveralls or wetted two-piece, whole-body cotton suits. This approach to auxiliary cooling can be quite effective under conditions of high temperatures and low humidity where evaporation from the wetted garment is not restricted.

Water-cooled Garments

These garments range from a hood which cools only the head, to vests and "longjohns", which offer partial or complete body cooling. This equipment requires a battery-driven circulating pump, liquid-ice coolant and a container.

Although this system has the advantage of allowing wearer mobility, the weight of the other components limits the amount of ice that can be carried and thus reduces the effective use time. The heat transfer rate in liquid cooling systems may limit their use to low-activity jobs; even in such jobs, their service time is only about 20 minutes per pound of cooling ice.

An outer insulating jacket should be an integral part of these systems to keep outside heat from melting the ice.

Air Circulation Cooling

The most highly effective, as well as the most complicated, personal cooling system is one that uses circulating air. By directing compressed air around the body from a supplied air system, both evaporative and convective cooling are improved. The greatest advantage occurs when circulating air is used with impermeable garments or double cotton overalls.

One type, used when respiratory protection is also necessary, forces exhaust air from a supplied-air hood ("bubble hood") around the neck and down inside an impermeable suit. The air then escapes through openings in the suit.

Air can also be supplied directly to the suit without using a hood. This can be done three ways:

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- By a single inlet
- By a distribution tree
- By a perforated vest

Also, a vortex tube can be used to reduce the temperature of circulating air. The cooled air from this tube can be introduced either under the clothing or into a bubble hood. The use of a vortex tube acts as a heat pump which separates the air stream into a hot and a cold stream and also can be used to heat in cold climates. It is, however, noisy and requires a constant source of compressed air supplied through an attached air hose. One problem with this system is the limited mobility of workers whose suits are attached to an air hose. These systems should therefore be used in work areas where there is not much moving around or climbing.

Respirator Usage

The use of a self-contained breathing apparatus (SCBA) itself and its additional weight adds stress to the user, and this stress will contribute to the overall heat stress of the worker.

Chemical Protective Clothing

Chemical protective clothing such as the totally encapsulated chemical protection suits will also add to the heat stress problem. Frequent rotation of workers may be necessary.

PROCEDURE

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Revision:

1

Procedure Owner:

HSE

Issuing Authority:

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12/2/2022



COLD STRESS PREVENTION AND CONTROL

1	Added Exceptions and Recordkeeping sections, revised sections 4.3 requirements, 4.4 wind chill, 4.5 control measures.	J. Thompson	12/2/2022
0	Initial issue, transferred information to new APTIM procedure template, made forms AMS-700-01-FM-00701 and 00702 attachments.	M. Karr	2/18/2020
INT	Added section 4.6.2.4	M. Hetzler	7/20/2018
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

COLD STRESS PREVENTION AND CONTROL

1.0 PURPOSE

The purpose of this Procedure is to establish the minimum requirements for Cold Stress Prevention and Control on APTIM sites.

2.0 SCOPE

This procedure applies to all APTIM employees, contractors, subcontractors and visitors associated with an APTIM site.

2.1 Exceptions

Deviations from this procedure must follow AMS-710-05-PR-01300 HSE Request for Variances.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Managers
- Supervisors
- Employees
- Contractors
- Subcontractors
- All Visitors

4.0 PROCEDURE

Each site shall make every attempt to prevent the possibility of incidents and accidents to employees when performing work activities in extreme cold weather environments through compliance with safety regulations, training of employees to properly perform their job activities and through employee involvement in safe work activities.

4.1 Cold Stress

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

4.2 Precautions

4.2.1 The following factors may contribute to a cold injury:

4.2.1.1 Exposure to humidity

4.2.1.2 Exposure to high winds

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4.2.1.3 Contact with wetness or metal

4.2.1.4 Inadequate clothing

4.2.1.5 Age

4.2.1.6 General health

4.2.2 The following physical conditions worsen the effect of cold exposure:

4.2.2.1 Allergies

4.2.2.2 Vascular disease

4.2.2.3 Excessive smoking

4.2.2.4 Excessive drinking

4.2.2.5 Specific drugs and medicines

4.2.3 Workers with blood vessel abnormalities (i.e., Raynauds phenomenon and acrocyanosis) shall take extra precautions to avoid chilling.

4.3 Requirements

4.3.1 An employee who becomes fatigued while working shall be removed to a warm environment and shall rest.

4.3.2 Personnel may take breaks and rest periods in warm environments where available to help prevent cold stress disorders.

4.3.3 The outer layer of clothing should be removed when entering the heated shelter. The other layers shall be loosened to allow for sweat evaporation.

4.3.4 Sitting or standing for prolonged periods of time shall be avoided in cold environments.

4.4 Wind Chill Index

4.4.1 Air temperature alone is not sufficient to assess the cold hazard in certain environments. Therefore, the wind chill index along with the air temperature shall be used.

4.4.2 The wind chill index is the cooling effect of any combination of temperature and wind velocity or air movement. See Attachment 8.1.

4.4.3 The wind chill index takes into account the wind velocity.

COLD STRESS PREVENTION AND CONTROL

4.4.3.1 An Anemometer may be purchased to measure wind speed in areas where wind chill can be a factor.

4.4.4 The wind chill index shall be used to evaluate the cold hazard.

4.5 Control Measures

4.5.1 Engineering Controls - Cold stress can be reduced by the following controls:

4.5.1.1 General or spot heating may be used to increase temperature at the site.

4.5.1.2 If work is being performed with bare hands for 10 or more minutes, special provisions should be made to keep the worker's hands warm.

4.5.1.3 When necessary, equipment and processes should be substituted, isolated, relocated, or redesigned to reduce the cold stress.

4.5.1.4 Power tools, hoists, cranes, and lifting aids shall be used to reduce the metabolic workload.

4.5.1.5 Heated warming shelters such as tents, cabins, automobiles, or trucks should be made available if work is performed continuously in an equivalent chill temperature of 30°F or below. Workers will be encouraged to use them.

4.5.2 Administrative Controls - These controls include the following work practices and rules designed to reduce total cold stress burden on the body.

4.5.2.1 Scheduling a work/rest regime to reduce the peak of cold stress; enforcing scheduled work breaks. See Attachment 8.2.

4.5.2.2 Urging frequent intake of warm, sweet, caffeine-free, non-alcoholic drinks or soup at regular intervals.

4.5.2.3 Scheduling the coldest work for the warmest part of the day when possible.

4.5.2.4 Moving work to warmer areas whenever possible; preplanning the activities prior to entering the cold environment.

4.5.2.5 Assigning extra workers to highly demanding jobs.

4.5.2.6 Allowing workers to pace themselves, and take extra work breaks when needed.

4.5.2.7 Providing relief workers for break times.

4.5.2.8 Teaching workers the basic principles of preventing cold stress and emergency response to cold stress.

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- 4.5.2.9 Maintaining protective supervision or a buddy system for those who work at 20 degrees or below.
- 4.5.2.10 Allowing new employees time to adjust to conditions before they work full-time in cold environments.
- 4.5.2.11 Arranging work to minimize sitting or standing still for long periods at a time.
- 4.5.2.12 Reorganizing work procedures to ensure as much of a job as possible is performed in a warm environment.
- 4.5.2.13 Include the weight and bulkiness of clothing when estimating work performance criteria.
- 4.5.3 Personal Protective Equipment - It is the responsibility of the employee to dress in the clothing appropriate to the expected work conditions. The correct clothing shall be addressed in the following manner:
 - 4.5.3.1 It is important to preserve the air space between the body and the outer layer of clothing in order to retain body heat.
 - 4.5.3.2 It is most important to protect the feet, hands, head, and face. The hands and feet are the farthest from the heart and become cooled most easily. Keeping the head covered is important because as much as 40 percent of heat is lost when the head is exposed to the elements.
 - 4.5.3.3 All clothing and equipment shall be fitted properly and not interfere with circulation.
 - 4.5.3.4 Clothing shall be of the loose-fitting type. Tight clothing of synthetic fabrics interferes with evaporation.
 - 4.5.3.5 Recommended first layer of clothing shall include a cotton T-shirt and shorts or underpants under cotton and wool thermal underwear. Two-piece long underwear is preferred because the top can be removed and put on as needed.
 - 4.5.3.6 Socks with high wool content are best. When two pairs are worn, the inside sock should be smaller, and made of cotton.
 - 4.5.3.7 Wool or thermal trousers are preferred. The best kind is either quilted or specially lined.
 - 4.5.3.8 Belts are not recommended because they cut off the circulation at the waist. Suspenders are encouraged.
 - 4.5.3.9 Trousers shall fit over the top of the boot to prevent snow and ice from entering.
 - 4.5.3.10 An anorak or snorkel coat or arctic parka shall fit loosely and have a drawstring at the waist. The sleeves shall fit snugly. A hood prevents the escape of warm air from the

COLD STRESS PREVENTION AND CONTROL

neck and also tunnels the warm air past the face to give a slightly warmer breathing air.

4.5.3.11 When wearing a hard hat, liners will be available for use.

4.5.3.12 A face mask or scarf is vital when working in cold wind. A ski mask gives better visibility than a snorkel hood. Face protectors should be removed periodically to check to for frostbite.

4.5.3.13 Safety glasses with side shields shall be worn in PPE required areas. Special safety goggles to protect against ultraviolet light and glare are required when there is snow coverage which could cause a potential eye exposure hazard.

4.6 Training

4.6.1 The workers shall be instructed in safety and health procedures.

4.6.2 The training shall include the following instructions:

4.6.2.1 Proper rewarming procedures and appropriate first aid treatment.

4.6.2.2 Proper clothing practice.

4.6.2.3 Recognition of signs and symptoms of impending cold conditions such as hypothermia or excessive cooling of the body (even when shivering does not occur), frostnip, or frostbite. Safe work procedures.

4.6.2.4 Recognize the dangers and destructive potential caused by unstable snow build-up, sharp icicles, and ice dams and know how to prevent accidents caused by them.

4.7 First Aid

4.7.1 Frostbite

4.7.1.1 Never rub affected area. Rubbing may cause further damage to soft tissue.

4.7.1.2 Warm area gently by soaking in water. The water should start out cold and warm up about every 5 minutes by adding water that is 5° warmer. Do not immerse affected part in water that is more than 105°F. If a thermometer is not available, test the water temperature with your hand. If the water temperature is uncomfortable, it is too hot.

4.7.1.3 Keep the affected area under water until it looks red and feels warm.

4.7.1.4 Loosely bandage the area with dry, sterile dressing. If fingers and toes are frostbitten, place cotton or gauze between them before the loose bandage.

4.7.1.5 Do not break blisters.

COLD STRESS PREVENTION AND CONTROL

4.7.1.6 Get professional help immediately.

4.7.2 Hypothermia

4.7.2.1 Remove any wet clothing and dry the victim.

4.7.2.2 Warm the body gradually by wrapping the victim in blankets or putting on dry clothing and moving the individual to a warmer place. Do not warm body quickly by immersing the person in hot water. Rapid warming can cause dangerous heart problems. If available, apply heating pads or other heating source to the body. Keep a protective barrier, such as towel, blanket, or clothing between heat source and victim to avoid burning the individual.

4.7.2.3 If the victim is alert, give warm liquid to drink. Never give liquids to an individual who is unconscious or semi-conscious.

4.7.2.4 Handle the victim gently.

4.7.2.5 Get professional help immediately.

5.0 TERMINOLOGY

Term	Definition
Anemometer	An instrument to measure wind speed.
Cold stress	The disruption of the body's thermal balance due to exposure to cold.
Core temperature	The temperature of the inner parts of the body most accurately determined by measuring with a rectal temperature.
Site	Any location, facility or project site where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities and/or project sites.

6.0 REFERENCES

6.1 Required Forms/Checklists

None	

6.2 Other Internal References

None	

COLD STRESS PREVENTION AND CONTROL

6.3 Other External References

None

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
HSE Education and Training (AMS-710-05-PR-01900)	Seven Years	Project Site, AMS Learning Management System

8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	Wind Chill Index
Attachment 8.2	Work/Warm-Up Schedule



Procedure Number: AMS-710-01-PR-00700

Revision: 1

Approval Date: 12/2/2022

COLD STRESS PREVENTION AND CONTROL

ATTACHMENT 8.1 WIND CHILL INDEX



COLD STRESS PREVENTION AND CONTROL

WINDCHILL INDEX

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



Procedure Number: AMS-710-01-PR-00700

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COLD STRESS PREVENTION AND CONTROL

ATTACHMENT 8.2 WORK/WARM-UP SCHEDULE

COLD STRESS PREVENTION AND CONTROL

WORK WARMUP SCHEDULE FOR 4 HOURS WORK SHIFT

Air Temperature - Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
		Max. Work	No. of	Max. Work	No. of	Max. Work	No. of	Max. Work	No. of	Max. Work	No. of
1.-26° to -28°	-15° to -19°	(Norm. Breaks)	1	(Norm. Breaks)	1	75 min	2	55 min	3	40 min	4
2.-29° to -31°	-20° to -24°	(Norm. Breaks)	1	75 min	2	55 min	3	40 min	4	30 min	5
3.-32° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
4.-35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease		Non-emergency work should cease	
5.-38° to -39°	-35° to -39°	40 min	4	30 min	5	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	
6.-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	
7.-43° & below	-45° & below	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	

- Schedule applies to moderate to heavy work activity with warm-up breaks of ten (10) minutes in a warm location. For light-to-moderate work (limited physical movement), apply the schedule one step lower. For example, at -30°F with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
- The following is suggested as a guide for estimating wind velocity. If accurate information is not available:
- 5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.
- If only the Windchill Factor is available, a rough rule of thumb for applying it, rather than the temperature and wind velocity factors given above, would be: 1) special warm-up breaks should be initiated at a wind chill of about 1,750 W/m²/hr; 2) all non-emergency work should have ceased at or before a wind chill of 2,250 W/m²/hr. In general, the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the absolute temperatures in the colder ranges, since windy conditions rarely prevail at extremely low temperatures.

* From Occupational Health & Safety Division, Saskatchewan Dept. of Labor

PROCEDURE

Procedure Number:

AMS-710-01-PR-00900

Revision:

3

Procedure Owner:

HSE

Issuing Authority:

HSE Education & Training Manager

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3/28/2022



NOISE CONTROL AND HEARING CONSERVATION

3	Revised to address changes to Alberta legislation that will take effect 4/1/2023.	M. Dotson	2/24/2023
2	Added reference to CSA standards	T. Felt	3/28/2022
1	Added reference to Noise Monitoring Form (form number was updated to correspond with this procedure)	M. Karr	4/2/2021
0	Initial Issue. Incorporated two legacy forms AMS-710-FM-01-00901, AMS-710-FM-01-00902 as attachments.	M. Karr	2/17/2020
Rev	Changes	Approved	Date

Parent Document:

N/A

NOISE CONTROL AND HEARING CONSERVATION

1.0 PURPOSE

To establish the minimum requirements for Noise Control and Hearing Conservation on APTIM projects.

2.0 SCOPE

This procedure, along with any associated guidance identified applies to and shall be followed by all subsidiaries and affiliates of APTIM at all worksites and locations, foreign and domestic, for the public (government) and private (commercial) contracts.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Project Managers
- HSE Managers
- Site Safety and Health Officers
- Employees

4.0 PROCEDURE

4.1 Project/Site Requirements

- 4.1.1 Each location, with the assistance of the Site Safety and Health Officer (SSHO) and the Health, Safety, and Environmental (HSE) Manager, shall develop a list of high noise activities and require the use of hearing protection for all employees engaged in those activities, regardless of the duration of the activity.
- 4.1.2 Once identified, the SSHO shall provide training on hearing protection and noise levels to impacted employees. Include in this training the proper use of hearing protection for high noise activities and the proper use of hearing protection (including the proper method of insertion) in the new employee orientation and shall review the information from time to time in Toolbox Meetings.
- 4.1.3 Assess employee exposure to occupational noise hazards.
- 4.1.4 Provide employees with hearing protection from exposure to occupational noise in excess of the permissible levels.
- 4.1.5 In all cases where the sound levels exceed the permissible exposure limit, a continuing, effective Hearing Conservation Program shall be administered.
- 4.1.6 When determining control measures for noise exposure the hierarchy of control must be used with personal protective equipment (PPE) adopted as the last resort.

NOISE CONTROL AND HEARING CONSERVATION

4.2 Monitoring and Hazard Determination

4.2.1 When information indicates that employee's exposure may equal or exceed an eight (8) hour time-weighted average (TWA) of 90 decibels, A weighted, (dBA), at construction sites or 85 dBA (82 dBA in Alberta, Canada) at active facilities, a Monitoring Program shall be developed and implemented. This Program determines which employees must be included in the Hearing Conservation Program and the proper hearing protective devices.

4.2.2 Monitoring is conducted by a qualified individual who, through professional credentials, training, or experience, has the necessary qualifications to specify and use the type of monitoring equipment (area or personal) that will best represent employee exposures.

In Alberta, Canada, the person conducting the assessment must be:

- Trained in conducting noise exposure assessments,
- Trained in the calibration, operation and maintenance of the equipment used in conducting noise exposure measurements and,
- Able to demonstrate an understanding of the methods used for measurement.

4.2.3 Exposure monitoring should be documented using AMS-710-01-FM-00903, Noise Monitoring Form, or equivalent.

In Alberta, Canada, recorded results of noise exposure assessments must include a record of the tasks being carried out by the worker whose noise exposure is being evaluated. Records will be retained for at least three years from the date of the assessment.

4.2.3.1 Where circumstances such as high worker mobility, significant variations in sound level, or a significant component of impulse noise make area monitoring generally inappropriate, sites shall use representative personal sampling to comply with monitoring requirements.

4.2.3.2 All continuous, intermittent, and impulsive sound levels from 80 decibels to 130 decibels shall be integrated into the noise measurements.

4.2.4 When employees are subjected to sound levels exceeding those listed in Attachment 7.1 - 29 CFR 1926.52—Occupational Noise Exposure Table, feasible administrative and engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of the table, PPE shall be provided and used to reduce sound levels within the levels of the table.

4.2.5 When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. Exposure to different levels for various periods of time shall be computed according to the formula set forth below.

NOISE CONTROL AND HEARING CONSERVATION

$$F(e) = \left(\frac{T_1}{L_1} \right) + \left(\frac{T_2}{L_2} \right) + \dots \left(\frac{T_n}{L_n} \right)$$

- F(e) The equivalent noise exposure factor.
- T The period of noise exposure at any essentially constant level.
- L The duration of the permissible noise exposure at the constant level (from Attachment 7.2).
- If the value of F(e) exceeds unity (1) the exposure exceeds permissible levels.

4.2.6 Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

4.2.7 Monitoring will be repeated whenever a change in equipment, process, or staffing occurs such that:

- Additional employees will be exposed in excess of 90 dBA as an eight (8) hour time weighed average (TWA) at construction sites or 85 dBA (82 dBA in Alberta, Canada) at active facilities or
- The attenuation provided by the hearing protective devices being used may be inadequate for the increase in the noise level.

4.2.8 In addition to requiring the use of Hearing Protection Devices (HPD) for Company operations that result in high noise levels, the Company will obtain information from the Client on the levels of noise in their facilities and will instruct employees to comply with all posted requirements for HPD's in the Clients' facilities.

4.3 Notification of Monitoring Results

4.3.1 Employees who are monitored will receive written notification of the results within 5 working days of the sites receipt of sampling results. The results will also be posted (by job classification, not by name) to notify other affected employees.

4.3.2 Sites shall provide affected employees or their representatives with an opportunity to observe any noise measurements conducted.

4.4 Exposure Control Methods

Every consideration will be given to the use of effective engineering and administrative controls to reduce employee exposure to occupational noise hazards. However, when these controls are infeasible or ineffective, appropriate PPE will be provided to reduce noise levels to the permissible range.

4.5 Audiometric Testing

4.5.1 When required, employees whose exposures equal or exceed an eight (8) hour TWA of 90 decibels at construction sites or 85 dBA at active facilities, will have a baseline

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audiometric examination within 6 months of exposure to noise above the PEL (or within one year if a mobile test van is used). Audiometric testing shall be provided at no cost to employees. This is in accordance with the requirements outlined in 29 CFR 1910.95 (g) & (h). Annual audiometric examinations will be compared to the baseline. The employee shall be instructed to limit occupational and non-occupational noise exposure for at least 14 hours prior to the audiometric examination. The baseline audiometric examination will be conducted within six months of the employee's first exposure to noise above 90 dBA.

- The audiometric testing will be performed by trained technicians that calibrate their audiometers daily. Once a year the audiometer should be given an extensive calibration. All technicians who perform the testing are to be certified by the Council for Accreditation in Occupational Hearing Conservation or equivalent.

4.5.2 Each annual audiometric examination will be compared to the baseline to determine if the audiogram is valid and if a Standard Threshold Shift has occurred. If the audiometric examination indicates an STS, the test shall be repeated within 30 days to determine if the Shift is Permanent or Temporary.

4.5.3 If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift has occurred, the employee shall be informed of this fact in writing, within 21 days of determination. Employees who suffer a Standard Threshold Shift will be refitted and retrained in the use of hearing protective devices and provided with hearing protectors offering greater attenuation, if necessary. Employees not using hearing protectors shall be fitted with hearing protectors, trained in the use and care, and required to use them.

4.5.4 In Alberta, Canada the company providing the audiometric testing services must provide aggregated test result data to the employer at least once per year. They must also advise the employer of any concerns that, in their opinion, are related to noise management at the worksite or area.

4.5.5 Employees shall be referred for a clinical audiological evaluation or an ontological examination, as appropriate, if additional testing is necessary or if the site suspects that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.

4.5.5.1 The employee shall be informed of the need for an ontological examination if a medical pathology of the ear that is unrelated to the use of hearing protection is suspected.

4.6 Fit Testing of Hearing Protection (Alberta, Canada)

4.6.1 Prior to the use of hearing protection employees will be required to fit tested for the hearing protection devices they use and wear. This is to prevent noise induced hearing loss. The effectiveness of hearing protection is greatly reduced if the equipment does not fit correctly or is not inserted or worn correctly.

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4.6.2 Fit testing of hearing protection can be conducted either quantitatively or qualitatively. Quantitative methods are the preferred standard but require special equipment. Qualitative methods are simpler to perform and rely on the worker's sense of hearing.

4.6.3 Tips to check the fit of foam ear plugs

- Have the worker use their fingertips to feel if the ear plugs are fully inserted into the ear canal, use a mirror to check, or have a coworker visually confirm.
- Have the worker cup hands tightly over their ears. If sounds are much more muffled with their hands in place, the ear plugs may not be sealing properly.
- Have the worker talk out loud. Their voice should sound hollow, as if they are talking into a barrel.
- Have the worker listen for noises around them. Noises should not be as loud as they were before inserting the ear plugs.

4.6.4 Tips to check the fit of earmuffs

- Read the manufacturer's instructions on how to don the earmuffs.
- Make sure the earmuffs cover the whole ear, and do not have anything between that prevents a good seal between the earmuff and the ear (for example, prescription eyewear).
- Have the worker listen for noises around them. Noises should sound muffled and not be as loud as they were before putting on the earmuffs.

4.7 Hearing Protective Devices

4.7.1 The use of hearing protective devices will be required for employees who are exposed to an average of 90 dBA or more during an eight- (8) hour period at construction sites or 85 dBA at active facilities.

4.7.2 Canadian locations require the use of hearing protection devices for employees who are exposed to 85 dBA (90 in Quebec) or more during an eight- (8) hour, period 84 dBA or more in a ten – (10) hour period, or 83 dBA in a twelve-hour forty-one-minute (12:41) period. Double hearing protection must be used for any noise exposure greater than or equal to 110 dBA. Double hearing protection must equal CSA Class A earplug + A or B earmuff and limited exposure time to keep sound reaching the worker's ear drum below 85 dBA.

4.7.3 Sites shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. Sites shall use an evaluation method described in 29 CFR 1910.95 App B: Methods for Estimating the Adequacy of Hearing Protection Attenuation.

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- 4.7.3.1 For employees who have experienced a standard threshold shift, hearing protectors shall attenuate employee exposure to an 8-hour time-weighted average of 85 decibels or below.
- 4.7.3.2 The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. Sites shall provide more effective hearing protectors where necessary.
- 4.7.3.3 Hearing protectors shall be replaced, as necessary.
- 4.7.4 At least three types of HPD's offering adequate attenuation shall be made available so that employees may select the more comfortable style.
- 4.7.5 HPDs will be provided at no cost to the employee and shall be replaced, as necessary.
- 4.7.6 Employees will be monitored to ensure proper use of HPDs.

4.8 Training

- 4.8.1 Each employee included in the Hearing Conservation Program will receive initial and annual training on:
- The effects of noise on hearing.
 - The purpose of hearing protective devices, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care.
 - The purpose of audiometric testing and an explanation of the test Practices.
- 4.8.2 Active Sites shall post a copy of the OSHA standard on the project site and give a copy to employees upon request.
- 4.8.3 Use the Noise Protection Flow Sheet Attachment 7.2 as a guide to manage noise levels at each location.

4.9 Audiometric Test Records Retention

- 4.9.1 Employee Audiometric Tests - shall be retained for the duration of the affected employee's employment plus 30 years.
- 4.9.2 Noise Exposure Measurement Records - shall be retained for two years.

The record shall include:

- Name and job classification of the employee.
- Date of the audiogram
- Examiner's name

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- Date of the last acoustic or exhaustive calibration of the audiometer
- Employee's most recent noise exposure assessment
- Measurements of the background sound pressure levels in audiometric test rooms.
- All audiometric records shall be provided upon request to employees, former employees, and representatives designated by the individual employee.

4.10 Hearing Loss Prevention Practices

The noise exposure monitoring and hearing conservation programs shall be evaluated annually, and all deficiencies will be addressed. A schedule for correction of deficiencies will be developed and monitored to ensure continuous improvement.

5.0 TERMINOLOGY

Term	Definition
Active Facility	APTIM facility that falls under the OSHA General Industry Standards
Hearing Protection Device (HPD)	A type of plug or muff that reduces the amount of sound that reaches the ear drum through a designed Noise Reduction Rating.
OSHA Recordable Hearing Loss	A work-related Standard Threshold Shift (STS) in hearing in one or both ears, and the employee's total hearing level is 25 decibels (dB) or more above audiometric zero (averaged at 2000, 3000, and 4000 Hz) in the same ear(s) as the STS.
Site	Any location, facility, or project where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities and/or project sites.
Standard Threshold Shift (STS)	A change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000m and 4000 Hz in either ear

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-01-FM-00903	Noise Monitoring Form

6.2 Other Internal References

None	

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6.3 Other External References

29 Code of Federal Regulations (CFR) 1926.52, Occupational Noise Exposure Table

29 CFR 1910.95 (g) & (h)

29 CFR 1910.95 App B – Methods for Estimating the Adequacy of Hearing Protector Attenuation

CSA Standard Z94.2-14 (R2019), Hearing Protection Devices — Performance, Selection, Care, and Use

CSA Standard Z1007-16, Hearing Loss Prevention Program Management

CSA Standard Z107.56-18, Measurement of Noise Exposure

CSA Standard Z107.6:16 (R2020) Audiometric Testing for use in Hearing Loss Prevention Program

7.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 7.1	Occupational Noise Exposure Table
Attachment 7.2	Noise Protection Flowchart



Procedure Number: AMS-710-01-PR-00900

Revision: 3

Approval Date: 2/24/2023

NOISE CONTROL AND HEARING CONSERVATION

ATTACHMENT 7.1 OCCUPATIONAL NOISE EXPOSURE TABLE



Procedure Number: AMS-710-01-PR-00900

Revision: 3

Approval Date: 2/24/2023

NOISE CONTROL AND HEARING CONSERVATION

OCCUPATIONAL NOISE EXPOSURE TABLE

Duration per day (hours)	Sound level dBA slow response
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
1/4 or less	115



Procedure Number: AMS-710-01-PR-00900

Revision: 3

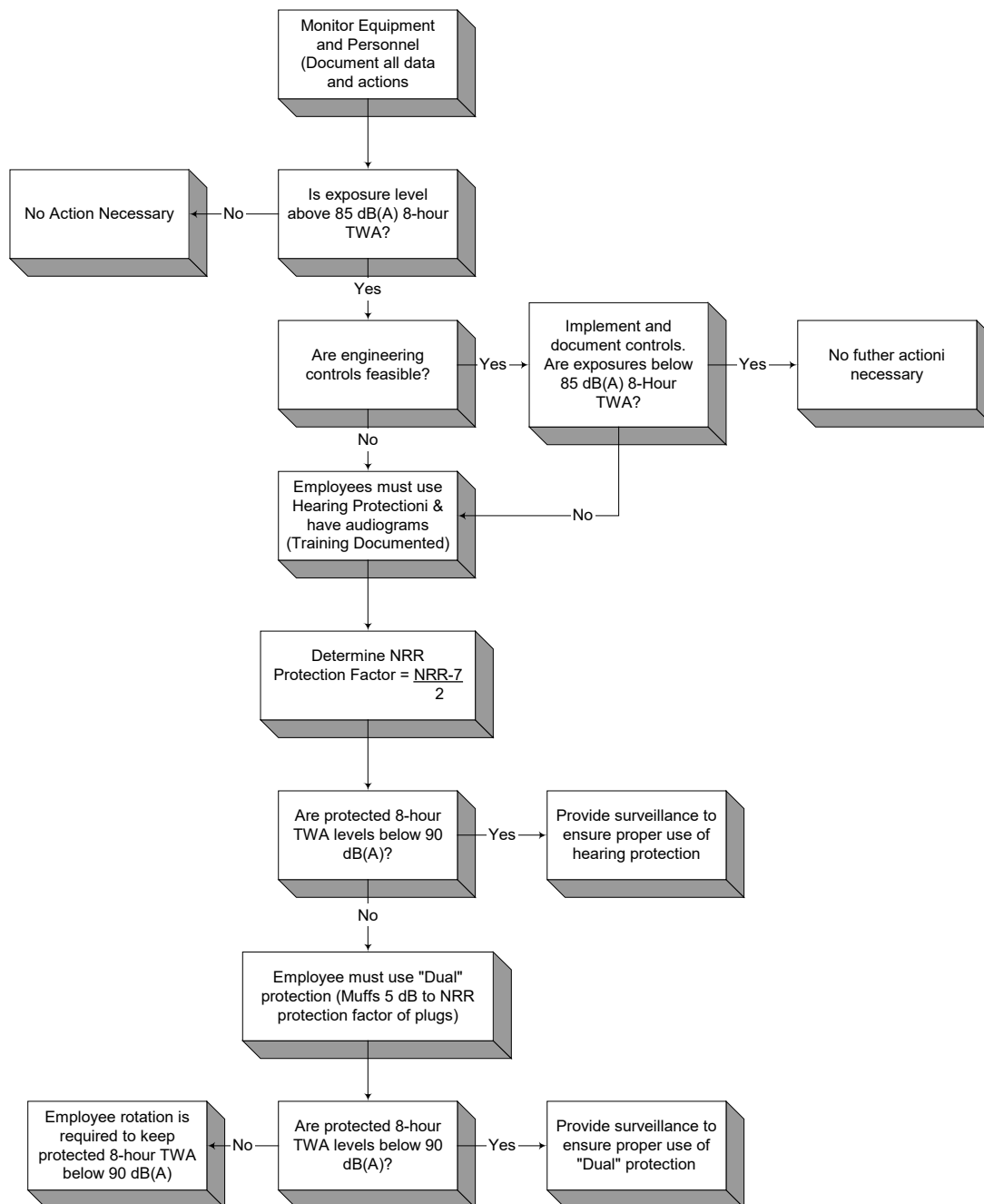
Approval Date: 2/24/2023

NOISE CONTROL AND HEARING CONSERVATION

ATTACHMENT 7.2 NOISE PROTECTION FLOWCHART

NOISE CONTROL AND HEARING CONSERVATION

NOISE PROTECTION FLOWCHART



PROCEDURE

Procedure Number:

AMS-710-01-PR-03600

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Sr. VP HSE

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6/26/2023



SUBSTANCE ABUSE

8	Clarified use of alcohol during work day in section 4.3.2 and the time for reapplying after a positive drug screen in section 4.11.4.	J. Thompson	6/26/2023
7	Changed to reflect minimum 30 day wait after first positive and minimum 6 months after second positive.	J. Thompson	01/18/2023
6	Revised language in sections 4.6.1 and 4.7.1, added term "medical review officer", added Exceptions and Recordkeeping sections, updated Attachment 8.2.	M. Dotson	12/15/2022
5	Added 10 CFR 707 Workplace Substance Abuse Programs at DOE sites to section 6.3 Other External References.	J. Thompson	11/12/2021
4	Updated substance abuse program manager information in Attachment 7.2	J. Thompson	10/5/2020
3	Revised section 4.8 to clarify the existing requirement related to drug and alcohol testing following an incident involve a commercial motor vehicle. Minor revision to heading on section 4.8.2. Added Attachment 7.2 DOE Outfall Mercury Operations Supplement	M. Karr	6/11/2019
2	Revised sections 4.6.1 and 4.6.2, to clarify that prospective employees may be subject to drug/alcohol testing. Also clarified in section 4.7.1 that 15% quarterly is acceptable in addition to 5% monthly. Transferred information to new APTIM template. Updated reference sections.	M. Hetzler	3/12/2019
1	Added clarification, "from the Client/Host site or facility" to 4.11.3.1.	M. Hetzler	6/20/2018
0	Revised the disciplinary actions and rehire eligibility following termination due to drug/alcohol violations. Also modified the drug screening / confirmation policy based on vendor recommendations. Additional minor changes were also made to address personnel titles and roles throughout the document. Puerto Rico Supplement added as Attachment	M. Hetzler	3/8/2018
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

SUBSTANCE ABUSE

1.0 PURPOSE

The purpose of this procedure is to establish the minimum requirements for the implementation and management of the Substance Abuse Program on APTIM sites. More stringent regulatory agency or client procedures, as well as conflicting national, state, and local laws, may supersede these requirements. Each project is responsible for identifying the most stringent procedure and including those requirements in the site-specific safety plan. We adhere to the most stringent of the applicable requirements.

2.0 SCOPE

This procedure applies to all applicants, prospective employees, existing employees, subcontractors and individuals working for APTIM through temporary staffing agencies.

2.1 Exceptions

All exceptions to this procedure will follow AMS-710-05-PR-01300 HSE Request for Variances.

3.0 RESPONSIBILITIES

The following employees have responsibilities defined in this procedure:

- APTIM Managers
- APTIM Supervisors
- APTIM Employees
- APTIM Subcontractors
- APTIM Human Resources
- HSE Representative
- Corporate Medical Services
- Corporate Security

4.0 PROCEDURE

4.1 General

- 4.1.1 APTIM (on behalf of itself, its affiliates subsidiaries, and related entities) has established this substance abuse procedure to further its objective to maintain a work environment free from substance abuse; provide a safe and healthy environment for our employees and the general public; maintain the quality and integrity of APTIM's products and services; preserve APTIM's reputation in the communities where APTIM operates; and protect and secure our property and information.
- 4.1.2 Sites shall review and implement applicable jurisdictional regulations if more stringent than the requirements defined in this procedure. If anything in this procedure conflicts

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with a legal requirement in the jurisdiction in which the employee works, the legal requirement is followed, as long as AMS-710-05-PR-01300 (HSE Request for Variances) requirements are met. Contact Corporate Medical Services or Legal as needed if you are unsure about the applicable procedures in a jurisdiction.

- 4.1.3 Subcontractors and lower tier subcontractors (a lower tier subcontractor is any subcontractor at any level working on any company project for a third party) are required to provide documentation that they maintain, at a minimum, a substance abuse prevention program equal to this procedure.
- 4.1.4 APTIM reserves the right to modify this procedure at any time consistent with changes in medical procedures, technologies, laws, or APTIM's operational needs. This procedure shall not, in any event, alter the basic "at will" status of any employee, nor shall it create any expressed or implied contractual rights relative to employment with APTIM.
- 4.1.5 This procedure is subject to the laws and regulations of the jurisdiction in which the employee works. Each APTIM site shall use this procedure as a template to create a site-specific substance abuse procedure. The site-specific substance abuse procedure shall be reviewed and approved by Corporate Medical Services and Legal.
- 4.1.6 This procedure sets forth the minimum substance abuse standards for APTIM. In accordance with the applicable authority matrices, business groups or projects may implement more stringent requirements as needed to satisfy any specific industry concerns, additional contractual, legal, or regulatory obligations that may be applicable.
- 4.1.7 This procedure applies to employees not covered under Department of Transportation (DOT) Testing Regulation 49 CFR Part 40. DOT regulated employers must comply with 49 CFR Part 40 and applicable DOT Agency regulations. Additional guidance can be found in AMS-710-02-PR-03900, Commercial Motor Vehicle Safety.

4.2 Illegal Drugs

- 4.2.1 The use, possession, concealment, manufacturing, promotion, transportation, distribution, or sale of illegal drugs by any employee or any employee of any subcontractor or lower tier subcontractor of APTIM is strictly prohibited and is grounds for disciplinary action up to and including termination.
- 4.2.2 Illegal drugs are defined as any drug (or the synthetic or generic equivalents of such drugs) not approved for medical use by the Food and Drug Administration (FDA), that are illegal under United States federal law or the law of the jurisdiction in which an employee is employed. This definition of illegal drugs includes but is not limited to marijuana, heroin, hashish, opiates, cocaine, hallucinogens, methamphetamine, synthetic cannabinoids, cathinones, depressants, and stimulants not prescribed for current medical treatment by a licensed physician.
- 4.2.3 The possession or use or being under the influence while on APTIM premises of any prescription medication not enclosed in the original manufacturer's packaging,

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pharmacy prescription bottle/container, or not legally prescribed to the possessor/user, is strictly prohibited and grounds for disciplinary action up to and including employment termination. This policy applies to all forms of medication, including pills, gel caps, tablets, lozenges, powders, liquids/gels, sprays, skin patches, etc.

- 4.2.4 To avoid the appearance of being in violation of this procedure, employees using over-the-counter medication while on APTIM premises should keep it stored in the manufacturer's packaging until needed.

4.3 Alcohol

- 4.3.1 Possession or consumption of alcoholic beverages while on APTIM premises is a violation of this procedure and is grounds for disciplinary action up to and including termination. "Alcohol or alcoholic beverages" means any beverage (e.g., beer, wine, spirits) with an alcohol concentration greater than 0.05% or subject to regulatory control for purchase or distribution
- 4.3.2 Consumption of alcohol within legal and reasonable limits at authorized, company-sponsored events on APTIM premises or approved by APTIM Management is not a violation of this procedure. To be clear, APTIM allows approved events after working hours at which alcohol is served. Consumption of alcohol during the workday when the employee intends to go back to work (ex: lunch during the workday) is not authorized.

4.4 Legally Prescribed Drugs and Over-The-Counter-Medication

- 4.4.1 Any employee who is taking prescribed or over-the-counter medication which according to their physician or the medication manufacturer is capable of adversely affecting the employee's mental or physical ability to perform the essential functions of the employee's job or to otherwise work safely must communicate this information to his/her supervisor, HSE Representative, or Human Resources representative.
- 4.4.2 Due to medical confidentiality policies, the employee is not required to disclose any specific medication or medical condition to the employee's supervisor. The employee is responsible for working with Human Resources to consult with the prescribing physician to properly evaluate the employee's ability to perform the essential functions of their position and any restrictions on the employee's ability to work safely in this position. Human Resources will supply an accurate job description listing the essential functions of the job for review by the health care provider as part of this process.
- 4.4.3 Failure to report the use of any prescribed or over-the-counter medication capable of affecting the employee's mental or physical ability to perform the essential functions of the job, or to otherwise work in a safe manner is a violation of this procedure and is grounds for disciplinary action up to and including termination of employment.

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4.5 Drug and Alcohol Testing

- 4.5.1 APTIM may use any type of drug and alcohol test permitted by the laws of the jurisdiction in which an employee is employed to detect drug or alcohol usage in violation of this procedure.
- 4.5.2 Drug and alcohol tests may be used in the following circumstances, as permitted under the laws of the jurisdiction in which the employee is employed:
- Post Offer/Pre-Employment
 - Random/Unannounced
 - Post-Incident
 - Reasonable Cause/Reasonable Suspicion (For Cause)
 - Post Rehabilitation/Follow Up
 - Pre-Access
 - Return to Work or Duty
 - When otherwise requested or required by the client or by contract and pursuant to all applicable laws and regulations.
- 4.5.3 Employees agree to comply with all drug/alcohol test collection facility rules and to sign all consent forms required by the drug/alcohol test collection facility.

4.6 Post Offer/Pre-Employment Drug/Alcohol Testing (Prior to an employee commencing work activities)

- 4.6.1 Following an employment offer and prior to commencing job duties beyond HSE Induction, the prospective employee will be tested for alcohol and illegal drugs when allowed by law. Testing varies from State and location but Aptim policy requires all pre-employment candidates to pass screening level protocols. No prospective employee will begin work on any project or at any subcontractor location without submitting to and successfully passing a laboratory certified pre-employment drug test pursuant to the requirements set forth in this procedure.
- 4.6.2 If an employee has been laid off or terminated from APTIM and subsequently rehired with APTIM after a 30-day time period, the prospective employee may be required to submit to a post offer/pre-employment drug/alcohol test before beginning work on a project.
- 4.6.3 An employee who was terminated for a positive drug or alcohol test, including refusing to take a drug or alcohol test, and re-applies for employment must fulfil all of the requirements of Section 4.11.4 of this procedure. Upon successful completion of Section 4.11.4, the prospective employee must take and pass a post offer/pre-employment drug/alcohol test.

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4.6.4 If a prospective employee refuses a post offer/pre-employment drug and/or alcohol test, the offer will be rescinded, and the employee will not be considered for a position with APTIM.

4.7 Random/Unannounced Drug/Alcohol Testing

4.7.1 A random/unannounced drug testing program is in effect, and all employees will be subject to random/unannounced drug testing unless the laws of the jurisdiction prohibit such testing. Accordingly, due to certain jurisdictional laws and exclusions, certain offices, facilities, project locations, or job positions may not be included in random/unannounced testing.

4.7.2 Employees at locations whereby random/unannounced testing is allowed will be included in the selection process for random/unannounced drug testing by using a computer-based random number generator that is matched to a reference number associated with each employee's identification number. These tests shall be random, unannounced, and conducted in the concurrent month that the random selections are provided. At a minimum, the program normally tests on a monthly average basis 5% (or 15% quarterly) of the affected work force not covered under a U.S. federal regulated program or managed under a drug and alcohol testing program specified in a collective bargaining agreement.

4.7.3 AMS-710-01-FM-03602 Random Employee Generator may be used to assist in generating a list of random selections.

4.8 Post Incident Drug/Alcohol Testing

4.8.1 Subject to the laws and regulations of the jurisdiction, APTIM conducts post-incident drug/alcohol tests on each employee whose action or inaction may have contributed to or caused the incident as determined through an initial investigation or witness statements.

4.8.1.1 This post-incident testing shall be performed as soon as practicable following work-related incidents.

4.8.1.2 Drivers involved in any incident with a Commercial Motor Vehicle will be subject to alcohol testing no later than 8 hours after the incident, and drug testing no later than 32 hours after the incident."

4.8.2 The following shall apply when a post-incident drug/alcohol test is conducted:

- The drug/alcohol test must have a completed custody and control form.
- In the event of a non-negative rapid drug test result, the employee will be suspended from work pending confirmation by the Medical Review Officer (MRO).
- The specimen collection shall be administered by a third-party collection company with appropriate custody and control forms completed and certified labs used.

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4.9 Reasonable Cause/Reasonable Suspicion Drug/Alcohol Testing

4.9.1 Subject to the laws and regulations of the jurisdiction in which the employee works, reasonable cause/reasonable suspicion drug/alcohol testing is performed when at least two trained company representatives observe an employee displaying signs and symptoms of impairment and may have used a substance prohibited by this procedure or when APTIM receives credible information creating a reasonable suspicion of drug/alcohol use. The two company representatives shall each complete the Reasonable Suspicion Documentation form (AMS-710-01-FM-03603), describing their specific and concurrent observations or the credible information that created the reasonable suspicion. Such symptoms, behaviors, or information includes, but is not limited to, the following:

- Extreme drowsiness, respiratory depression, large pupils, constricted pupils, and slurred speech;
- Disorientation;
- Drunken behavior with or without the smell of alcohol;
- Admission by the employee of hallucinations or drug/alcohol use on the job;
- Unexplained tremors, convulsions, or violent behavior;
- Excessive absenteeism/tardiness, including established absentee patterns;
- Significant decline in job performance;
- Significant change in personality (misconduct, insubordination);
- Unexplained absences from workstation;
- Information from credible source(s) indicating possible substance abuse or use in violation of policy;
- Negative changes in personal hygiene; or
- Difficulty in motor coordination;
- Smelling alcohol on employee's breath or person.

4.9.2 The designated HSE Representative/Site Manager is responsible for discreetly removing the suspected employee from duty and escorting the employee to an office for privacy. The employee's supervisor and the site Human Resource representative should be present in the office. The HSE Representative, HR Representative, the employee's supervisor, and others (as deemed necessary) must work together collectively to evaluate if the signs and symptoms documented by the two trained company representatives are due to a medical condition or an emergency event that needs to be addressed immediately.

4.9.3 The employee shall be suspended from duty until the receipt of a negative test. If an onsite third-party drug screen collector is not available, a company representative shall drive the employee suspected to a collection facility for drug/alcohol testing. If the

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collection is conducted by an APTIM employee, the collector must meet the certification requirements of 49 CFR Part 40 Subpart C. The employee suspected will not be allowed to return to work until the receipt of a negative test.

- 4.9.4 Upon completion of a positive drug/alcohol test, the Company representative shall ensure the employee has arrangements to be transported home.
- 4.9.5 Employees directly observed exhibiting potential signs of impairment will not be allowed to return to work until the receipt of a negative test result from the MRO. If the drug/alcohol test result is negative, the completion of a fitness-for duty evaluation is needed before the employee may return to work. The HSE Representative will coordinate with Human Resources to submit a job description and detail about the observed signs of impairment to the appropriate health care provider for an evaluation of the employee's ability to safely perform the essential functions of the position and any work-related restrictions or accommodations needed.

4.10 Drug and Alcohol Testing Procedures

Note: All procedures are subject to federal law and the law of the jurisdiction in which the employee being tested works. Changes to these procedures in order to conform to legal requirements are authorized. Contact Corporate Medical Services or Legal as needed if you are unsure about the applicable procedures in a jurisdiction.

4.10.1 Collection Procedure

Unless governed by a Fitness for Duty Program pursuant to 10 CFR Part 26, APTIM follows the U.S. DOT Drug and Alcohol Testing Procedure as outlined in 49 CFR Part 40, at a minimum, for urine and breath alcohol specimen collections. APTIM follows specific written procedures for specimen collection, shipping, testing, storage, and analysis (AMS-710-01-WI-03601). These procedures are available for review and can be requested from your supervisor, APTIM's Human Resources Department or an APTIM Designated Employer Representative (DER).

4.10.2 Laboratories

APTIM selects laboratories certified by the U.S. Department of Health and Human Services Substance Abuse and Mental Health Services Administration under the National Laboratory Certification Program (NLCP) for all urine testing required under this part. The laboratories conduct tests in accordance with standards of the Mandatory Guidelines for Federal Workplace Drug Testing Programs (Mandatory Guidelines).

4.10.3 Medical Review Officer

The Medical Review Officer ("MRO") shall meet all qualification training requirements as outlined in 49 CFR Part 40.121(c). Each job site must maintain documentation showing that the MRO for their drug screens currently meets all requirements of 49 CFR Part 40.121(c). The MRO will be knowledgeable about and have clinical experience in controlled substances abuse disorders, including detailed knowledge of alternative medical explanations for laboratory confirmed drug test results, about issues relating to adulterated and substituted specimens as well as the possible

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medical causes of specimens having an invalid result and the DOT's MRO guidelines and agency regulations.

4.10.4 Cost of Testing

APTIM pays all costs associated with Company-required drug and alcohol testing.

4.10.5 Time of Testing

4.10.5.1 Employees shall report to the drug/alcohol testing location designated by APTIM immediately after notification from the Company of a testing obligation. Generally, the Company schedules drug/alcohol tests immediately before, during, or immediately after an employee's work hours, and employees must report to the testing facility within two hours after notification. If the employee requires additional time, the employee shall provide the reason for the time extension request immediately to the designated HSE Representative. Requests should be presumed denied unless specifically granted by the site HSE Representative within the two-hour timeframe.

4.10.5.2 Employees shall make an attempt at providing a specimen within 30 minutes of arrival to the collection facility/location. The only exception is if the collection facility is unable to perform the testing within 30 minutes of arrival at no fault of the employee.

4.10.6 Rapid Drug Testing Cups (Instant Cups)

Rapid drug testing cups should only be used when authorized by the law of the jurisdiction in which the employee works. (Check with Corporate Medical Services or Legal if you are unsure.) If a rapid drug testing cup is used, the following policies will apply:

- The rapid drug testing cup must be a U.S. Food and Drug Administration (FDA) approved screening device.
- A third-party certified collector must be used unless written approval is obtained from APTIM's DER.
- A result from a rapid drug testing cup is never considered positive; if a drug metabolite is detected the result is considered as non-negative.
- If a rapid drug testing cup is non-negative then an employee may be suspended pending confirmation from the laboratory and MRO.
- A prospective employee will not proceed in the hiring process beyond HSE Induction with a non-negative rapid drug testing cup result until a confirmed negative result is received from the MRO. Employment will be contingent on the final laboratory and MRO result.
- All specimens from a rapid drug testing cup, whether negative or non-negative, must be sent to the laboratory for analysis.

4.10.7 Procedure for Observed Specimen Collection (As permitted by the laws and regulations of the jurisdiction in which the employee is employed.)

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4.10.7.1 A directly observed specimen collection is required without advance notice to the employee/prospective employee if:

- The drug test is a return-to-duty test or a follow-up test collection;
- An employee/prospective employee provides a specimen and the temperature is out-of-range;
- An employee/prospective employee leaves the testing area without the approval from an APTIM representative after notice of testing and before giving a sample;
- There is clear and convincing evidence that the employee/prospective employee is trying to substitute a specimen sample with another sample;
- The employee/prospective employee provides a specimen that is too dilute to test as determined by the laboratory;
- An adulterant is detected in the employee/prospective employee's specimen as determined by the laboratory;
- When an observed collection is requested by the certified collector or MRO.

4.10.7.2 A third-party observer of the same sex as the employee/prospective employee must be utilized; If written approval is obtained from APTIM's DER, a company observer of the same sex may be utilized if a third party of the same sex is unavailable.

4.11 Results of Drug/Alcohol Tests

4.11.1 Compliance with the Substance Abuse Procedure is a Condition of Employment

Employees who violate any provision in this procedure will be subject to disciplinary action, up to and including termination.

4.11.2 Refusal to Test

Refusal to test is considered a positive test and is grounds for disciplinary action, up to and including termination of employment. Refusal to test under this procedure includes:

- Failure to appear for any test (except a pre-employment test) within 2 hours, after being directed to do so by an APTIM representative.
- Failure to provide a urine/alcohol specimen for any drug/alcohol test because the employee left the testing site before the testing process commenced or was completed.
- Fails to permit the observation or monitoring of the provision of the specimen in the case of a directly observed or monitored collection in a drug test.
- Failure to provide a sufficient amount of urine/breath/saliva when directed, in cases in which the MRO determines that there was no adequate medical explanation for the failure.
- Failure or refusal to take an additional drug/alcohol test that APTIM or the collector has directed the employee to perform.

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- Failure to undergo a medical examination or evaluation, as directed by the MRO as part of the verification process, or as directed by the DER.
- Failure to cooperate with any part of the testing process (e.g., refusing to empty pockets when directed by the collector, behaving in a confrontational way that disrupts the collection process, failure to wash hands after being directed to do so by the collector).
- For an observed collection, failure to follow the observer's instructions to raise clothing above the waist, lower clothing, and underpants, and to turn around to permit the observer to determine whether a prosthetic or other device that could be used to interfere with the collection process is present.
- Possession or wearing a prosthetic or other device that could be used to interfere with the collection process.
- Admitting to the collector or MRO that the employee adulterated or substituted the specimen.
- Submitting a specimen that the MRO reports verified as adulterated or a substituted test result.

4.11.3 Positive Drug/Alcohol Tests

4.11.3.1 Any employee who tests positive for drugs or alcohol, after a MRO confirmed result, will be removed by the HSE Representative, Site project manager, or Site Human Resources Manager from the Client/Host site or facility and confidentially notified of the positive result. The employee who tests positive will be subject to disciplinary action up to and including termination. If a prospective employee tests positive after a conditional offer of employment, the offer of employment will be rescinded.

4.11.3.2 Urine screening and confirmation levels, relative to drug testing, designated by APTIM can be found on the APTIM HSE intranet page.

4.11.3.3 The breath alcohol screening and confirmation levels designated by APTIM, and disciplinary actions, are shown below and can also be found on the APTIM HSE intranet page.

Initial Screening Breath Alcohol Test	
BAC	Action Taken
0.00	Negative Test; no further action required
>0.00	Confirmation test required after 15 minutes

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Confirmation Breath Alcohol Test		
BAC	Action Taken for 1st offense	Action Taken for 2nd offense (within a 12-month period)
> 0.00 but less than 0.04	Remainder of current shift + 3-day suspension	Up to Termination
.04 or greater	Up to Termination	Up to Termination

- 4.11.3.4 Any employee who has a confirmed breath alcohol test result greater than 0.00 percent but less than 0.04 percent Breath Alcohol Concentration (BAC) will be suspended without pay for the remainder of the current day/shift and for the following 3 consecutive workdays/shifts. Upon returning to work, the employee must perform a breath alcohol test prior to gaining access to the work location. If the result is greater than 0.00 percent BAC, the employee will be subject to disciplinary action up to and including termination.
- 4.11.3.5 Any employee who has a confirmed breath alcohol test result of 0.04 BAC or greater will be subject to disciplinary action up to and including termination.
- 4.11.3.6 Any employee who has a confirmed breath alcohol test level greater than 0.00 percent BAC twice within a twelve-month period will be subject to disciplinary action up to and including termination. This includes any random and/or post-incident testing that the employee may be subject to over the same duration.
- 4.11.3.7 Any employment offer to a prospective employee who has a confirmation breath alcohol test level greater than 0.00 percent BAC will be immediately rescinded.
- 4.11.3.8 Breath alcohol tests must be administered by a screening test technician (only for initial screenings) or breath alcohol technician (for initial screening and confirmation tests).
- 4.11.3.9 Employees who have been drinking alcohol on their personal time and are called in for “emergency” work must declare to their supervisor that they have been drinking alcohol within the last 8 hours of reporting to work; employees who declare to their supervisor that they have been drinking alcohol on their personal time will not be subject to disciplinary action but will not work the emergency shift. Any employee who arrives at work after using alcohol will be subject to breath alcohol testing and the subsequent appropriate disciplinary action, up to and including termination.
- 4.11.3.10 Any employee who is scheduled “on-call” should not drink any alcohol during the “on-call” timeframe. Any employee who drinks alcohol while scheduled “on-call” who is called in for work and shows symptoms of impairment or signs of alcohol consumption when arriving at work will be scheduled for alcohol testing and will be subject to disciplinary action up to and including termination.

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- 4.11.3.11 The consequences of a positive test result and procedures for appealing the positive test result will be explained prior to any disciplinary or adverse action being taken. Every employee has the right to inspect or obtain a copy of the positive drug/alcohol test result.
- 4.11.3.12 In the event of a positive rapid drug screen or a breath alcohol test with a confirmed result that exceeds the minimum, the employee must make personal arrangements to be transported home. If the employee is unable to make arrangements, a company representative must make transportation arrangements for the employee. No employee who has tested positive to a drug or breath alcohol test will be permitted to drive upon exiting the site.
- 4.11.3.13 Drug/Alcohol-free awareness programs have been created for all employees as well as reasonable suspicion supervisor training to assist in identifying and addressing drug and alcohol use by employees.
- 4.11.3.14 Any employee who is arrested during non-work hours for a drug or alcohol-related offense is required to report the arrest to the APTIM HSE Representatives prior to the start of the employee's next shift. The employee may be subject to perform a reasonable suspicion drug and breath alcohol test where permitted by local laws and regulations.
- 4.11.4 Rehire Eligibility after Positive Drug/Alcohol Tests
- 4.11.4.1 Former employees are eligible to reapply after termination of employment for a positive drug/alcohol test. APTIM will not consider a former employee terminated for a positive drug/alcohol test for rehire until the requirements below are met and a minimum of 30 days have elapsed since the employment termination. APTIM will not consider a former employee terminated for a second offense violation of this policy until at least six (6) months have elapsed since employment termination and the requirements below are met. APTIM will not consider prospective employees whose prior offer of employment was rescinded based in part on a positive pre-employment drug/alcohol test until at least 30 days have elapsed since the positive test and the requirements below are met.

APTIM may decide to require a longer period (more than 30 days or 6 months) before considering a former employee for rehire or prospective employee for hire, depending on the facts and circumstances (such as the reason for testing, the employee's past performance, whether or not the substance indicated in the positive test was legal or not, and other relevant factors.)

In addition to these time period guidelines, the following requirements must be met in order for a former/prospective employee to be reconsidered for employment:

- Successfully completing an evaluation by a certified Substance Abuse Professional (SAP) if in the U.S. and counselling or rehabilitation if outside of the U.S. Successful completion of all recommended courses of treatment established by the SAP/counselor and providing documentation from the SAP/counselor to APTIM's DER; the former employee/prospective employee will be responsible for all costs associated with completing this requirement.

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- Completing the Agreement to Submit to Alcohol and Substance Abuse Screening form (AMS-710-01-FM-03601); and
- 4.11.4.2 Completing the Employee Rehire and Return to Work Agreement form (AMS-710-01-FM-03605) Former employees/prospective employees rehired/hired after a positive alcohol or drug test are subject to periodic, unannounced follow-up drug/alcohol testing under direct observation for 12 months as permitted by laws and customs of the jurisdiction in which the employee works.
- 4.11.5 Appealing a Drug Test Result
- 4.11.5.1 Any employee may appeal a drug test result. The employee/prospective employee should contact the MRO to discuss, explain, or contest the test results within the appropriate time period under the appropriate law of the jurisdiction.
- 4.11.5.2 Any employee/prospective employee who desires to appeal a drug test result can have the original specimen retested. The employee must make a request to appeal the test result directly to the MRO within the specific time period (generally within 72 hours after initial notification). The procedure for appealing a drug test result includes:
- The retest will only be completed on an aliquot of the original specimen that yielded the positive result. A second specimen will not be collected.
 - The cost of the retest is the responsibility of the employee/prospective employee. Payment must be made directly to the MRO prior to the specimen's retest.
 - The retest will be completed at a Substance Abuse and Mental Health Services Administration (SAMHSA) certified laboratory of the employee/prospective employee's choice.
 - The employee/prospective employee will send the name and address of the SAMHSA certified laboratory along with the payment to the MRO before the specimen will be released for testing.
 - The result of the retest is the final determining result regarding the appeal process. No further retesting is allowed.
- 4.11.6 Adulterated, Substituted, Invalid, or Diluted Specimens
- Adulterated or substituted specimens, which the analytical laboratory test cannot yield a result, as determined by the MRO and in accordance with U.S. federal guidelines, are treated as positive test results.
- 4.11.6.1 In the event of an invalid specimen the MRO will attempt to determine if there is a medical explanation for the invalid result. Any re-testing of an employee, because of an invalid urine sample submission, shall be done under the direction of the MRO and in accordance with the time of submission requirements outlined in Section 4.11.5 of this procedure; retesting may require collection under direct observation. In the event that a specimen's temperature is out-of-range, an observed recollection will be administered when / as permitted by the law and regulations of the jurisdiction in which the employee

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works. If the specimen's temperature is out-of-range after the observed recollection, the result will be considered a refusal to provide a valid specimen.

- 4.11.6.2 Dilute specimens at the laboratory will be tested at Level of Detection (LOD). A dilute negative drug test result will be treated as negative; a dilute positive test result will be treated as positive result.

4.12 Privacy and Confidentiality

4.12.1 General Procedure

- 4.12.1.1 Individual privacy and confidentiality will be carefully protected in maintaining a record retention program. Any information obtained through drug and alcohol test results, unrelated to the illegal use of drugs or alcohol, will be held in strict confidence by the MRO and not released to APTIM, except as necessary to ensure the individual's fitness to perform essential job functions safely. With the exception of the testing laboratory, the MRO, DER (or other individuals designated by APTIM to receive test results and resulting employment decisions), the individual, identified results of an employee or prospective employee's drug or alcohol tests will not be released to anyone without the express written authorization of the tested individual, except in response to a valid subpoena, as ordered by a court or governmental agency, or where necessary to meet client requirements and only where appropriate confidentiality measures are taken. Results reported to APTIM by the MRO as a confirmed positive are held in strict confidence, protecting individual privacy and confidentiality carefully.

- 4.12.1.2 Written records shall be stored in locked containers or in a secured location. Such records will not be made a part of individual personnel files. Unless an employee gives his or her written consent, the employee's drug and alcohol test results will not be released to a subsequent employer absent a court order or unless required by law.

4.12.2 Searches and Inspections

- 4.12.2.1 APTIM, or its client or other designee, may at any time conduct searches and inspections on APTIM premises where there is reason to believe that an employee may be in possession of substances prohibited under this procedure. APTIM, or its client or other designee, may inspect an employee's personal property on APTIM Premises for the purpose of determining if employees are in possession, use, transportation, or concealment of any prohibited items, substances, or paraphernalia. Searches and inspections may be conducted without prior announcement. Submission to a search or inspection is a condition of employment. Failure to cooperate and not sign an Agreement to Submit to Alcohol and Substance Abuse Screening form (AMS-710-01-FM-03601) shall result in immediate suspension and is grounds for disciplinary action up to and including termination. Employees shall acknowledge and agree that they have no expectation of privacy in any space, item, locker, property, or equipment located on APTIM Premises or equipment owned, operated, leased, provided, or controlled by APTIM or a Host Employer.

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4.12.2.2 If an illegal substance is found on APTIM premises, the employee(s) making the discovery is responsible to report the finding immediately. Based on the circumstances, the employee(s) will first notify his/her supervisor and/or Corporate Security. Corporate Security will be the APTIM Lead in handling the reported finding and will ensure the following parties are notified: Corporate Medical Services, local law enforcement, the designated HSE Representative, the Site/Facility Manager, and the Human Resource Business Unit Director. The employee(s) who discovered the illegal substance should document his/her findings thoroughly.

4.12.3 Criminal Drug/Alcohol Conviction

Any employee convicted of a criminal drug or alcohol offense (meaning a finding of guilt or imposition of sentence, including a plea of *nolo contendere*) must notify APTIM within five (5) days of that conviction/plea/sentence. Failure to notify APTIM will be grounds for disciplinary action up to and including termination.

4.12.4 Drug and Alcohol Education and Employee Assistance Program (EAP)

4.12.4.1 APTIM conducts drug/alcohol use awareness education for all employees, as well as Reasonable Suspicion Supervisor/Manager training, to assist in identifying and addressing drug and alcohol use by employees. The purpose of drug/alcohol awareness education is to:

- Provide employees with an awareness of drug/alcohol use problems concerning the health and safety aspects of such use.
- Help employees recognize symptoms of abuse.
- Help employees recognize drugs/alcohol and drug paraphernalia.
- Help employees understand this procedure and penalties for violating this procedure and to outline procedures for handling situations related to this procedure.
- Reinforce employee awareness of APTIM's work rules on this subject.
- Reinforce the dangers of drug/alcohol abuse in the workplace.
- Provide information on the availability of drug/alcohol counseling, rehabilitation, and employee assistance.

4.12.4.2 Any employee desiring information on substance use and abuse or a list of Employee Assistance Programs available in the area should contact APTIM's Human Resources Department.

4.12.4.3 An employee's decision to seek assistance will not be used as a basis for any disciplinary action.

4.12.4.4 Participation in the EAP shall not be used as a counter measure to any scheduled drug / alcohol tests or resulting disciplinary action. Any employee notified by an APTIM representative of the requirement to perform a drug and alcohol test may not participate

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in the Employee Assistance Program (EAP) until after a negative test result has been received from the MRO.

4.13 Miscellaneous

- 4.13.1 The written substance abuse procedure and all related procedure exhibits must be made available to all employees/prospective employees. The Agreement to Submit to Alcohol and Substance Abuse Screening form must be signed by each employee and prospective employee.
- 4.13.2 Subcontractors, suppliers, alliance companies, and vendors shall inform each of their employees/prospective employees of the provisions of this procedure and of the applicability of their respective company's substance abuse procedures.

5.0 TERMINOLOGY

Term	Definition
Alcohol Confirmation Test	A subsequent test using an EBT, following a screening test with a result that meets or exceeds the minimum BAC level that provides quantitative data about the alcohol concentration.
Alcohol Screening Device (ASD)	A breath or saliva device, other than an EBT, that is approved by the National Highway Traffic Safety Administration and placed on a conforming products list for such devices.
APTIM Premises	Any work location or property owned by APTIM and any other property where APTIM employees are performing work.
Breath Alcohol Concentration (BAC)	A breath alcohol test determines how much alcohol is in your blood by measuring the amount of alcohol in the air you breathe out (exhale).
Breath Alcohol Screening Test	An analytical procedure to determine whether an employee may have a prohibited concentration of alcohol in a breath or saliva specimen.
Breath Alcohol Technician	A person who instructs and assists employees in the alcohol testing process and operates an evidential breath testing device.
Custody and Control Form (CCF)	Form used to document every urine collection required by the drug testing program.
Chain of Custody (COC)	The procedure used to document the handling of the urine specimen from the time the employee gives the specimen to the collector until the specimen is destroyed. This procedure uses the Testing Custody and Control Form (CCF).
Designated Employer Representative (DER)	The corporate DER has knowledge of and authority to make decisions about the testing process, answer questions about the procedure, receives test results from the MRO and BAT and takes immediate action to remove employees from their

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	duties when they violate drug and alcohol testing rules, such as test positive or refuse a test.
Drug Confirmation Test	A second analytical procedure performed on a urine specimen to identify and quantify the presence of a specific drug or drug metabolite.
Drug-Related Paraphernalia	As defined in a regulatory context, drug paraphernalia includes any instrument or implement or combination adapted for administration of controlled substances—e.g., hypodermic syringe, needle, metal or plastic (snorting) tube—under circumstances which reasonably indicate an intention to use such instruments for the purposes of illegally administering any controlled dangerous substance.
Drug Screening Test	In drug testing, a test to eliminate “negative” urine specimens from further analysis or to identify a specimen that requires additional testing for the presence of drugs.
Evidential Breath Testing Device (EBT)	A device approved by NHTSA for the evidential testing of breath at the .02 and .04 alcohol concentrations, placed on NHTSA's Conforming Products List (CPL) for “Evidential Breath Measurement Devices”, and identified on the CPL as conforming to the model specifications available from NHTSA's Traffic Safety Program.
Gas Chromatography Mass Spectrometry (GC-MS)	A person who is a licensed physician and who is responsible for receiving and reviewing laboratory results generated by an employer's drug testing program and evaluating medical explanations for certain drug test results.
Medical Review Officer (MRO)	A person who is a licensed physician and who is responsible for receiving and reviewing laboratory results generated by an employer's drug testing program and evaluating medical explanations for certain drug test results.
Screening Test Technician (STT)	A person who instructs and assists employees in the alcohol testing process and operates an ASD.
Substance Abuse Professional (SAP)	Evaluates employees who have violated DOT regulations and/or APTIM substance abuse program's procedure and make recommendations concerning education, treatment, follow-up testing, and aftercare. The SAP determines if the employee demonstrates successful compliance with the recommended education and treatment.

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-01-FM-03601	Agreement to Submit to Alcohol and Substance Abuse Screening

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6.2 Other Internal References

AMS-710-01-FM-03602	Random Employee Generator
AMS-710-05-PR-01300	HSE Request for Variance
AMS-710-05-PR-02200	Incident Reporting
AMS-710-01-FM-03603	Reasonable Suspicion Documentation Form
AMS-710-01-FM-03605	Employee Rehire and Return to Work Agreement
AMS-710-01-WI-03601	Specimen Collection Protocols

6.3 Other External References

10 CFR Part 26, Fitness for Duty
49 CFR Part 40, Department of Transportation Drug and Alcohol Testing
10 CFR 707, Workplace Substance Abuse Programs at DOE Sites

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
Positive test results	Indefinite	Electronic HR Recordkeeping System and Employee Medical File

8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	Puerto Rico Supplement
Attachment 8.2	DOE Outfall Mercury Operations Supplement



Procedure Number: **AMS-710-01-PR-03600**

Revision: **8**

Approval Date: **6/26/2023**

SUBSTANCE ABUSE

ATTACHMENT 8.1 PUERTO RICO SUPPLEMENT

SUBSTANCE ABUSE

PUERTO RICO SUPPLEMENT

1. Purpose: Per the provisions of Puerto Rico Laws Annotated Title 29 §§ 161-161h, relating to “Controlled Substances Detection Testing in the Private Work Sector” the Supplement provisions below add to and where necessary modify APTIM’s Substance Abuse Program (“Policy”). To the extent of any inconsistency between the Policy and this Puerto Rico Supplement, the terms of this Supplement will control.
2. Effective Date: For applicants to and employees working at APTIM’S Puerto Rico operations the Policy and this section of the Supplement to the Policy will be effective May 7, 2018.
3. Puerto Rico’s Workplace Drug Testing Law Does Not Apply to Workplace Alcohol Testing. Puerto Rico’s workplace drug testing law does not apply to workplace alcohol testing law and thus APTIM reserves the right to conduct alcohol tests and take any disciplinary or other action with respect to prohibited alcohol use, without limitation, except to the extent, and only to the extent, limited by, if any, other applicable law and pursuant to its Policy.
4. Illegal Use of Controlled Substances. The illegal use, production, distribution or possession of controlled substances is a crime under the laws of Puerto Rico and the United States of America, and can result in imprisonment, probation, fines and/or other penalties.
5. Forbidden Conduct. The possession, distribution, use, consumption and illegal traffic of controlled substances is conduct forbidden by the Company.
6. Education and Available Assistance. The Company’s plan to educate and inform employees on the health risks associated with illegal drug use consists of maintenance of a resource file regarding such risks and periodic discussion of such risks and this Policy and its administration during employee meetings (e.g., safety meetings). The Company has also adopted an employee assistance program that includes services relating to substance abuse. For more information, please refer to Policy Section 4.13.4 (Drug and Alcohol Education and Employee Assistance Program (EAP)).
7. Rules of Conduct. The Company’s rules of conduct relating to the use of illegal drugs set forth throughout the Policy (e.g., in Policy Section 4.2 (Illegal Drugs) and employees who violate those rules will be subject to discipline up to and including termination of employment, except as may be limited under law. Please also refer to the Consequences for Policy Violations – First Time Positive Drug Tests section of this Puerto Rico Supplement
8. Drug Testing Circumstances
9. Testing for detection for controlled substances (illegal drugs) will only take place in the circumstances below (alcohol testing will take place as set forth in the Policy).
10. Pre-Employment Testing. Pre-employment drug testing will only be performed as part of a general physical medical examination, required of all candidates for employment, also referred to as “applicants.” (“Candidate for employment” means any person who applies to APTIM for a job, whether verbally or in writing, and who is offered a job, even if conditionally).

SUBSTANCE ABUSE

11. Reasonable Suspicion Testing. Employees are subject to testing for illegal drugs if the Company has individualized reasonable suspicion that an employee is using illegal drugs. Testing will take place within twenty-four (24) hours of a reasonable suspicion determination. Reasonable suspicion determinations will be made by two (2) supervisors of an employee, one of whom must be the employee's direct supervisor. Individualized reasonable suspicion" is the moral conviction that a specific person is under the effects or influence of illegal drugs or is a drug user regardless of whether the fact is established afterwards or not. Said suspicion must be grounded on observable and objective facts, such as:

- a. Direct observation of the use or possession of illegal drugs;
- b. Physical symptoms which indicate being under the influence of illegal drugs;
- c. A persistent pattern of abnormal conduct or erratic behavior in the workplace.

Reasonable suspicion testing will be conducted within 24 hours of the supervisory reasonable suspicion determinations.

12. Post-Accident Testing. An employee will be subject to post-accident testing when an accident occurs in the workplace attributable to the employee in connection with his/her job functions and that occurs during working hours. An employee will not be required to take a drug test if he/she is not in full control of his/her mental faculties because of the accident, unless a medical order provides otherwise. An accident is an accidental occurrence, event or action resulting from an act or function of an employee which affects or puts at imminent risk the health, safety or property of any natural or juridical person. Post-accident test will be performed as soon as is reasonably practicable following an accident.

13. Follow-Up (Rehabilitation) Testing. Subject to applicable law, including Puerto Rico law, if an employee, in the course of his/her work, is admitted to a rehabilitation program, APTIM may require the employee to submit to follow-up tests as needed. As an example, follow-up tests will be conducted periodically after an employee has a first-time confirmed positive test result as part of an appropriate rehabilitation program to which an employee is referred under the Policy and this Puerto Rico Supplement.

Procedures to be Followed to Conduct Drug Tests.

- a. Applicants and employees – also referred to as “donors” -- will be directed to provide a urine specimen* at a Company designated facility/location. Each donor must verify his or her identity to the collector. In return, a donor may ask collection site personnel to disclose their identity. *Note: a urine specimen will be collected, except in circumstances in which it is not possible to take the same.
- b. The donor's urine specimen will be collected by a trained collection site person (the Collector). To protect themselves, donors should ensure that entries on any forms presented by the Collector are accurate.
- c. The Collector may require donors to remove unnecessary outer garments that might conceal items used to tamper with the collection process.
- d. The privacy of donors will be respect - urine sample collection will not be observed while the sample is being provided. The Collector will take the sample from the donor

SUBSTANCE ABUSE

at the moment the donor abandons the voiding room (e.g., a bathroom). For greater reliability, the temperature of the sample will be taken in the presence of the donor who has submitted to the test, as a measure to determine if the sample has been adulterated. In the event that the adulteration of a sample is determined, the same shall be discarded and the donor shall be requested to provide a new one, this time in the presence of a person of his/her same sex, who is a member of the laboratory personnel, so that the privacy of the employee may be protected to the maximum,

- e. Drug tests shall be administered and conducted by a certified laboratory in accordance with scientifically accepted analytical and sample custody chain procedures pursuant to recommendations in the Mandatory Guidelines for Federal Workplace Drug Testing Program. The sample shall not be submitted to any type of test other than that which is strictly necessary for the detection of controlled substances.
 - f. Every sample with a positive drug test result shall be submitted to a second corroborative analysis by the gas spectrometry chromatography method.
 - g. A Medical Review Officer (the MRO) will review and evaluate confirmed positive test results and will, in accordance with applicable law and recommended standards, attempt to contact the donor to determine if there is a valid medical explanation for the confirmed positive test result. The MRO will thereafter report the result to APTIM.
 - h. Before APTIM will take any disciplinary action based on a positive drug test result, said result must be verified through a confirming laboratory test.
14. Notification to Laboratory. If an applicant or employee receives a confirmed positive drug test result, he/she will be given an opportunity to notify the confirming laboratory of any information which is relevant to the interpretation of the result, including the use of prescribed or over the counter drugs.
15. Settlement of Disputes Over Drug Test Results. Procedures for settlement of disputes over drug test results are described in Policy Section 4.12.5 (Appealing a Drug Test Result). Please also refer to the Right to Retest (Employees Only) paragraph of this Puerto Rico Supplement. To the extent of any inconsistency between Policy Section 4.12.5 and that Right to Rest (Employees Only) paragraph that paragraph will control.
16. Right to Retest (Employees Only). The Company will advise an employee with a confirmed positive drug test in writing that he/she is entitled to contract another laboratory to obtain a second result from the same sample, and should he/she wish to do so, the minimum amount of the obtained sample needed will be transferred to an independent laboratory contracted by him/her, to conduct the tests. If a second test made at an employee's request is negative, the Company may suggest three (3) laboratories, of which the employee must choose one (1) for a third test at the Company's expense. The result of the third test is binding.
17. Maximum of Two Tests Per Year. Employees may be required to submit to a maximum of two (2) drug tests per year, unless they have a confirmed positive test result from one of such tests or as part of a counselling, treatment or rehabilitation program.
18. Unjustified Refusals to Test. The unjustified refusal of an employee to submit to a urine test, when so required shall constitute prima facie evidence that the result would have been positive and shall result in the application disciplinary measures. Unjustified refusal

SUBSTANCE ABUSE

means the refusal of a person to submit to the tests for the detection of controlled substances or to cooperate with the processing of such tests, such as without excluding others, failing to show up, without justification, at the place where the sample is to be taken; abandoning the place where the sample is to be taken; clearly stating his/her refusal to submit to the procedure; failing to obey orders or follow the instructions of the laboratory or the official in charge to produce the sample adequately; or altering the sample.

19. Consequences for Policy Violations – First-Time Positive Drug Tests. The first time an employee tests positive for illegal drugs, the Company will allow and require the employee to be evaluated by a Substance Abuse Professional and to attend an appropriate rehabilitation program. In the event that the employee expressly refuses to participate in said rehabilitation program, or if the result of additional follow-up tests is positive, the Company may impose corresponding disciplinary actions taking into account the relationship between the employee's conduct and his/her functions, its effect on the proper and normal function of the enterprise, and the risk to the safety of other employees and the public in general. All employees who have been granted the opportunity to participate in an assistance and rehabilitation program in order to fight the use of controlled substances shall have the obligation to collaborate and comply with all the requirements of the program in order to achieve their rehabilitation within the shortest term possible. Noncompliance with any of the obligations imposed by the program will constitute conduct that could bring about the imposition of disciplinary measures.
20. Confidentiality. Any information, interview, report, statement or memorandum on the results of tests conducted under the Policy as supplemented by this Puerto Rico Supplement will be deemed to be confidential information. No positive drug test result on a test administered under the Policy as Supplemented by this Puerto Rico Supplement will be used as evidence in a criminal suit against the employee, unless it is used by the employee as evidence in his/her defense.



Procedure Number: AMS-710-01-PR-03600

Revision: 8

Approval Date: 6/26/2023

SUBSTANCE ABUSE

ATTACHMENT 8.2 DOE OUTFALL MERCURY OPERATIONS SUPPLEMENT

SUBSTANCE ABUSE

DOE OUTFALL MERCURY OPERATIONS SUPPLEMENT

1. **Purpose:** The Supplemental provisions below add to and where necessary modify APTIM's Substance Abuse Program ("Policy"). To the extent of any inconsistency between the Policy and this DOE Outfall Mercury Operations Supplement, the terms of this Supplement will control.
2. **Effective Date:** For applicants to and employees working at APTIM'S DOE Outfall Mercury operations the Policy and this section of the Supplement to the Policy will be effective May 29, 2019.
3. **APTIM's substance abuse program manager is:**
Lynell Gomez-James

Medical Services Manager

1200 Brickyard Lane, Suite 202

Baton Rouge, LA 70802

225-348-0922

Lynell.GomezJames@aptim.com
4. **Testing Designated Positions:** APTIM may designate positions and "testing designated positions." In general, these are positions where a single mistake or inattention to performance of duties by an APTIM employee can create an immediate threat to the employee, other employees or individuals, the environment, public health and safety, or national security. Such positions may include but not be limited to the following:
 - Positions which require the employee to:
 - Operate heavy machinery or dangerous equipment
 - Bear firearms
 - Perform emergency response functions
 - Positions covered by the Personnel Security Assurance Program (PSAP), 10 CFR Part 710, Criteria and Procedures for Determining Eligibility for Access to Classified Matter or Special Nuclear Material
 - Positions that entail critical duties that require an employee to perform work which affords both technical knowledge of and access to nuclear explosives sufficient to enable the individual to cause a nuclear or explosive detonation (commonly known as the Personal Assurance Program [PAP]), 10 CFR Part 710, Criteria and Procedures for Determining Eligibility for Access to Classified Matter or Special Nuclear Material
 - Pilots and/or Firefighters

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- Positions directly engaged in nuclear reactor construction, maintenance, or operation
- Positions directly engaged in hazardous materials production, use, storage, transportation or disposal
- Positions allowed unescorted access to DOE reactors
- All personnel with an “L” or “Q” clearance.

APTIM’s “testing-designated positions” may include radiological control technicians of all levels. APTIM may occasionally require drivers with Commercial Driver’s License, whereby the requirements of 49 CFR 382, Controlled Substances and Alcohol Use and Testing, shall apply.

5. **APTIM utilizes a third-party medical management company (MMO) in CORE Health Networks** for substance abuse scheduling, MRO and specimen collection. CORE provides a turn-key drug screening program consistent with all applicable state and federal laws and regulations, and is familiar with DOE general quality assurance practices. CORE has managed other APTIM DOE substance abuse sites (KAPL, Los Alamos National Laboratory, Bettis Atomic Laboratory). CORE has over 3500 network clinics across the US.
6. **Education and Available Assistance:** The Company’s plan to educate and inform employees on the health risks associated with illegal drug use consists of maintenance of a resource file regarding such risks and periodic discussion of such risks and this Policy and its administration during employee meetings (e.g., safety meetings). The Company has also adopted an employee assistance program that includes services relating to substance abuse. For more information, please refer to Policy Section 4.13.4 (Drug and Alcohol Education and Employee Assistance Program (EAP)). Training on reasonable suspicion drug testing is conducted annually for all supervisors.
7. **Any employee convicted of a drug related offense will be removed immediately from any DOE site.** Notification of an employee conviction of a drug related offense will be provided to DOE security upon realization.
8. **Pre-Employment Testing:** Pre-employment drug testing will only be performed as part of a general physical medical examination, required of all candidates for employment, also referred to as “applicants.” (“Candidate for employment” means any person who applies to APTIM for a job, whether verbally or in writing, and who is offered a job, even if conditionally).
9. **Reasonable Suspicion Testing:** Employees are subject to testing for illegal drugs if the Company has individualized reasonable suspicion that an employee is using illegal drugs. Testing will take place within twenty-four (24) hours of a reasonable suspicion determination. Reasonable suspicion determinations will be made by two (2) trained supervisors of an employee, one of whom must be the employee’s direct supervisor. “Individualized reasonable suspicion” is the moral conviction that a specific person is under the effects or influence of illegal drugs or is a drug user regardless of whether the fact is established afterwards or not. Said suspicion must be grounded on observable and objective facts, such as:

SUBSTANCE ABUSE

- Direct observation of the use or possession of illegal drugs;
 - Physical symptoms which indicate being under the influence of illegal drugs;
 - A persistent pattern of abnormal conduct or erratic behavior in the workplace.
10. **Reasonable suspicion testing** will be conducted within 24 hours of the supervisory reasonable suspicion determinations. Training on reasonable suspicion drug testing is conducted annually for all supervisors.

PROCEDURE

Procedure Number:

AMS-710-01-PR-04001

Revision:

5

Procedure Owner:

HSE

Issuing Authority:

HSE Education & Training Manager

Approval Date:

2/1/2023



COVID-19 CONTROL PLAN FOR ALL APTIM WORK LOCATIONS (OFFICES AND PROJECTS)

5	Updated to make clear reference to Community Levels and not Community Transmission Levels	M. Dotson	02/01/2023
4	Updates to reflect CDC updates.	J. Thompson	10/7/2022
3	Minor corrections.	J. Thompson	8/8/2022
2	Updated to eliminate screening and scale to reflect current CDC guidance.	J. Thompson	04/28/2022
1	Updated masking requirements to reflect current CDC guidance	J. Thompson	3/1/2022
0	Initial Issue	J. Thompson	1/10/2022
Rev	Changes	Approved	Date

Parent Document:

N/A

COVID-19 CONTROL PLAN FOR ALL APTIM WORK LOCATIONS (OFFICES AND PROJECTS)

1.0 PURPOSE

To protect employees from Coronavirus Disease 2019 (COVID-19), a respiratory disease caused by the SARS-CoV-2 virus. The Center of Disease Controls (CDC) guidelines are used to establish COVID-19 prevention protocols defined in this Plan.

2.0 SCOPE

This COVID-19 Control Program (CCP) applies to all employees working at APTIM owned or leased office locations and projects, except locations and projects in California. For California work locations, see AMS-710-01-FM-04203.

If state, local, client, or landlord guidance is more restrictive than the CCP, then employees are expected to follow the more restrictive guidelines. Workplace Playbooks are developed, if needed, to define location-specific restriction defined outside the CCP.

2.1 Exceptions

If restrictions at the worksite location are more rigorous than what is listed in the plan, then a Workplace Playbook must be developed to identify those restrictions.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

3.1 Office Manager

- Oversight and implementation of the CCP at worksite location.
- Maintain Office Playbook, if needed to define site specific restrictions.
- Ensure employees and visitors adhere to site defined restrictions, if applicable.
- Communicate any changes required by a facility to Facility Management.

3.2 HSE Site Manager

- Review data on COVID-19 and make CCP improvement recommendations.
- If required, develop Project Plans/ Playbook and assess site compliance.
- Provide training and awareness materials to employees.
- Conduct health risk assessments for office and work locations where assigned.
- Communicate any medical expectations to preferred medical providers.

3.3 Employees

- Adhere to CCP prevention and mitigation measures.

COVID-19 CONTROL PLAN FOR ALL APTIM WORK LOCATIONS (OFFICES AND PROJECTS)

- Report symptoms of acute respiratory illness (fever, coughing, shortness of breath) at once to supervision.
- Stay home when sick and update supervisor on expected return.

3.4 Preferred Occupational Medical/Testing Provider

- Use rapid diagnosis method to test for COVID-19.
- Report confirmed or unconfirmed cases of COVID-19 to assigned HSE Manager.

4.0 PROCEDURE

4.1 Vaccination

We encourage employees to follow the advice of their healthcare providers and to educate themselves about vaccination and its effectiveness. Resources can be found at the [CDC's website: Vaccines for COVID-19 | CDC](#) and [Myths and Facts about COVID-19 Vaccines | CDC](#)

You are up to date with your COVID-19 vaccines when you have received all doses in the primary series and all boosters recommended for you, when eligible. See the CDC link for more information. [Stay Up to Date with COVID-19 Vaccines Including Boosters | CDC](#)

APTIM no longer requires employees to update vaccination self-attestations, given the changes to OSHA and federal government contractor directives.

4.2 Awareness and Education

APTIM continually assesses hazards and evaluates the effectiveness of current COVID-19 controls. Additionally, we ensure employees have access to information on known site-specific exposures, controls, and reporting requirements. We do this through the following methods:

- COVID-19 training available on-line in Talent Connection. This required training is assigned to current employees and new hires.
- On-going assessments of local, state, and federal guidelines (i.e., CDC and Occupational Safety Health Administration (OSHA)) by APTIM Leadership, HSE and legal to maintain an accurate understanding of the current hazards.
- The [COVID-19 APTNet page](#) with current information links to CDC, World Health Organization (WHO), and APTIM-specific information.
- Awareness posters - CDC-recommended signage on COVID-19 prevention is posted in communal areas (restrooms, bulletin boards, lobby, etc.).

4.3 Self – Monitoring/Screening

Employees can be exposed to the virus either at the work location or away from work. Fever, coughing, and shortness of breath are primary symptoms that may be present between 2-14 days from exposure to the virus. The following are screening options:

COVID-19 CONTROL PLAN FOR ALL APTIM WORK LOCATIONS (OFFICES AND PROJECTS)

- Employees Self-Evaluation - continually evaluate for any symptoms, particularly fever, coughing or shortness of breath and remain at home if showing signs of illness.
- Stop Work Authority - an employee who notices a co-worker exhibiting symptoms of acute respiratory illness (fever, coughing, shortness of breath) and is concerned about exposure, should notify their supervisor and contact HSE to evaluate how to proceed.
 - **NOTE:** Employees are expected to treat each other with respect, dignity, and in keeping with APTIM's policies and collaborative culture. ***Harassment, bullying or other mistreatment of employees because of a suspicion of symptoms is grounds for discipline, up to and including termination of employment.***

4.4 Contamination Prevention and Sanitation

Current medical understanding is that the virus is primarily transmitted via respiratory droplets when an infected person coughs, sneezes or talks. The most reliable way to prevent infection from surfaces is handwashing (or use hand sanitizer) regularly.

4.4.1 Sick Employees Stay Home

If experiencing symptoms of acute respiratory illness (fever, cough, shortness of breath), notify your supervisor, and do not report to work. Follow the Return-to-Work and Quarantine protocols in the Return-to-Work Flowchart - Attachment 8.1 for guidelines on coming back to work.

4.4.2 Social Distancing Practices

Remote Working: APTIM is open to remote work for employees who may not need to be in the office or project environment. Manager approval and a remote working agreement are required for employee remote work.

Social Distance: Social distancing is only one component of how to protect yourself and others at this stage of the COVID-19 pandemic. APTIM no longer mandates social distancing of 6' or more in its office locations. Employees who wish to seek accommodations can contact HR or Compliance.

4.4.3 Sanitation Measures:

- 4.4.3.1 Use a tissue or elbow to contain a cough or sneeze. This process reduces contamination on hands and in the air. Properly wash hands after a cough or sneeze.
- 4.4.3.2 Wash hands or use hand sanitizer before and after using frequently touched items (i.e., coffeemaker, microwave, vending machines, ice/water dispensers, or copiers).
- 4.4.3.3 **NOTE:** If unable to use soap/ water, use hand sanitizer containing 60% alcohol

4.4.4 Face Masks:

The CDC recommends wearing a mask when in an area where the COVID-19 Community Level is high. (Note that this policy references Community Level, not Community Transmission Level). To



COVID-19 CONTROL PLAN FOR ALL APTIM WORK LOCATIONS (OFFICES AND PROJECTS)

check community status, go to: [COVID-19 by County | CDC](#). If your community is a red site, mask requirements will be defined in the Workplace Playbook.

Even in locations where masks are not recommended, employees are always free to wear a mask while at work. Each work location has a supply of masks for use by employees in unexpected/planned close-contact situations that do not have a mask with them.

4.4.5 Approved Travel Guidelines

If planning approved travel, domestically or internationally, employees should check the [CDC Travel webpage](#) prior to scheduling the trip for current federal, [state, and local](#) requirements.

4.5 Reporting and Illness Management

4.5.1 At work - report symptoms (fever, cough, or difficulty breathing) to your supervisor, HSE, and HR to ensure prompt medical care and prevent potential contamination to the office.

4.5.1.1 If it is determined others may have been exposed, appropriate notifications will be communicated per established protocols and in keeping with applicable privacy laws.

4.5.1.2 HR maintains information related to employees who test positive for COVID-19 or were exposed by "close contact" for tracking purposes. HSE may conduct internal review to evaluate workplace protocols and improve protection.

4.5.2 At home - notify your supervisor and stay home. Follow the return-to-work protocol in Attachment 8.1.

4.5.3 Supervisors notify HR of any COVID-19 positive employees.

4.5.4 Cases believed to be emergent in nature without regard to work-relatedness will be handled by following the Office Emergency Action Plan.

4.6 Return to Work Protocol and Quarantine after Exposure

The CDC recommendations for [Quarantine and Isolation](#) after a COVID-19 diagnosis or exposure were used to develop the APTIM protocols in Attachment 8.1. Use this tool to guide a safe return to work.

5.0 TERMINOLOGY

Term	Definition
None	



COVID-19 CONTROL PLAN FOR ALL APTIM WORK LOCATIONS (OFFICES AND PROJECTS)

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-01-FM-04002	Covid-19 Workplace Playbook for [Worksite]

6.2 Other Internal References

AMS-710-01-PL-04000	Covid-19 Vaccination and Testing Policy
AMS-710-01-FM-04203	Covid-19 Prevention Program for California Work Locations

6.3 Other External References

CDC Vaccination Recommendations
CDC Recommendations for: Mask
COVID-19 Integrated County View (provides information about transmission rate in particular US counties/parishes)
COVID-19 Quarantine and Isolation CDC

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
None		

8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	Return to Work Protocol



Procedure Number: AMS-710-01-PR-04001

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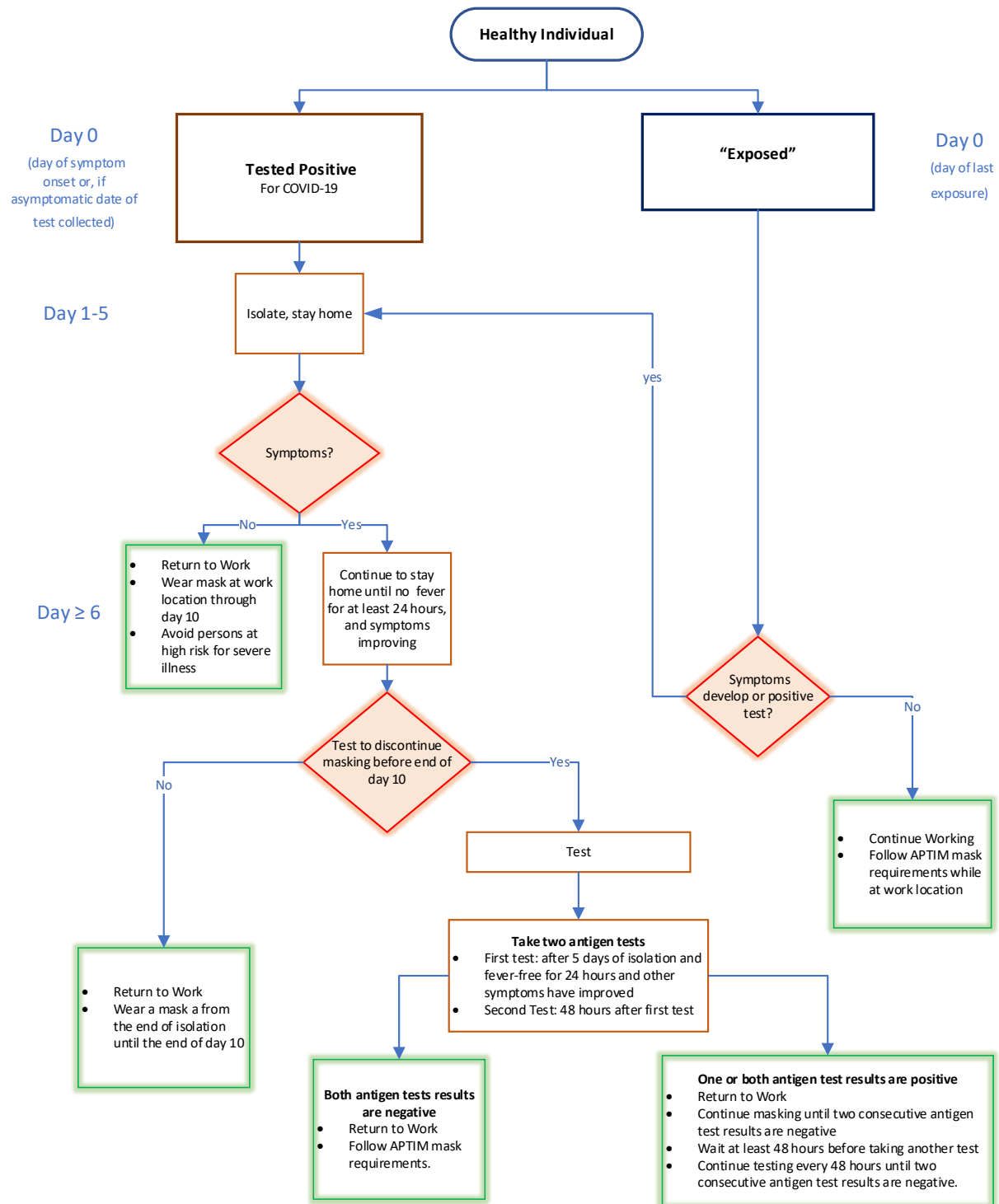
COVID-19 CONTROL PLAN FOR ALL APTIM WORK LOCATIONS (OFFICES AND PROJECTS)

ATTACHMENT 8.1 RETURN TO WORK PROTOCOL

COVID-19 CONTROL PLAN FOR ALL APTIM WORK LOCATIONS (OFFICES AND PROJECTS)

COVID-19 RETURN TO WORK (RTW) FLOWCHART

October 2022 – V12



PROCEDURE

Procedure Number:

AMS-710-01-PR-05000

Revision:

0

Procedure Owner:

HSE

Issuing Authority:

VP HSE

Approval Date:

4/2/2021



MEDICAL SURVEILLANCE PROGRAM

0	Initial Issue	M. Karr	4/2/2021
Rev	Changes	Approved	Date

Parent Document:

N/A

MEDICAL SURVEILLANCE PROGRAM

1.0 PURPOSE

The purpose of this procedure is to establish the minimum requirements for the implementation and management of the Medical Surveillance Program.

2.0 SCOPE

This procedure applies to all APTIM employees and temporary employees associated with an APTIM site.

Subcontractors and lower tier subcontractors (a lower tier subcontractor is any subcontractor at any level working on any company project whether directly with APTIM or through an APTIM subcontractor) are required to provide documentation that they maintain, at a minimum, a medical surveillance program equal to this procedure.

3.0 RESPONSIBILITIES

The following personnel have responsibilities defined in this procedure:

- APTIM Managers
- APTIM Supervisors
- APTIM Employees
- APTIM Contractors
- APTIM Subcontractors
- APTIM Vendors
- APTIM Site Visitors

4.0 PROCEDURE

Medical screening and medical surveillance are two fundamental necessities for ensuring the health and safety of employees when used in conjunction with AMS-710-01-PR-02300 Occupational Health Plan. Medical screening is, in essence, only one component of a comprehensive medical surveillance program. Occupational health regulations concerning "medical surveillance" requirements are generally a combination of medical screening and medical surveillance and are clinically focused with information obtained from the clinical processes used in the monitoring and analysis of results.

The company's Medical Surveillance Program consists of various examination protocols which vary based upon each employee's essential job functions, site specific requirements, and jurisdictional regulatory requirements.

4.1 General

- 4.1.1 APTIM reserves the right to modify this procedure at any time consistent with changes in medical procedures, technologies, laws, or APTIM's operational needs. This procedure shall not, in any event, alter the basic "at will" status of any employee, nor

MEDICAL SURVEILLANCE PROGRAM

shall it create any expressed or implied contractual rights relative to employment with APTIM.

- 4.1.2 This procedure is subject to the regulations, laws, and customs of the jurisdictions in which the work will occur; therefore, each APTIM site will use this procedure as a template to create a site-specific medical surveillance procedure.
- 4.1.3 This procedure is intended to set forth the minimum medical surveillance program standards for APTIM. In accordance with the applicable authority matrices, business groups or projects may implement more stringent requirements as needed to satisfy any specific industry concerns, additional contractual, legal, and/or regulatory obligations that may be applicable.
- 4.1.4 Medical surveillance exams and consultations will be performed by or under the direct supervision of a licensed physician and all medical test analyses should be performed by a laboratory that has demonstrated satisfactory performance in an established inter-laboratory testing program and meets the minimum requirements for certification in the jurisdiction in which it is located.
- 4.1.5 APTIM will provide medical surveillance exams at a reasonable time and location, at no cost to the employee and without loss of pay.
- 4.1.6 The licensed physician providing written opinion may review the result of any associated drug screen against the medical questionnaire when evaluating the final opinion. Failure to disclose any medical condition or the use of any prescribed medication capable of affecting the employee's mental and/or physical ability to perform the essential functions of the job on the medical questionnaire is a violation of this procedure and is grounds for disciplinary action up to and including termination.

4.2 Baseline Medical Protocols

- 4.2.1 Employees will be subject to pre-employment and pre-placement baseline examination based on the essential functions of the job, site-specific requirements, and the regulatory requirements of the jurisdiction. Baseline examinations are performed on a conditional post offer basis, and when potential hazardous exposures are identified by the project site's hazardous risk assessment.
 - 4.2.1.1 All baseline examinations are conducted strictly upon a post-offer of employment and/or pre-placement basis. The individual responsible for scheduling the examinations must verify that a formal offer of employment has been made and the offer accepted prior to arranging the exam.
 - 4.2.1.2 Following an employment offer and prior to becoming an active employee, the prospective employee will be tested for alcohol and illegal drugs. No prospective employee will begin work on any project or at any subcontractor location without submitting to and successfully passing an approved pre-employment drug test pursuant to the requirements set forth in the Substance Abuse Program procedure AMS-710-01-PR-03600.

MEDICAL SURVEILLANCE PROGRAM

- 4.2.1.3 Offer letters must be provisioned that the receipt of a negative drug/alcohol screen result and physician written opinion (PWO) noting that an individual is medically fit to perform the specific job assignment is required prior to proceeding with employment.
- 4.2.2 All employees whose job functions involve potential exposure at or above action levels are subject to periodic/annual examinations as required by the occupational health laws of the jurisdiction.
- 4.2.3 Employees who participate in the asbestos medical surveillance program must follow the requirements set forth in AMS-710-01-PR-02500 Asbestos on the Job.

4.3 Periodic/Annual Medical Protocols

The frequency and content of examinations will vary based on the essential functions of the job, site-specific requirements, and the regulatory requirements of the jurisdiction. More frequent examinations may be necessary, depending on the extent of potential or actual exposure, the type of chemicals involved, the duration of the work assignment, and the individual worker's profile.

If employees are in between assignments that require monitoring for the same contaminants of concern, a Request for Extension of Medical Surveillance Requirements (AMS-710-01-FM-03507) can be completed in order to prevent a lapse in monitoring.

4.4 Exit Protocols

At the end of employment, all personnel in the medical surveillance program should complete an Exit Examination Acceptance/Declination form. Exit examinations are required for all employees leaving the company unless their most recent exam is less than six months old.

4.5 Medical Surveillance Protocols

Medical Surveillance Protocols – Baseline, Periodic/Annual, and Exit, as applicable, includes but is not limited to:

1. 1,2-dibromo-3-chloropropane
2. 1,3-Butadiene
3. Acrylonitrile
4. Arsenic (Inorganic) (AMS-710-01-PR-02900)
5. Asbestos (Construction and Shipyards)
6. Asbestos (General Industry)
7. Benzene (AMS-710-01-PR-03000)
8. Bloodborne Pathogens (AMS-710-01-PR-00300)
9. Cadmium
10. Carcinogens (Suspect)
11. Chromium (VI), Hexavalent Chromium (AMS-710-01-PR-03800)

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12. Coke Oven Emissions
13. Compressed Air Environments
14. Crane Operator Exam
15. Designated Qualified Operator Exam (DQO)
16. Diver Exam
17. Diver Medical Exam
18. DOT Exam (Department of Transportation)
19. Ethylene Oxide
20. Fit for Duty Exam – Craft, Professional/Salary, and Clean Construction (Union/Non-Union) (AMS-710-01-PR-01100)
21. Fit for Duty Exam – Field Labor (AMS-710-01-PR-01100)
22. Formaldehyde
23. Functional Assessment Exam
24. HAZWOPER Field Exposure
25. Knoll's Atomic Power Laboratory (KAPL)
26. Laboratory - Hazardous Chemicals
27. Lead (AMS-710-01-PR-02700)
28. Medical Surveillance Exams – Baseline, Periodic/Annual, and Exit (AMS-710-01-PR-03500)
29. Methylene Chloride
30. Methylenedianiline
31. Noise (AMS-710-01-PR-00900)
32. Pre-Placement General Labor Exam
33. Quantitative/ Qualitative Respirator Fit Test
34. Respirator Certification Exam (AMS-710-02-PR-03500)
35. U.S. Army Corp of Engineers (USACE)
36. Vaccinations (Business Travel and Potential Exposure)
37. Vinyl Chloride

4.6 Physician Written Opinions

- 4.6.1 It is important to note that physician written opinions (PWO) are not considered confidential medical records. The physician written opinion (PWO) is designed and intended to communicate employee medical clearances, restrictions, and disqualifications to management and the employee. A physician written opinion

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(PWO) that notes restrictions will be signed by both the employee and the employee's manager.

4.6.2 The physician written opinion (PWO) must include:

- Name of the individual
- Date of the exam
- Employee number or personal identification numbers
- Name of the specific regulation upon which the medical opinion was based (if applicable)
- If any detected medical conditions would place the employee at increased risk of material impairment of the employee's health while working in the specific job position
- Recommended limitations/restrictions upon the employee's assigned work
- If the employee is unable to perform his or her job duties with or without accommodations
- If the employee has been informed of the examination results
- Any medical recommendations for respirator use such as:
 - No limitations,
 - Medically not able to wear a respirator,
 - May wear a respirator for escape only,
 - Any specific limitations that have been placed on the use of the respirator, and
 - If the document has been provided to the employee.
- Date, printed name, and signature of the licensed physician providing the opinion

4.6.3 Whenever a restricted medical clearance is issued, the HSE manager, Human Resource manager, and hiring manager will be notified and will determine if the medical restriction will have an impact on the employee's ability to perform the essential duties of the intended job.

Specifically, all persons must be able to perform the essential functions of their job, with or without reasonable accommodations, and without posing a direct threat to the health and safety of themselves or others.

4.7 Re-Hiring Former Employees

4.7.1 When a former employee is being re-hired, if the most current company medical examination is less than six months old and the HSE Manager can confirm that the individual was not subject to hazardous exposures during non-company employment, the HSE Manager may choose to waive a new baseline examination. Periodic/Annual

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examinations will be based on the most recent examination date rather than a new date of hire.

- 4.7.2 Returning former employees shall be subject to post offer/pre-employment drug and alcohol testing at the time of re-hire unless the break in service has been less than 30 days, as permitted under the laws and customs of the jurisdiction in which the employee is employed.

5.0 TERMINOLOGY

Term	Definition
Fitness for Duty	The employees' physical, mental, and medical qualifications to perform their job duties
Toxic Substance or Harmful Physical Agent	Any chemical substance, biological agent (bacteria, virus, fungus, etc.), or physical stress (noise, heat, cold, vibration, repetitive motion, ionizing and non-ionizing radiation, hypo-hyperbaric pressure, etc.) which: (1) be listed in the latest edition of the NIOSH Registry of Toxic Effects of Chemical Substances, (2) have yielded positive evidence of an acute or chronic health hazard in testing conducted by or known to the employer, or (3) be the subject of a material safety data sheet (MSDS) kept by or known to the employer indicating that the material may pose a hazard to human health.

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-01-FM-03507	Request for Extension of Medical Surveillance Requirements

6.2 Other Internal References

AMS-710-01-PR-02900	Arsenic Exposure Control Program
AMS-710-01-PR-02500	Asbestos on the Job
AMS-710-01-PR-00300	Bloodborne Pathogens
AMS-710-01-PR-03000	APTIM Benzene Safety Program
AMS-710-01-PR-02700	Construction Lead Hazard Abatement Program
AMS-710-01-PR-01100	Fitness for Duty Program
AMS-710-01-PR-03800	Hexavalent Chrome
AMS-710-01-PR-03500	Medical and Exposure Records
AMS-710-01-PR-00900	Noise Control and Hearing Conservation
AMS-710-01-PR-02300	Occupational Health Plan



Procedure Number: AMS-710-01-PR-05000

Revision: 0

Approval Date: 4/2/2021

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AMS-710-02-PR-03500	Respiratory Protection
AMS-710-01-PR-03600	Substance Abuse Program

6.3 Other External References

1910 Subpart Z - Toxic and Hazardous Substances

7.0 ATTACHMENTS

Attachment	Attachment Title
None	

Checklist Number: **AMS-710-02-CK-01613**Revision: **1**Approval Date: **8/29/2022****INTRUSIVE ACTIVITIES CHECKLIST**

Purpose: This form is designed to help the Competent Person – Intrusive Activities make decisions during boring/excavation around underground/overhead utilities.

DATE _____ PROJECT NAME/NUMBER _____

Competent Person – Intrusive Activities: _____

DURATION/SUMMARY OF WORK TO BE PERFORMED: _____

Consideration	Check	Check	Explanation	Initial
Has the city and state one-call been contacted?	☐ Yes	☐ No		
If one-call not available, has a private locating service been contacted?	☐ Yes	☐ No		
Were any utilities identified through private locating service? (If yes, indicate on site drawings)	☐ Yes	☐ No		
Are any as-built drawings available? If so, do they show any utilities?	☐ Yes	☐ No		
Has a visual inspection of the work area(s) been completed for signs of underground/overhead utilities?	☐ Yes	☐ No		
Are there any "No Drill Zones" on-site. If so, have proposed boreholes/excavations been relocated	☐ Yes	☐ No		
Are there overhead utilities that will be closer than the minimum clearance distances established in AMS-710-02-PR-06600 Equipment Operation Around Overhead Power Lines (Minimum Clearance Distances – Table A)?	☐ Yes	☐ No		
Are there any fiber optic cables or high-pressure fuel lines within 50 feet of hole locations?	☐ Yes	☐ No		
If fiber optic cables or high-pressure fuel lines are within 50 feet, there is an agreement with the fiber optic company been established?	☐ Yes	☐ No		

Checklist Number: **AMS-710-02-CK-01613**Revision: **1**Approval Date: **8/29/2022****INTRUSIVE ACTIVITIES CHECKLIST**

If yes to question above, has a Fiber Optic or High-Pressure Fuel Line Contingency plan been approved?	☐ Yes	☐ No		
Can a test borehole be advanced by hand digging, augured probing, post hole digging, hydrovacting and/or air knifed to 5 feet bgs?	☐ Yes	☐ No		
If hand digging, probing, post hole digging, and or air knifing to 5 feet bgs is not possible, can a non-invasive geophysical investigation be conducted? If not, has an Authorization to Drill Permit been signed?	☐ Yes	☐ No		
Person completing Form	Signature:			
Other considerations:				



Form Number: AMS-710-02-FM-02701

Revision: 1

Approval Date: 7/12/2022

VEHICLE INSPECTION FORM

Make		Model		
Unit #		Inspection Date		Odometer Reading
<i>The items below are to be inspected on a weekly basis. Report ALL items in need of repair to the mechanics at the time of inspection. Return the completed sheet to the Equipment Superintendent and Safety Department at the end of the week.</i>				
Inspection	Notes			
Lubrication	☐			
Starting System	☐			
Instruments (speedometer & temperature gauge)	☐			
Cooling System (Radiator)	☐			
Air System	☐			
Glass	☐			
Mirrors (Rear-view & left outside)	☐			
Defroster	☐			
Brakes	☐			
Steering System	☐			
Tires	☐			
Headlights	☐			
Tail lights	☐			
Brake lights	☐			
Horn	☐			
Windshield Wipers	☐			
Fire Extinguisher	☐			
Seat belts	☐			
Back-up alarm	☐			
Condition of vehicle body	☐			
Initials & badge # of inspector	☐			
Driver Notification Sticker present and legible	☐			
Other	☐			
To be completed by Mechanic / Equipment Services Group:				
Date Reported	Repairs Made		Date Repaired	
This form must be sent to ESGdocs@aptim.com				
Signature of Mechanic / ESG Representative				

PROCEDURE

Procedure Number:

AMS-710-02-PR-03500

Revision:

1

Procedure Owner:

HSE

Issuing Authority:

HSE Education & Training Manager

Approval Date:

9/22/2022



RESPIRATORY PROTECTION

1	Updated section 4.7.16 checking facepiece and section 4.7.17.5 checking breathing air lines	M. Dotson	9/22/2022
0	Initial Issue	T. Felt	4/13/2022
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

RESPIRATORY PROTECTION

1.0 PURPOSE

To establish the minimum requirements for Respiratory Protection on APTIM projects and at office, warehouse, laboratory or shop locations.

2.0 SCOPE

This procedure, along with any associated guidance identified applies to and shall be followed by all subsidiaries and affiliates of APTIM at all worksites and locations, foreign and domestic, for the public (government) and private (commercial) contracts.

2.1 Exceptions

The only exceptions that will be considered to this procedure are those which provide greater workplace safety and health for personnel. Exceptions must be approved per the requirements established by the AMS Issuing Authority.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Managers
- HSE Area Managers
- Project HSE
- Supervisors
- Employees
- Contractors/Subcontractors

4.0 PROCEDURE

Each project, shop, warehouse or facility shall follow this procedure and use it as the minimum guidelines to develop their site-specific procedure for Respiratory Protection.

4.1 General

- 4.1.1 Every consideration will be given to the use of effective engineering controls to eliminate or reduce exposure to respiratory hazards to the point where respirators are not required. However, when feasible engineering controls are not effective in controlling toxic substances, negative exposure assessments are occurring or escape respirators are required the company, at no charge, will provide appropriate respiratory protective equipment to the Aptim employee.
- 4.1.2 Employees required to use respiratory protective devices because of exposure to toxic substances will do so as a condition of employment. Employees required to use respirators will be properly fitted, appropriately tested, medically screened, and thoroughly trained in their use.

RESPIRATORY PROTECTION

4.2 Project Specific Respiratory Protection Plan and Assessments

- 4.2.1 The Project or Area HSE Manager develops and implements the location-specific respiratory protection program. This plan may be part of safety and health plan.
- 4.2.2 The Project Respiratory Protection Plan will be developed for the specific respiratory hazards of the location based upon a location/task risk assessment and will layout information that is to be included in training, the provisions for controlling the distribution of respirators, the method to be used for cleaning and maintenance of respirators, and how the requirements of this Procedure will be met at the location level.
- 4.2.3 A respiratory hazard assessment specific to their risks using AMS-710-02-FM-03507, Location Specific Respiratory Hazard Evaluation Form or equivalent evaluation in safety and health plans. This hazard assessment will be reviewed, minimally, on an annual basis or as changing conditions warrant.

4.3 Respirator Selection and Use

- 4.3.1 If a question exists concerning the type of respirator required Corporate HSE&Q or Industrial Hygiene shall be consulted.
- 4.3.2 The Location or Area HSE Manager will select respirators to be used on site, based on the hazards to which workers are exposed. Respirators shall be NIOSH approved. Respirators used for chemical warfare materiel operations shall meet NIOSH chemical, biological, radiological and nuclear (CBRN) standards. The Location or Area HSE Manager will conduct a hazard evaluation for each operation, process, or work area where airborne contaminants may be present in routine operations or during an emergency. The hazard evaluation will include:
- Identification and development of a list of hazardous substances used in the workplace, by department, location or work process.
 - Identification of site contaminants from previous characterization and investigation which are present in concentrations that could pose occupational exposure at or above regulatory action levels or published exposure limits.
- 4.3.2.1 Review of work processes to determine where potential exposures to these hazardous substances may occur. This review shall be conducted by surveying the workplace, reviewing process records, analytical data and talking with employees and supervisors.
- 4.3.2.2 Exposure monitoring to quantify potential hazardous exposures. Exposure monitoring can include real-time direct reading, colorimetric detectors, near real-time and integrated air sampling methods analyzed by an AIHA accredited laboratory.
- 4.3.2.3 Integrated personal air sampling shall follow current NIOSH, OSHA or EPA methods for quantifying potential workplace exposures.
- 4.3.2.4 The Protection Factor (PF) for the respirator selected shall be used according to the following relationship with the Permissible Exposure Guideline (PEG) to establish justification for selection:

RESPIRATORY PROTECTION

$PF \times PEG \geq \text{Maximum anticipated contaminant concentration}$

- 4.3.2.5 If this equation is false, a respirator with a greater PF must be selected. Also review the following Table to determine the required fit testing for the expected maximum anticipated contaminant concentration. The Local or Area HSE Manager may determine that a more conservative approach (e.g., 50 percent PF) may be needed. Decision to do so should be documented in the safety and health plan or project Respiratory Protection Plan.

Respirator Type, Protection Factor, and Fit Testing Method

Respirator Type	Protection Factor	QLFT	QNFT
Half-Face, Negative Pressure (<100 Fit Factor) ¹	10	Yes	Yes
Full-Face, Negative Pressure (<100 Fit Factor) Used in Atmosphere up to 10 Times the PEG	10	Yes	Yes
Full-Face, Negative Pressure (<100 Fit Factor) Used in Atmosphere Over 10 Times the PEG ²	50	No	Yes
PAPR ³	100	Yes	Yes
SCBA/SAR Used in Positive Pressure (Pressure Demand Mode)	10,000	Yes	Yes

Footnotes:

1. If quantitatively fit tested, the device must demonstrate a fit factor of at least 100.
2. If quantitatively fit tested, the device must demonstrate a fit factor of at least 500.
3. The PF for PAPRs vary based on type and accessories. Verify with manufacturer.

Once the type of respirator that is applicable and suitable for the purpose intended has been selected, then consider the fit and comfort of the respirator.

4.4 Issuing Respirators

- 4.4.1 Respirators will not be fit tested or issued to individuals who have facial hair (including stubble) or any other condition, which interferes with the sealing surface of the respirator.
- 4.4.2 Respirators will not be fit tested nor issued to individuals who have not received appropriate respirator training in addition to fit testing and a medical clearance.
- 4.4.3 Employee-owned respirators shall not be used.
- 4.4.4 Respirators must provide adequate face and eye protection for the expected task.
- 4.4.5 Contractor personnel shall provide their own respiratory protective equipment and shall also confirm meeting all other requirements of their own Respiratory Protection Program and that of the company's RPP (i.e., medical clearance, training, etc.).
- 4.4.6 APTIM may provide the following respiratory protective equipment to Contractor Personnel:

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- Disposable equipment such as filter elements.
- Hardware for airline systems (up to, but not including the airline and facepiece) which employees are sharing.

4.4.6.1 The company will not provide the following respiratory protective equipment to contractor or partner personnel without Local or Area HSE Manager approval:

- APR or PAPR facepieces.
- SCBAs, SAR respirators, or airline.

4.5 RPP Coordinator Responsibilities

4.5.1 The Area or Program HSE manager shall appoint a Respiratory Protection Program (RPP) Coordinator for each location which uses or may have a need to use respiratory protection. The HSE Representative must assure the RPP Coordinator has the necessary training to fulfill his/her responsibilities.

4.5.2 Responsible for cleaning, maintenance, and storage of all respirators not routinely used or not individually assigned.

4.5.3 Maintains respirator supplies, including spare parts; submits purchase requests for new equipment; and assure that sufficient quantities of cartridges are available for each field office/project.

4.5.4 Assure that air supply and emergency respiratory protection is thoroughly inspected and maintained.

4.5.5 Ensures repairs are done by either qualified personnel under the direction of the RPP Coordinator, or by contracted supplier.

4.5.6 Maintain models and sizes of respirators available for selection and fitting.

4.5.7 Conducts fit testing.

4.6 General Use Procedures:

4.6.1 Employees will use their assigned respirator protective equipment under conditions specified by this program, and following the training they receive on the use of each model. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH or by its manufacturer.

4.6.2 The employee shall clean, disinfect, and properly store the assigned respirator, unless other arrangements are made on a project level.

4.6.3 The employee shall guard against damage to the assigned respirator.

4.6.4 The employee shall inspect the respirator before each use and after cleaning.

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- 4.6.5 All employees shall conduct user seal checks each time that they wear their respirator. Employees shall use the positive and negative pressure check specified in 29 CFR 1910.134 Appendix B-1 of the Respiratory Protection Standard.
- 4.6.6 The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and negative pressure check procedures provided that the written Respiratory Protection Plan demonstrates that the manufacturer's procedures are equally effective.
- 4.6.7 All employees shall be permitted to leave the respiratory protection work zone and proceed through a contamination reduction zone to the support area or change room to maintain their respirator for the following reasons: to clean their respirator if the respirator is impeding their ability to work, change filters or cartridges, replace parts, or to inspect respirator if it stops functioning as intended. Employees should notify their supervisor before leaving the area.
- 4.6.8 Employees are not permitted to wear tight-fitting respirators if they have any condition, such as facial scars, facial hair, or missing dentures, that prevents them from achieving a good seal. Employees are not permitted to wear headphones, jewelry, or other articles that may interfere with the face piece-to-face seal.
- 4.6.9 The employee shall report any malfunction of the respirator immediately to their supervisor and/or the RPP Coordinator.
- 4.6.10 The employee shall report to their supervisor any change in their medical status that may impact their ability to wear a respirator safely.
- 4.6.11 Use of Corrective Lens Eyewear
- 4.6.12 In general, contact lenses are permitted to be worn when negative pressure respiratory protection is used. Although in certain instances, client- or project-specific rules may not allow for their use.
- 4.6.13 If an employee chooses not to wear contact lenses, management shall assure that the appropriate frames or ophthalmic device attachments are obtained and provided at no cost to the employee.
- 4.6.14 Obstruction of Face Seal
- 4.6.15 Employees who wear respirators are required to be clean shaven to the extent that there is no obstruction between the wearer's skin and the facepiece. Trimmed mustaches and facial hair which does not interfere with the seal are allowable.
- 4.6.16 In addition, respirators shall not be worn when conditions prevent a good face-to-facepiece seal such as corrective lenses or goggles, or other personal protective equipment (PPE).
- 4.6.17 If an APR or PAPR is used, the respirator shall be equipped with an end-of-service life-indicator (ESLI) certified by NIOSH for the contaminant. If an ESLI is not available for

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the contaminant, a cartridge element change schedule shall be implemented which is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. This information will be described in the site safety and health plan or project specific respiratory protection plan.

4.6.18 Specific Requirements

The following information details specific requirements by respirator class:

4.6.18.1 Air Purifying (APR) Systems

When APRs are worn, new filter elements shall be installed at the beginning of operations. The filter elements shall be changed whenever the ESLI (color indicators) indicates that cartridge life has expired (e.g., mercury cartridges). When no ESLIs are available, filter replacement will be based on the calculations performed by the Health and Safety Representative. Additionally, the cartridges will be replaced if “breakthrough” is perceived or whenever an increase in breathing resistance is detected. In most cases, the cartridges will be replaced a minimum of once daily, usually at the end of the work shift.

4.6.18.2 Powered Air Purifying (PAPR) Systems

When PAPRs are worn, the filter elements shall be changed whenever the ESLI (color indicators) indicates that cartridge life has expired (e.g., mercury cartridges). When no ESLIs are available, filter replacement will be based on the calculations performed by the Health and Safety Representative. Additionally, the cartridges will be replaced if “breakthrough” is perceived or when airflow through filter elements decreases to an unacceptable level as indicated by the manufacturer’s test device.

4.6.19 Emergency Procedures

When an alarm sounds, employees in the affected department must immediately don their emergency escape respirator, shut down their process equipment, and exit the work area. All other employees must immediately evacuate the area as defined in emergency plans. The location specific Emergency Preparedness Plan shall describe these procedures (including proper evacuation routes and rally points) in greater detail.

4.6.20 Respiratory Malfunction

4.6.20.1 For any malfunction of an APR (e.g., such as breakthrough, facepiece leakage, or improperly working valve), the respirator wearer should inform his or her supervisor that the respirator no longer functions as required, and go to the designated safe area to maintain the respirator. The supervisor must ensure that the employee receives the needed parts to repair the respirator, or is provided with a new respirator. Repairs shall be verified by the RPP Coordinator or another qualified person.

4.6.20.2 All workers wearing atmosphere-supplying, supplied air respirator (SAR) will work with a “buddy”.

4.6.20.3 If a worker experiences a malfunction of an SAR, he or she should signal to the “buddy” that he or she has had a respirator malfunction. The buddy, if not already in SAR

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protection shall don equivalent respiratory protection and aid the worker in immediately exiting the SAR work zone.

4.7 Breathing Air Quality and Use

- 4.7.1 The Location/Area HSE Manager shall ensure that compressed breathing air compressor provided air and oxygen used for respiration comply with the following specifications:
- 4.7.2 Compressed oxygen shall meet the United States Pharmacopoeia requirements for medical or breathing oxygen; and
- 4.7.3 Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-2018, to include:
- Oxygen content (v/v) of 19.5-23.5%;
 - Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
 - Carbon monoxide (CO) content of 10 ppm or less;
 - Carbon dioxide content of 1,000 ppm or less; and
 - Lack of noticeable odor.
 - Breathing air for SCUBA or surface supplied air diving operations shall be specified in the Dive Operations Plan or Dive Safe Practices Manual.

Note: In Canada, APTIM will follow CSA Standard Z180.1-13 Compressed Breathing Air and Systems

- 4.7.4 The Location or Area HSE Manager shall ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air.
- 4.7.5 The Location or Area HSE Manager shall ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.
- 4.7.6 For supplied-air respirators, only Grade D breathing air shall be used in the cylinders. The Location/Area HSE Manager will coordinate deliveries of compressed air with the company's vendor and require vendor to certify by certificate of analysis that the air in the cylinders meets the specifications of Grade D breathing air.
- 4.7.7 The RPP Coordinator will maintain a minimum air supply of one fully charged replacement cylinder for each SAR unit. In addition, SCBA or emergency egress cylinders may be recharged as necessary from the breathing air cascade system by qualified and trained personnel.
- 4.7.8 The Location or Area HSE Manager will assist with training for use of compressed breathing air systems, charging SCBAs and emergency egress cylinders.

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- 4.7.9 The location shall ensure that compressors used to supply breathing air to respirators are constructed and situated so as to
- Prevent entry of contaminated air into the air-supply system;
 - Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 deg.C) below the ambient temperature;
 - Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions.
 - Have a tag containing the most recent change date and the signature of the person authorized by Aptim to perform the change. The tag is maintained at the compressor.
- 4.7.10 For compressors that are not oil-lubricated, the location shall ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.
- 4.7.11 For oil-lubricated compressors, a high-temperature and carbon monoxide alarm, to monitor carbon monoxide levels shall be integrated. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.
- 4.7.12 The location shall ensure that breathing air couplings are incompatible with outlets for nonrespirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.
- 4.7.13 The location shall verify all quick connect couplings i.e., Foster, Schrader, Hansen are compatible with the SAR manufacturer recommendations and components.
- 4.7.14 The location shall use only the respirator manufacturer's NIOSH-approved breathing-gas containers, marked and maintained in accordance with the Quality Assurance provisions of the NIOSH approval for the SCBA as issued in accordance with the NIOSH respirator-certification standard at 42 CFR part 84.
- 4.7.15 Each location utilizing compressed gas cylinder breathing air shall maintain a calibrated oxygen and carbon monoxide portable air monitoring instrument to test each compressed air cylinder before placing the cylinder into service.
- 4.7.16 Periodic and pre use oxygen content and carbon monoxide measurements shall be performed at the SAR facepiece.
- Place a calibrated 4 gas real-time air monitor inlet port/line inside the facepiece where air enters the mask. Place instrument with the digital display in operators view. (MSA Altair 4x, Sirius or equivalent instruments have quick response time based on length of sample line)
 - Open the valve on the applicable regulator to create air flow from primary air source. The same should be conducted separately when supplied air emergency escape egress bottles are incorporated into the user supplied air system.

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- Leave monitor inlet or sample line in mask with air flowing for 30 seconds. This will normally allow enough time and air flow for sensors to measure air sample stream. (Consult instrument manufactures manual for flow rate when using sample lines or passive monitors)
- Take reading of digital display on monitor and record gas levels.
- Monitoring instrument should be equipped with at least a oxygen (O₂), carbon monoxide (CO), lower explosive limit (LEL) and hydrogen sulfide (H₂S) sensor. (Note: the H₂S sensor can be substituted with an alternate gas sensor if H₂S is not a concern)

4.7.17 Supplied Air Breathing Systems (SCBA)

- 4.7.17.1 Airline couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of airline respirators with nonrespirable gases or oxygen.
- 4.7.17.2 Standard airline couplings for breathing air systems are Foster quick connect fittings with locking dots. Hansen quick connect fitting may also be used, but must not be used where they can be inadvertently actuated and disconnected. For example, Hansen fittings could be used at the regulator connection, but not on the airline unless protected from disconnection by some other means.
- 4.7.17.3 The hose line length shall not exceed 300 feet from the air bank regulator to the user.
- 4.7.17.4 No more than three connections, excluding the connection to the regulator and final connection to the respirator, shall be between the breathing air cylinders and the user.
- 4.7.17.5 Breathing air hose shall be protected from direct contact with chemical materials which may permeate the hose. Acceptable methods of protection include suspension of the hose from the surface or covering with a commercially available sleeve or visqueen. Breathing air lines shall be walked down at least daily before use. Breathing air hoses that become contaminated are to be disposed of properly.
- 4.7.17.6 The breathing air regulator shall be adjusted to provide air pressure as per the manufacturer's recommendations.
- 4.7.17.7 Cascade systems shall be equipped with low pressure warning alarms or similar warning devices to indicate air pressure in the manifold below 500 psi.
- 4.7.17.8 When using a cascade system to supply breathing air, assign a trained worker (outside the SAR work zone) as safety standby within range to hear the low-pressure alarm.
- 4.7.17.9 When a cascade system is used to recharge SCBA air cylinders, it shall be equipped with a high-pressure supply hose and coupling rated at a capacity of at least the maximum air delivery system pressure. The supply hose and coupling shall be relatively short (< 3 feet) and secured to prevent whipping when pressurized. NOTE: Many supplied air systems today use "high pressure" cylinders 4,500 psi vs 2,400 psi. Critical that all system components are rated for planned operating pressures.

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- 4.7.17.10 Large supplied air cylinders shall be stored and handled to prevent damage to the cylinder or valve. Cylinders shall be stored upright with the protective valve cover in place and in such a way (e.g., supported with substantial rope or chain in the upper one-third of the cylinder, or in racks designed for the purpose) as to prevent the cylinder from falling. Cylinders shall not be dropped, dragged, rolled, or allowed to strike each other or to be struck violently. Cylinders shall never be exposed to temperatures exceeding 125 degrees F. Cylinders with visible external damage, evidence of corrosion, or exposure to fire shall not be accepted or used.
- 4.7.17.11 Only cylinders within current hydrostatic test periods shall be used. For fiber wrapped bottles designated by the DOT-E label, hydrostatic testing shall be completed every 3 years. Maximum service life for these cylinders is 15 years. Steel or aluminum cylinders shall be hydrostatically tested every 5 years. No maximum service life is established for steel or aluminum cylinders.
- 4.7.17.12 Breathing air cylinders shall be legibly identified with the word "AIR" by means of stenciling, stamping, or labeling as near to the valve end as practical.
- 4.7.17.13 SCBAs shall only be used in the positive pressure mode when in the Exclusion Zone.
- 4.7.17.14 Standby SCBA equipment must be present when air supply systems are used in Immediately dangerous to life or health (IDLH) or potentially IDLH atmospheres.
- 4.7.18 Escape/Egress Respirator Units
- These respirators are intended for use in areas where escape with a short-term (5-minute air supply) is necessary. They may be used as adjuncts to airline respirators as a backup air supply, or as independent emergency devices in areas where respiratory protective equipment is not normally required.
 - Appropriate training shall be accomplished and documented prior to assigning employees to tasks or locations subject to the use of these respirators.
 - Not to be used as primary standby respirators for confined space entry.
 - Not to be used to enter, or continue working in, a hazardous atmosphere.
- 4.7.19 For all IDLH atmospheres, the location shall ensure that:
- 4.7.19.1 The Location or Area HSE Manager is notified well in advance of any planned or potential entry into IDLH atmospheres.
- 4.7.19.2 Appropriate operations management and Corporate Health, Safety, Environmental and Quality Director participate in planning and approval of activity.
- 4.7.19.3 One employee or more, if needed, are located outside the IDLH atmosphere.
- 4.7.19.4 Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere, and the employee(s) located outside the IDLH atmosphere.

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- 4.7.19.5 The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue.
- 4.7.19.6 The location SSHO or designee shall be notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue.
- 4.7.19.7 Employee(s) located outside the IDLH atmosphere are equipped with:
- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied air respirator with escape/egress unit.
 - Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry. Equivalent means of rescue can be considered.
- 4.7.19.8 The Location or Area HSE Manager shall be notified when an emergency rescue occurs;
- 4.7.19.9 The Location and Area HSE Manager shall review the JSA and approve all respiratory protection to be used in potentially IDLH Environments.
- 4.7.19.10 The Location and Area HSE Manager shall approve equivalent means for rescue where retrieval equipment is not required.

4.8 Employee Medical Evaluation

- 4.8.1 Employees assigned to wear respirators, or who request to wear an APR voluntarily, must successfully complete a medical evaluation and have a company approved licensed physician or other licensed health care professional (PLHCP) deem them medically fit before being permitted to wear a respirator.
- 4.8.2 Any employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use.
- 4.8.3 Medical evaluation procedures are as follows:
- 4.8.3.1 Use AMS-710-02-FM-03501 or equivalent medical review provider questionnaire.
- 4.8.3.2 The Location HSE Manager or medical surveillance coordinator provides a copy of this questionnaire to all employees requiring medical evaluations.
- 4.8.3.3 Employees will be permitted to fill out the questionnaire on company time.
- 4.8.3.4 The company will assist employees who are unable to read the questionnaire (by providing help in reading the questionnaire or providing in language fluent with employee). When this is not possible, the employee may be refused to use respiratory protection.
- 4.8.3.5 Follow-up medical exams will be granted to employees as required by the standard, and/or as deemed necessary by the company approved physician or other PLHCP.

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- 4.8.3.6 All employees will be granted the opportunity to speak with the physician or other PLHCP about their medical evaluation, if they so request.
- 4.8.3.7 Aptim provides the company approved physician or other PLHCP with a copy of this procedure, a copy of the Respiratory Protection standard, the list of hazardous substances by work area, and for each employee requiring evaluation:
- Their work area or job title
 - Proposed respirator type and weight
 - Length of time required to wear respirator
 - Expected physical workload (light, moderate, or heavy)
 - Potential temperature and humidity extremes
 - Any additional protective clothing required
- 4.8.3.8 Any employee required for medical reasons to wear a positive pressure air purifying respirator will be provided with a PAPR.
- 4.8.3.9 After an employee has received clearance and begun to wear his or her respirator, additional medical evaluations will be provided under the following circumstances:
- Employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains, or wheezing.
 - The company approved physician or other PLHCP or supervisor informs the Aptim Medical Services Coordinator, Location or Area HSE Manager that the employee needs to be reevaluated;
 - Information from this program, including observations made during fit testing and program evaluation, indicates a need for reevaluation;
 - A change occurs in workplace conditions that may result in an increased physiological burden on the employee.
- 4.8.4 The location and Aptim medical services coordinator maintain a list or database of employees currently included in the respiratory protection program and having successfully completed the medical evaluation requirements of this procedure.
- 4.8.5 All examinations are to remain confidential between the employee, the physician or other PLHCP, medical services coordinator and HSE Manager.
- 4.8.6 Medical Forms
- 4.8.6.1 AMS-710-02-FM-03501 or equivalent is used when conducting the initial medical evaluation, the Medical Questionnaire for Respirator
- 4.8.6.2 In addition to the standardized questionnaire, the physician or other PLHCP must also be furnished with a copy of the latest OSHA Standard governing the type of exposure to which the employee will be subjected. A description of the employee's duties as they

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relate to the exposure, the anticipated exposure level, a description of the respiratory protective equipment to be used, and any available information from previous medical evaluations of the employee must also be furnished to the physician or other PLHCP on the Request for Medical Evaluation for Respirator Use (AMS-710-02-FM-03502) or equivalent form.

- 4.8.6.3 At the conclusion of the evaluation, the physician or other PLHCP will submit a written opinion to the Aptim medical services coordinator. This will contain the approval or denial for respiratory protection use and any recommendations from the physician or other PLHCP regarding the employee's limitations.
- 4.8.6.4 The Company must furnish a copy of the physician's or other PLHCP's opinion to the employee, within thirty (30) days of its receipt by the Company.

4.9 Fit-Testing Requirements

- 4.9.1 Employees who are required to wear respiratory protection will be fit tested to any respirator with a negative or positive pressure tight-fitting facepiece. The employee must be fit tested with the same make, model, style, and size of respirator that will be used. Fit testing shall occur:
- Annually in the US
 - In Canada, APTIM will follow CSA Z94.4-18 Standard which requires medical clearance and fit testing at a minimum of every two years.
 - When there are changes in the employee's physical condition that could affect respiratory fit (e.g., obvious change in body weight, facial scarring, etc.).
- 4.9.1.1 If employees are using a new respirator, make or model Fit testing shall be performed in accordance with Appendix A to §1910.134—Fit Testing Procedures (Mandatory)
- 4.9.2 Employees will be fit tested with the make, model, and size of respirator that they will actually wear. Employees will be provided with several models and sizes of respirators so that they may find an optimal fit. Fit testing of tight fitting elastomeric PAPRs is to be conducted in the negative pressure mode. Loose fitting hood PAPRs shall be tested in the pressure mode.
- 4.9.3 Respirators will be fitted properly and be tested for their face piece to-face seal.
- 4.9.4 There are two acceptable methods for conducting these tests:
- Qualitative
 - Quantitative
- 4.9.5 The fit test is valid only for respirators of the same model and size tested.
- 4.9.6 Qualitative fit testing Protocols: based on the wearer's subjective response to a challenge atmosphere, of which three popular tests are: the irritant smoke test, the saccharin solution test, and the odorous vapor test.

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- Irritant Smoke Test: Directing an irritant smoke from a smoke tube towards the respirator being worn performs the Irritant Smoke Test. If the wearer does not detect the irritant smoke, a satisfactory fit is assumed to be achieved. Since this type of test provokes an involuntary response from the employee, it is the preferred testing method when available.
- Saccharin Solution Test: This test relies on the wearer's ability to taste a saccharin solution sprayed around the outside of the respirator. The test is performed by placing an enclosure over the respirator wearer's head and shoulders and administering the solution from a nebulizer. If the wearer does not react to the chemical, then a satisfactory fit is assumed to be achieved. The saccharin solution aerosol protocol is currently the only available, validated test protocol for use with disposable particulate respirators not equipped with high-efficiency filters.

NOTE: This test is dependent on the wearer's honest indication of taste. There is not an involuntary response.

- Odorous Vapor Test: The odorous vapor test relies on the respirator wearer's ability to detect an odorous material, usually isoamyl acetate (banana oil) inside the respirator. The test is performed by placing an isoamyl acetate saturated material near the respirator. If the wearer is unable to smell the chemical, then a satisfactory fit is assumed to be achieved.

4.9.7 Quantitative Fit Test (QNFT) Protocols: using a nonhazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

- Employer Ensures:
 - Persons administering QNFT can calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly, and ensure that test equipment is in proper working order.
 - QNFT equipment is kept clean and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.
- Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol (Portacount®) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of

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at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.

Portacount® Fit Test Requirements:

1. Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 Series 100, Series 99, or Series 95 particulate filter) per manufacturer's instruction.
2. Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. Individual shall already have been trained on how to wear the respirator properly.
3. Check the following for the adequacy of the respirator fit: chin properly placed; adequate strap tension, not overly tightened; fit across nose bridge; respirator of proper size to span distance from nose to chin; tendency of the respirator to slip; and self-observation in a mirror to evaluate fit and respirator position.
4. Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.
5. Follow the manufacturer's instructions for operating the Portacount® and proceed with the test.
6. The test subject shall be instructed to perform the exercises provided in the Portacount® manual or software.
7. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

Portacount® Test Instrument:

1. The Portacount® will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.
2. Since the pass or fail criterion of the Portacount® is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this attachment.
3. A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

4.9.8 Fit Test Card

The respirator wearer is issued an employee fit test card (AMS-710-02-FM-03504) with the following information:

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- Name
- Date of fit test
- Manufacturer, model, and size of each successfully tested respirator
- Name and signature of the person that conducted the test
- Fit test challenge agent used
- Fit factor if a quantitative fit test was performed

4.9.9 Fit Testing and Seal check

The qualitative fit test should be repeated at least once every 12 months for routine use.

4.9.10 Fit Checks

There are two tests that are used in the field to check the seal of the respirator. These are known as the positive and negative fit checks. Each of these two tests must be performed every time an employee puts on a respirator and prior to entering a contaminated area.

4.10 Purchase of Approved Equipment

These requirements apply to all NIOSH/MSHA approved respirators used on APTIM locations. Non-approved "Dust Masks" with one strap shall not be used on APTIM projects.

4.11 Cleaning, Care, Maintenance, and Storage

4.11.1 Cleaning: Respirators shall be cleaned, disinfected, or sanitized after use to ensure that proper protection is provided to the user. Each worker shall be briefed on the cleaning procedure and be assured that they will always receive a clean and disinfected/sanitized respirator. Such assurances are especially important when respirators are not individually assigned to workers. Respirators maintained for emergency or general use shall be cleaned and disinfected/sanitized after each use.

4.11.1.1 Respirator cleaning and disinfecting/sanitizing recommendations:

- Remove any filters, cartridges, canisters, speaking diaphragms or valve assemblies.
- Wash facepiece and breathing tube in cleaner-disinfectant or detergent solution (43°C or 110°F maximum temperature). Use a soft hand brush to help in removal of dirt and grime.
- Rinse completely in clean water (43°C or 110°F maximum temperature).
- Air dry in clean area or wipe dry with clean rags.
- Clean other respirator parts as recommended by the manufacturer.
- Inspect valves, head straps, and other parts. Replace with new parts if defective.
- Insert new filters, cartridges, or canisters, and make sure seal is tight.

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- After completely dry put in a sealed container, like a zip-log plastic bag, for storage.
- 4.11.1.2 Cleaner-disinfectant solutions are available that effectively clean the respirator and contain a bactericidal agent.
- 4.11.1.3 Alternately, respirators may be washed in a liquid detergent solution, and then wiped with a clean piece of paper toweling, which has been dipped into a disinfecting/ sanitizing solution or a solution of rubbing alcohol. The respirator must then be rinsed in fresh water and air dried.
- 4.11.1.4 Respirator-freshening wipes are not an adequate substitute for this cleaning and disinfecting process.
- 4.11.1.5 The RPP Coordinator is responsible for the cleaning and disinfecting of respirators.
- 4.11.1.6 A log is maintained to include a record of date of cleaning and the cleaning attendant.
- 4.11.2 Storing the Respirator
- 4.11.2.1 When respirators are not being used, they shall be individually sealed in plastic bags and stored at locations established by location management in order to protect them against dust, sunlight, extreme temperatures, excessive moisture, or damaging chemicals. Respirators should not be stored (thrown) in toolboxes or gang boxes. They shall be stored in such a way that the face piece, straps and exhalation valve are not distorted.
- 4.11.2.2 Atmosphere supplying respirators will be stored in a secure location that is identified in the Project RPP
- 4.11.2.3 The storage location of emergency respiratory protection shall be readily accessible and prominently identified.
- 4.11.2.4 Respirators shall be stored in an area free of contamination.
- 4.11.3 Inspecting the Respirator
- All respirators shall be inspected by the individual before and after each use, and at least monthly by the user's supervisor to ensure that they are in satisfactory working condition. These maintenance inspections will be documented by the supervisor using AMS-710-02-FM-03509.
- 4.11.4 Respirator Maintenance
- 4.11.4.1 The RPP Coordinator or any other personnel assigned to respirator maintenance shall be thoroughly trained. Substitution of parts from different brands or types of respirators invalidates approval of the device. Repairs and adjustments should never be made beyond the manufacturer's recommendations.

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4.11.4.2 At all times respirators are to be properly maintained to ensure they function properly and adequately to protect the employee. Maintenance involves a visual inspection for cleanliness and defects. Worn or deteriorated parts are replaced prior to use.

4.11.4.3 No components will be replaced, or repairs made beyond those recommended by the manufacturer. Repairs to regulators or alarms of atmosphere-supplying respirators will be conducted by the manufacturer.

4.11.4.4 The following criteria will be used when inspecting respirators:

- Facepiece:
 - cracks, tears, or holes
 - facemask distortion
 - cracked or loose lenses/face shield
- Head straps:
 - breaks or tears
 - broken buckles
- Valves:
 - residue or dirt
 - cracks or tears in valve material
- Filters/Cartridges:
 - approval designation
 - gaskets
 - cracks or dents in housing
 - proper cartridge for hazard
- Air Supply Systems:
 - breathing air quality/grade
 - condition of supply hoses
 - hose connections
 - settings on regulators and valves

4.11.4.5 Employees are permitted to leave their work area to perform limited maintenance on their respirator in a designated area that is free of respiratory hazards. Situations when this is permitted include to wash their face and respirator facepiece to prevent any eye or skin irritation, to replace the filter, cartridge or canister, and if they detect vapor or gas breakthrough or leakage in the facepiece or if they detect any other damage to the respirator or its components.

4.11.5 Defective Respirators

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4.11.5.1 Respirators that are defective or have defective parts shall be taken out of service immediately.

4.11.5.2 If, during an inspection, an employee discovers a defect in a respirator, they should immediately bring the defect to the attention of his or her supervisor. Supervisors give all defective respirators to the Location HSE Manager or RPP Coordinator who will decide whether to:

- Temporarily take the respirator out of service until it can be repaired.
- Perform a simple fix on the spot such as replacing a head strap.
- Dispose of the respirator due to an irreparable problem or defect.

4.11.5.3 When a respirator is taken out of service for an extended period of time, the respirator will be tagged out of service, and the employee will be given a replacement of similar make, model, and size. All tagged out respirators will be kept in storage away from in service respirators.

4.12 Training

4.12.1 All personnel prior to wearing a respirator, shall be trained in the proper use of respirators

4.12.2 The Location or Area HSE Manager will provide training to respirator users and their supervisors on the contents of the Respiratory Protection Program and their responsibilities. Workers will be trained prior to using a respirator in the workplace. Supervisors will also be trained prior to using a respirator in the workplace or prior to supervising employees that must wear respirators.

4.12.3 The training course will cover the following topics:

- The location specific Respiratory Protection Program
- The OSHA Respiratory Protection standard
- Respiratory hazards encountered at the location and their health effects
- Proper selection and use of respirators
- Limitations of respirators
- Respirator donning and user seal (fit) checks
- Fit testing
- Emergency use procedures
- Maintenance and storage
- Medical signs and symptoms limiting the effective use of respirators

4.12.4 Employees will be retrained annually or as needed (e.g., if they change departments and need to use a different respirator). Employees must demonstrate their

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understanding of the topics covered in the training through hands-on exercises and a written test. Respirator training will be documented by the Location or Area HSE Manager and the documentation will include the type, model, and size of respirator for which each employee has been trained and fit tested.

4.13 Program Evaluation

The Location Manager shall ensure that the Program is periodically evaluated to determine the effectiveness of the Program during all phases of operation in which respirators are being used. Frequent walk-through inspections during these activities shall be conducted to monitor and document supervisor and worker compliance with the requirements of the program. In addition to general assessment of the overall Respiratory Protection Program, specific evaluations of the respirator cleaning, inspection, maintenance, repair, storage, and use practices shall be conducted and documented weekly to ensure that the desired results of these operations are consistently achieved.

5.0 TERMINOLOGY

Term	Definition
NIOSH/MSHA Approved	Tested and listed as satisfactory jointly by the Mine Safety and Health Administration (MSHA) of the U. S. Department of Labor and the National Institute for Occupational Safety and Health (NIOSH) of the U. S. Department of Health and Human Services.
Challenge Agent	The air contaminant introduced into a test chamber so that its concentration inside and outside the respirator may be compared.
IDHL	Immediately dangerous to life or health means an atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere.

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-02-FM-03501	Medical Questionnaire for Respirator Use
AMS-710-02-FM-03502	Request for Medical Evaluation for Respirator Use
AMS-710-02-FM-03503	Respirator Training and Fit Test Record
AMS-710-02-FM-03504	Employee Fit Test Card
AMS-710-02-FM-03506	Respiratory Protection Training Program Wallet Card
AMS-710-02-FM-03507	Location Specific Respiratory Hazard Evaluation Form
AMS-710-02-FM-03508	Location Specific Voluntary and Mandatory Respirator Use

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AMS-710-02-FM-03509	Monthly Maintenance Checklist for Respirators

6.2 Other Internal References

AMS-710-04-WI-00301	Health and Safety Plans (HASP) for Hazardous Waste Operations and Emergency Response sites.
AMS-710-01-FM-00103	Employee Notification of Industrial Hygiene Results
AMS-710-02-FM-02902	Breathing Air Testing Form
AMS-710-05-PR-01900	HSE Education and Training
AMS-710-04-PR-00300	Hazardous Waste Operations
AMS-710-01-PR-03500	Medical and Exposure Records

6.3 Other External References

Title 30, Part II of the CFR (Code of Federal Regulations) - NIOSH/MSHA Approvals for Respirators
Title 29 CFR 1926.103 Respiratory Protection
Title 29 CFR 1910.134 Respiratory Protection
Title 29 CFR 1910.1020 Hazardous waste operations and emergency response
American National Standards Institute - Practices for Respiratory protection Z88.2-2015
CSA Z94.4-18 Selection, Use, and Care of Respirators
CSA Z108.1-13 Compressed Breathing Air and Systems

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
Medical and Exposure Records (AMS-710-01-PR-03500)	30	Corporate Workers Compensation Supervisor & Aptim Occupational Health Medical Provider
Training Records	Duration of project 7 years	Site Location HSE Learning Management System
Fit Test Records	1 year (required annually)	Site Location

7.1 A copy of this plan is kept at the Location and is available to all employees for review.

7.2 Copies of training and fit test records shall be maintained at the Location.

7.3 These records will be updated as new employees are trained, as existing employees receive refresher training, and as new fit tests are conducted.

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- 7.4 The Location HSE Manager or RPP Coordinator will also maintain copies of the medical clearances for all employees covered under the respirator program. The physician's or other PLHCP's documented findings are confidential and will remain at the company approved medical provider. The company will only retain the physician's or other PLHCP's written recommendation regarding each employee's ability to wear a respirator.

8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	Selection Table for Respiratory Protection

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ATTACHMENT 8.1
SELECTION TABLE FOR RESPIRATORY PROTECTION

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SELECTION TABLE FOR RESPIRATORY PROTECTION

OSHA Standards that contain requirements for Respiratory Protection
(this list is not all-inclusive)

1926 Construction	1910 General Industry	1915 Maritime Industry	Title
	1910.134		Mechanical Paint Removers
1926.57	1910.94		Ventilation
1926.58	1910.1001	1915.1001	Asbestos
1926.60	1910.1050	1915.1050	Mehtylenedianiline
1926.62	1910.1025	1915.1025	Lead
1926.65	1910.120		Hazardous Waste Operations and Emergency Response
1926.98	1910.156		Respiratory Protection for Fire Brigades
1926.103	1910.134	1915.152	Respiratory Protection
1926.353			Ventilation and Protection in Welding, Cutting, and Heating
1926.354		1915.53	Welding, Cutting, and Heating in way of preservative coating
1926.651			General Requirements
1926.800			Underground Construction
1926.1103	1910.1003	1915.1003	4—Nitro biphenyl
1926.1104	1910.1004	1915.1004	alpha—Naphthylamine
1926.1106	1910.1006	1915.1006	Methyl chloromethyl ether
1926.1107	1910.1007	1915.1007	3,3—Dichlorobenzidine
1926.1108	1910.1008	1915.1008	bis—chloromethyl ether
1926.1109	1910.1009	1915.1009	beta—naphthylamine
1926.1110	1910.1010	1915.1010	Benzidine
1926.1111	1910.1011	1915.1011	4—Aminodiphenyl
1926.1112	1910.1012	1915.1012	Etyleneimine
1926.1113	1910.1013	1915.1013	beta—propiolactone
1926.1114	1910.1014	1915.1014	2—Acetylaminofluorene
1926.1115	1910.1015	1915.1015	4—Dimethylaminoazobenzene
1926.1116	1910.1016	1915.1016	N—Nitrosodimethylamine
1926.1117	1910.1017	1915.1017	Vinyl Chloride

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1926 Construction	1910 General Industry	1915 Maritime Industry	Title
1926.1118	1910.1018	1915.1018	Inorganic Arsenic
1926.1127	1910.1027	1915.1027	Cadmium
1926.1128	1910.1028	1915.1028	Benzene
1926.1129	1910.1029		Coke Oven Emissions
1926.1144	1910.1044	1915.1044	1,2—dibromo—3—chloropropane
1926.1145	1910.1045	1915.1045	Acrylonitrile
1926.1147	1910.1047	1915.1047	Ethylene Oxide
1926.1148	1910.1048	1915.1048	Formaldehyde
1926.1153	1910.1053	1915.1053	Respirable Crystalline Silica
1926.1126	1910.1026	1915.1026	Chromium VI
	1910.1043		Cotton Dust
	1910.261		Pulp, Paper, and Paperboard Mills

**PROJECT HSE INSPECTION FORM**

Project Location: _____

Date: _____

Type of Project: _____

Contract No.: _____

Your Name: _____

Supt.: _____

	Safe	At Risk	N/A	I/H
1.0 GENERAL				
1.1 All employees receive New Employee HSE orientation and trained in PIP?				
1.2 Safety Rule Book distributed with a sign off sheet retained as evidence of training?				
1.3 HSE meetings held with supervisor and subcontractors every two weeks?				
1.4 HSE meetings held each week with work crews?				
1.5 Minutes of jobsite safety meetings recorded and kept at jobsite?				
1.6 Competent contractor personnel assigned responsibility to inspect jobsite for safety?				
1.7 Government (OSHA) sign posted? Form 300 up-to-date?				
1.8 Safety bulletins, accident prevention material, safety rules posted?				
1.9 Weekly safety inspection reports by subcontractor personnel prepared and kept at jobsite?				
1.10 Minimum two certified First Aid/CPR personnel per shift?				
1.11 Managing an Incident Poster complete and posted?				
1.12 Approved and stocked First Aid Kit on jobsite?				
1.13 Good housekeeping maintained? (all)				
1.14 Employees informed on access to med. & exposure records?				
1.15 Provisions made for vessel to vent during off work hours?				

	Safe	At Risk	N/A	I/H
1.16 Precautions taken to protect customer's property, employees, and visitors from paint spray & abrasive blasting materials?				
1.18 Employees informed of any special site or customer HSE requirements?				
1.19 Subcontractors aware of Employer responsibilities? Complying with APTIM requirements?				
1.20 Protection over manways/doorsheets?				
1.21 JSA being used to plan new or hazardous jobs? Employees involved in process?				
1.22 Atmospheric monitoring performed where required? Documented?				
1.23 Vessels and/or pipelines isolated/blinded/blanked?				
1.24 Appropriate manuals and proper instructions on jobsite?				
1.25 Dangerous openings fenced or covered?				
1.26 Test water to come through clean lines?				
1.27 Employees informed of evacuation route?				
1.28 All noise areas posted?				
2.0 PERSONAL PROTECTION				
2.1 Hearing protection provided and worn by all where noise levels are excessive?				
2.2 Hard hats and safety glasses (with ANSI Z87 or equiv. side shields) provided for and worn by all?				
2.3 Appropriate work gloves worn by employees for their assigned work?				



PROJECT HSE INSPECTION FORM

	Safe	At Risk	N/A	I/H
2.4 Additional eye and face protection provided for and worn by all where exposed to potential eye or face injury?				
2.5 Adequate footwear worn by employees for their assigned work?				
2.6 Have respirator users received a medical evaluation? Fit-tested?				
2.7 Written Respiratory Protection Program on site?				
2.8 Are respirators, blast and paint hoods available and used?				
2.9 Fresh air respirators used for internal spray painting?				
2.10 Personnel trained in wearing and inspection of PPE? Is PPE being inspected?				
2.11 Are burning goggles/face shields available & used?				
2.12 Are approved safety harnesses used where required?				
2.13 Approved lanyard connected at waist level or above to approved anchorage?				
2.14 Wire rope, independent lifelines used for each employee on suspended scaffold, painter's boom, air buggy and boatswains chairs?				
2.15 Supplied air helmet or hood used by all operators when abrasive blasting?				
2.16 Preventive injections provided for workers around raw sewage?				
2.17 Airline filtering devices functioning properly? Carbon monoxide monitor installed after filter? Set at 10 PPM? Alarm checked and meter bump checked daily with test gas?				
2.18 Protective skin cream provided and used by painters?				
3.0 HAZARD COMMUNICATION PROGRAM (OR RIGHT TO KNOW PROGRAM)				
3.1 Written program on site?				

	Safe	At Risk	N/A	I/H
3.2 Personnel trained and logged in?				
3.3 All safety data sheets (SDS) on site? (Current within 3 yrs.)				
3.4 Containers labeled (other than container that contents will be used up in one shift)?				
4.0 SANITATION / HEALTH / ENVIRONMENT				
4.1 Marked & labeled portable containers used to dispense drinking water?				
4.2 Single service cups used for drinking water, containers provided for new & used cups?				
4.3 Adequate number of toilet facilities provided & maintained?				
4.4 Special washing facilities provided for workers handling materials which may be harmful to their health?				
4.5 Illumination in work areas (including offices, shops) adequate?				
4.6 Is ventilation adequate?				
4.7 Means provided for waste/scrap removal?				
4.8 Waterless hand cleaner, etc. provided?				
5.0 FLAMMABLE MATERIALS				
5.1 In areas where flammables are stored or where operations present a fire hazard "NO Smoking or Open Flame" sign posted?				
5.2 Fuel containers posted?				
5.3 Indoor and outdoor storage of flammables in approved containers or cabinets with warning signs posted?				
5.4 Form, scrap lumber & all other debris including combustible scrap/debris removed from work areas at regular intervals?				

PROJECT HSE INSPECTION FORM

	Safe	At Risk	N/A	I/H
5.5 Containers provided for collection, separation of waste & trash?				
5.6 Solvent waste, oily rags & flammable liquids kept in fire resistant covered containers until removed from worksite?				
5.7 Required portable fire-fighting equipment available, properly located & maintained? Inspection tags up to date?				
5.8 Fuel operated equipment shut off for refueling & bonded to fuel tank?				
5.9 Are Safety Cans used for flammables?				
5.10 Fire extinguisher operational & available with 75' (23m) of each work area? Have monthly & annual inspection tag?				
5.11 Fire extinguishers available within 50' (15m) of each work area where flammable liquids are used/stored?				
5.12 Safety-shutdown on stoves & excess flow valves on pre-heater lines?				
5.13 Gas manifolds marked & capped?				
5.14 Stationary flammable containers grounded-bonded? Have spill containment?				
5.15 Combustibles kept 35' (15m) from welding areas?				
5.16 Fire extinguishers in cab of crane, hoist, etc.?				
5.17 Non-sparking fans used & bonded to tank for ventilation?				
5.18 Ventilation fans correctly sized for tank volume?				
5.19 Ventilation used to prevent flammable vapors exceeding 10% of LFL (Lower Flammable Limits)?				
5.20 Inside work stopped when flammable vapors exceed 10% LFL?				

	Safe	At Risk	N/A	I/H
5.21 Oxygen (O ₂) level not less than 19.5% or greater than 22%?				
5.22 Flammable liquid containers clearly labeled/bonded during use?				
5.23 Paint spillage contained & cleaned up daily?				
5.24 Atmospheric monitoring for oxygen & LFL performed before entry into enclosed spaces? Proper forms completed before starting work & when painting? Tests taken at two-hour intervals, after lunch & monitored?				
6.0 AIR TOOLS OR EQUIPMENT				
6.1 Hand held powered tools (saws, air impact) equipped with guard & ONLY with constant pressure switch?				
6.2 Hand held powered tools (drills, tappers, fastener drivers, disc & belt sanders, power saws and angle grinders) provided with momentary contact "on-off" switch?				
6.3 Devices provided on air power tools to prevent tools from becoming accidentally disconnected from hose?				
6.4 Air hose connections secured? Wired or chained together?				
6.5 Air driven nailers operating at more than 100 psi provided with safety device on the muzzle to prevent nail ejection unless muzzle is in contact with work surface?				
6.6 Airless spray guns (operating at 1000 psi) equipped with safety preventing pulling of trigger until safety device is manually released?				
6.7 Excess flow valves in air lines greater than ½" (12.7mm) diameter?				
6.8 Blast pots tested & certified?				



PROJECT HSE INSPECTION FORM

	Safe	At Risk	N/A	I/H
6.9 Abrasive blasting equipment, hose, nozzles & dead men switch in safe condition? Static dissipating hose used or abrasive pot properly grounded?				
6.10 Air hoses inspected weekly?				
6.11 Airless spray equipment inspected weekly for safe condition? Static dissipating hose used or pump properly grounded?				
6.12 Is air for cleaning being used properly (30 psi max)?				
6.13 Is air receiver test & certified & equipped with pop-off safety valve & pressure gauge?				
6.14 Man ways free from cables & hoses?				
7.0 POWER TOOLS				
7.1 Power actuated tools provided with safety shield/guard & operator has evidence of special training in their use?				
7.2 Do electric portable power tools have grounding conductor or double-insulated?				
7.3 All fixed power woodworking tools provided with a disconnect switch that can be locked or tagged in the off position?				
7.4 Defective tools & equipment tagged as unsafe, or controls locked in off position, or physically removed from site?				
7.5 Correct tools provided & used?				
7.6 Abrasive wheels properly handled & stored?				
8.0 ELECTRICAL				
8.1 On power circuits, exposed or concealed where accidental contact by tools/equipment may be hazardous, warning sign shall be posted and all workers advised of hazard?				

	Safe	At Risk	N/A	I/H
8.2 Regular inspections made to assure effective grounding of noncurrent carrying metal parts of portable and/or plug connected equipment or GFCI's installed on all 110-120 V temporary circuits? MPS Log up to date?				
8.3 Temporary lights equipped with guards to prevent accidental contact with bulb?				
8.4 Receptacles, attachment plugs not interchangeable on circuits of different voltages, current ratings or type of current (AC or DC)?				
8.5 Electrical equipment properly grounded?				
8.6 Approved electrical equipment used where flammable vapors may develop?				
8.7 Electrical service lines greater than 220V elevated or buried?				
8.8 Transformers fenced off or elevated?				
8.9 All electrical power cords handled safely, grounded & in good repair?				
8.10 EPD's or ELCB's installed & working on 220V power sources?				
9.0 LADDERS				
9.1 Ladders regularly inspected properly constructed, in safe condition & destroyed when found defective?				
9.2 Side rails extended 3' (1m) above landing or provision of grab rails?				
9.3 Top of ladders tied to prevent displacement?				
9.4 Double cleat ladders provided for working area having 25 or more workers & two-way traffic is expected?				
9.5 Double cleat ladders not exceeding 24' (7.3m) in length?				
9.6 Single cleat ladders not exceeding 30' (9.1m) in length?				

PROJECT HSE INSPECTION FORM

	Safe	At Risk	N/A	I/H
9.7 Cleats inset into edges of side rails or filler blocks used?				
9.8 No metal ladders used within 15' (4.6m) of electrical lines?				
9.9 Stepladders used only in full open position?				
9.10 Stepladders of sufficient height so that top two steps do not have to be used to perform work?				
9.11 All manufactured single & extension ladders equipped with ladder shoes?				
9.12 Cable ladders properly secured to structure?				
9.13 Permanent ladders used for access have rest platforms every 24' (7.3m) with climb devices installed?				
10.0 SCAFFOLDING				
10.1 All open sides & ends of platforms more than 10' (3.05m) above ground or floor level, provided with top rails (42" high (1.06m), midrail & toe boards (4" high (101mm)? Area below scaffold barricaded?				
10.2 Where workers pass or work under scaffolds; screens or other overhead protection provided?				
10.3 Platform planks laid together tight preventing tools, etc. from falling through?				
10.4 Scaffold guyed or tied to structure every 26' (7.9m) vertically & 30' (9.1m) circumferentially?				
10.5 Scaffolding set plumb with adequate foundation bearing plates?				
10.6 Platform planks extend over end supports not less than 6" (152mm), nor more than 18" (457mm)?				
10.7 Planks secured to prevent dislodgment?				

	Safe	At Risk	N/A	I/H
10.8 Ladders used to gain access to scaffold work platforms?				
10.9 Stairways have handrails?				
10.10 Scaffold trap doors provided & used for access from underneath?				
10.11 Rest platform (or scaffold trap door) provided @ 35' (10.7m) intervals on tank erection ladder?				
10.12 Scaffolds erected properly and tagged?				
10.13 Scaffold boards' ends secure from splitting, tested & properly lapped?				
10.14 Brackets plumb, inspected & good condition? Bracket posts pinned?				
10.15 Tool pails used & secured from falling?				
10.16 Bracket straps welded by qualified welders, inspected & circled by qualified inspector?				
10.17 Handlines erected tight & clamped off?				
10.18 Handlines erected on top angle or wind girders?				
10.19 Third handlines installed where needed?				
10.20 Approved scaffolds used at shaft & column splices?				
10.21 Safety line system installed & used while erecting roof framing & roof plates?				
10.22 Tubular scaffold approved type (2" or 50.8 mm od.)?				
10.23 Tubular scaffold properly erected, braced & guyed with access ladders & toe boards?				
10.24 Suspended scaffolds, suspended work platforms & aerial lifts approved? Used correctly?				
10.25 Insulation link provided when welding from suspended platform or suspended scaffold?				

PROJECT HSE INSPECTION FORM

	Safe	At Risk	N/A	I/H
10.26 Are independent lifelines with correct cable grab device used on suspended work platforms & scaffolds (except when suspended from crane or derrick)?				
10.27 Correct cable grab used on cable ladders?				
10.28 Boatswain chair on job? Approved type?				
10.29 Powered single or double point suspended scaffold have "U.L." approved label & capacity chart?				
11.0 ROLLING SCAFFOLDS (Manually propelled)				
11.1 Wheel brakes set while in use?				
11.2 No riders on work platform while moving?				
11.3 Work level 6' (2m) or more above ground floor level have guard rails and toe boards?				
11.4 All cross & diagonal bracing in place & properly connected?				
11.5 Height does not exceed 4 times least base dimension unless outriggers are used?				
11.6 Ladder access to work platform?				
11.7 Are rolling scaffolds properly assembled, inspected & tagged?				
12.0 SWINGING SCAFFOLDS - 2 points Suspension				
12.1 Roof hooks or irons securely installed & anchored?				
12.2 Sheaves fit size of rope used?				
12.3 Equipped with standard guardrails & toe boards?				
12.4 Load limit marked on each scaffold?				
12.5 Suspension lines inspected before first use & frequently during use? (Record of inspection kept)?				

	Safe	At Risk	N/A	I/H
12.6 Each employee equipped with safety harness & shock absorbing lanyard & attached to life line?				
12.7 Lifeline attached at top to independent support & extending to ground level?				
12.8 Suspension lines capable of supporting six times rated load?				
12.9 Power cables for electric hoist machines secured to platform to prevent snagging between power supply joint & platform?				
13.0 FLOOR & WALL OPENINGS				
13.1 Wall openings 30" (762mm) H, 18" (467mm) W or greater from which there is a drop of 4' (1.2m) or more & bottom of opening less than 3' (1m) above working surface provided with guardrails?				
13.2 Bottom of wall openings less than 4" (102mm) above work surface provided with standard toe board 4" (102mm) high				
13.3 Open sided floors 6' (2m) or more above floor or ground level provided with standard railing & toe board or other equivalent perimeter protection?				
13.4 Stairways when used during construction have handrails on all open sides, guardrails at landings & filler blocks in all recessed treads?				
14.0 MATERIAL HANDLING EQUIPMENT				
14.1 Approved canopy guards on fork lift trucks & roll-over protection on all earth moving equipment?				
14.2 Rated capacity posted on all lifting, hoisting equipment clearly visible to the operator?				
14.3 Wire rope inspection within last 30 days?				



PROJECT HSE INSPECTION FORM

	Safe	At Risk	N/A	I/H
14.4 Where mobile cranes are regularly used, daily inspections made of critical items & records kept?				
14.5 Written tractor, crane, derrick, inspection within last 30 days?				
14.6 Hand signal chart posted?				
14.7 Qualified personnel operating equipment?				
15.0 CRANES - GENERAL				
15.1 Annual inspection made of crane hoisting machinery & record kept of dates & results?				
15.2 On tower cranes, daily inspection made of rigging?				
15.3 On tower cranes, weekly inspections made of supporting parts, safety appliances & record kept of repairs required?				
15.4 Where a crane is used – lift log being maintained?				
15.5 Adequate & safe working conditions?				
15.6 Derrick or crane in safe working condition? Operator certified?				
15.7 Capacity charts at operator's station?				
15.8 Written crane, derrick/wire rope inspection within last 30 days on site? Annual inspection for hoist & crane available?				
15.9 Tail-swing of crane barricaded when within 7' (2.1m) of grade?				
15.10 Signal person designated?				
15.11 No part of crane or load closer than 15' (4.6m) to energized electrical lines?				
16.0 EXCAVATIONS, TRENCHING & SHORING				
16.1 Excavated material effectively stored & retained at least 2' (.6m) or more from edge of excavations & trenches?				

	Safe	At Risk	N/A	I/H
16.2 Utility company contacted & advised of proposed excavation work to determine underground utility exposure or when overhead power lines are involved?				
16.3 Substantial stop logs or barricades installed when mobile equipment working adjacent to excavation?				
16.4 Trenches more than 5' (1.5m) in depth shored to standard, laid back to stable slopes or provided with other equivalent protection where hazard of moving ground exists?				
16.5 Trenches less than 5' (1.5m) protected where hazardous ground movement exists?				
16.6 Trenches in hard or compact soil shored to standard when depth is more than 5' (1.5m) & 8' (2.4) or more in length?				
16.7 In lieu of shoring in hard or compact soil, trench above the 5' (1.5m) level sloped (slope not steeper than a 1' (.3m) rise to each 1.5' (.45m) horizontal)?				
16.8 Trenches 4' (1.2m) deep or more provided with ladder located no more than 25' (7.6m) of lateral travel?				
17.0 WELDING, CUTTING, BURNING				
17.1 Proper PPE provided, in good condition & being used?				
17.2 All oxygen & fuel gas gauges in working condition?				
17.3 All oxygen & fuel gas hoses in good condition & free of grease & oil?				
17.4 Burning torch equipped with back flow prevention devices for both oxygen & fuel gas at the torch?				
17.5 Back flash arrestors on regulators used for flame cutting?				
17.6 Mechanical lighters used for lighting torches?				

PROJECT HSE INSPECTION FORM

	Safe	At Risk	N/A	I/H
17.7 Oxygen & fuel gas cylinders stored in upright position in designated areas with caps in place? Cylinders tied off? Oxygen stored 20' (6.1m) from fuel gas cylinders?				
17.8 Electric arc welding cables in good condition & properly attached by lugs to weld machine?				
17.9 Welder's shields & helper's goggles in good condition & equipped with proper lenses?				
17.10 Fire extinguishers provided within 25' (7.6m) of welding, cutting or burning operations?				
17.11 All welding cable positioned to eliminate tripping hazards?				
18.0 ROOFING				
18.1 Safety harness and life lines or catch platform?				
18.2 Roofing bracket scaffolds secured?				
18.3 Crawl or chicken ladders secured & evenly spaced cleats?				
Flat & Low Pitch Roofs Less than 4/1 Pitch?				
18.4 Warning line 6' (2m) from roof edge in work area?				
18.5 Safety harness & lines in use at perimeter or standard handrails or equivalent?				
18.6 Protective equipment used when handling hot pitch?				
18.7 Ladder access same as for pitch roofs?				
18.8 Materials stored 6' (2m) from edge?				
18.9 All openings covered or protected by guardrails?				
19.0 CONCRETE FORMING & POURING				
19.1 Vertical re-steel & anchor bolts protected by covering when employees working above?				

	Safe	At Risk	N/A	I/H
19.2 Employee wearing safety harness or equivalent when 6' (2m) or more adjacent work surface?				
19.3 Walk & standing boards provided when pouring horizontal surfaces on re-steel?				
19.4 Employees provided with & using PPE, while pouring concrete?				
19.5 No riding concrete buckets?				
19.6 All pump crete lines secured at all joints?				
19.7 Concrete trucks blocked when discharging on a slope?				
19.8 Shoring & re-shoring adequate for support?				
19.9 Properly guarded work platform for walls, columns, beams, etc.?				
19.10 Power troweling machines equipped with positive on/off switch?				
20.0 STEEL ERECTION				
20.1 Decking or safety nets 2 stories or no more than 30' (9.1m) where erection is being performed?				
20.2 Safety railing no less than 1/2" (13mm) wire rope 42" (1.07m) high around the perimeter of all temporary planked or metal docked floors? Minimum of 3 cable clips per interconnecting eye?				
21.0 DEMOLITION				
21.1 Dust controlled by wetting?				
21.2 Employees provided with dust respirators & goggles?				
21.3 Chutes properly erected & drop area barricaded off?				
21.4 Floor openings protected?				
21.5 Employee access to building provided with overhead protection?				

**PROJECT HSE INSPECTION FORM**

	Safe	At Risk	N/A	I/H
21.6 Stairways in building used for access properly lighted & maintained?				
22.0 RADIATION				
22.1 Radiation operators certified?				
22.2 Are film badges, dosimeters & alarm rate meters worn by all x-ray personnel?				
22.3 Survey meters used? Calibrated?				
22.4 Warning signs & lights installed?				
22.5 Radioactive source properly stored?				
22.6 Alarm rate meters worn where required?				
23.0 RIGGING				
23.1 Adequate equipment available to perform the job safely?				
23.2 Crosby cable clips used, properly installed, correct number, size & torque where required?				
23.3 All ropes, cables & hooks inspected daily before use & are in safe condition?				
23.4 2L43-D is used to hang internal painters rigging from center vent or manhole?				
23.5 Slings proper size, safe condition? Capacity marked?				
23.6 All hooks moused?				
23.7 Guy lines marked where needed?				
23.8 Plate clamps in safe working condition? Capacity marked? Correct inspection color?				
23.9 Plate spreaders marked with capacity & weight?				



Form Number: AMS-710-05-FM-01402

Revision: 1

Approval Date: 10/26/2022

PROJECT HSE INSPECTION FORM

Remarks (Were At Risk and Imminent Hazard conditions corrected?): _____

Project HSE Signature: _____

Date: _____

Construction Manager Signature: _____

Date: _____

Original—Construction Office

Copy—Project HSE File

Copy—Construction Manager File

PROCEDURE

Procedure Number:

AMS-710-00-PR-01700

Revision:

3

Procedure Owner:

HSE

Issuing Authority:

HSE Education & Training Manager

Approval Date:

8/4/2023



WORK AREA HAZARD ASSESSMENT

3	No content changes; updated document number and applicable references.	M. Dotson	8/4/2023
2	Revision to address addition of HASP.	M. Dotson	8/1/2023
1	Revisions to address addition of JSA work instruction, Added sections 4.2.5.10 – 4.2.5.27 PPE Hazard Assessment, added Exceptions and Recordkeeping sections.	M. Dotson	8/19/2022
0	Initial issue as APTIM vetted document.	M. Karr	10/18/2021
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

WORK AREA HAZARD ASSESSMENT

1.0 PURPOSE

The purpose of this Procedure is to establish the minimum requirements for Work Area Hazard Assessment on APTIM sites.

2.0 SCOPE

This procedure applies to all APTIM employees, contractors, subcontractors, and visitors associated with a APTIM site.

2.1 Exceptions

Client HASP, JSA and PPE Hazard Assessment templates may be utilized if required.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Managers
- Supervisors
- Employees
- Contractors
- Subcontractors

4.0 PROCEDURE

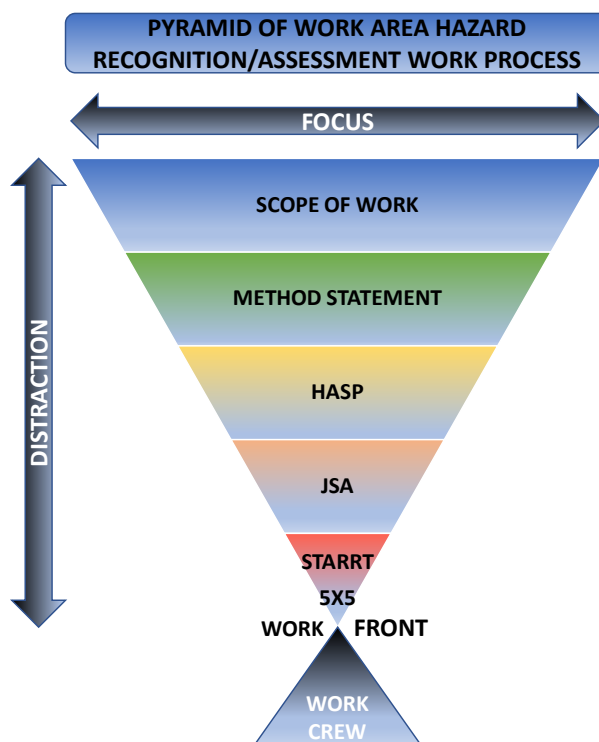
4.1 Work Area Hazard/Recognition Process Philosophy

- 4.1.1 It is The Work Area Hazard/Recognition Process Philosophy that a hazard's risk potential is the product of the Level of Focus and the Level of Distraction. The Level of Focus and the Level of Distraction have an inverse relationship. An increase in focus shall decrease the distraction resulting in less risk potential for an incident to occur at the actual work front. An increase in distraction shall have a decrease in focus resulting in a greater risk potential for an incident to occur at the actual work front. This philosophy is applicable at all levels, phases, and stages of work activity.
- 4.1.2 Varied types of work hazard analyses are to be conducted to mitigate hazard risk potential with the Level of Focus increasing and the Level of Distraction decreasing as the hazard analysis becomes nearer to the actual work activity.
- 4.1.3 The result from the completion of every hazard analysis/recognition process becomes the basis from which to begin the next level of hazard analysis/recognition study. This process is visually displayed in the Pyramid of Work Area Hazard Recognition/Assessment (Figure 4-1).

WORK AREA HAZARD ASSESSMENT

- 4.1.4 If during the Work Area Hazard/Recognition Process it is discovered that a previous step failed to identify a potential risk or hazard, then the previous step shall be repeated or revisited to incorporate the new findings.
- 4.1.5 Work shall not proceed to the next level or step of the Work Area Hazard Analysis Process prior to the completion of the previous step.

Figure 4.1 Pyramid of Work Hazard Recognition / Assessment Work Process



4.2 Work Area Hazard Analysis/Recognition Process (Work Area Hazard Assessment Steps)

- 4.2.1 Utilizing the following steps below, each site shall develop a Work Area Hazard Assessment Process specific to their needs. Performing a method statement is a best management practice to tie steps one (1) and four (4) together, but is not required.
- 4.2.2 The location specific Work Area Hazard Assessment Process shall minimally include a means of engaging the supervision in developing an assessment prior to the start of work, and a method of engaging their respective work crews in the assessment process. The location specific Work Area Hazard Assessment Process shall, minimally, have a means of ensuring each worker has the opportunity to conduct a 360° review of their specific work task, as well as documenting that review.

WORK AREA HAZARD ASSESSMENT

4.2.3 Scope of Work (Step One)

The first step in the Work Area Hazard Analysis/Recognition Process begins with the process of defining the Scope of Work. The Scope of Work is a definition of the work to be performed. The objective is to establish an understanding of the work to be performed.

4.2.3.1 The Scope of Work shall define the major elements of work to be executed (e.g., civil, structural, mechanical, or electrical).

4.2.3.2 Within the Scope of Work each of the major disciplines shall be defined to include elements such as:

- Painting and coating
- Instrumentation and electrical
- Structural
- Civil

4.2.3.3 The major disciplines identified in the Scope of Work review shall serve as the basis for development of the method statements

4.2.4 Method Statement (Step Two)

The second step in the Work Area Hazard Analysis/Recognition Process entails the development of a Work Method Statement or equivalent document (e.g., Job Hazard Assessment). A Work Method Statement shall provide specific instructions on the work to be performed, outline hazards involved, and identify key safety measures to be implemented during the work activity. The Method Statement shall also detail which control measures have been introduced to ensure the safety of anyone who is affected by the task or process.

4.2.4.1 For each discipline of work identified under the site scope of work the Site Manager shall prepare Method Statements, using AMS-710-00-FM-01702—Sample Method Statement 2.

4.2.4.2 The site HSE Manager/Supervisor shall maintain a copy of the site method statements and shall submit copies to Business Unit/Operating Group HSE Director or designee for business sector, area, district and/or global application.

4.2.4.3 Within the Method Statement the following minimum information shall be included:

- Sequence of key activities
- Identification of the craft required, including necessary skill/certification
- Identification of the tools and equipment required
- A clear statement of responsible persons, i.e., who is in charge of the work, who has specific responsibilities, e.g., flagmen, riggers.
- Identification of what materials are required for execution of the activity

WORK AREA HAZARD ASSESSMENT

- Identification of what services are required and how they shall be provided
- Reference to emergency procedures, including contact telephone numbers, reference to emergency provisions such as spill kits.
- Key activities identified in the Method Statement(s) (or equivalent document(s)) shall serve as the basis for the development of an activity specific Job Safety Analysis (JSA).

4.2.5 Project Specific Health and Safety Plan (HASP) Development (Step Three)

The third step in the Work Area Hazard Analysis/Recognition Process is to develop a project specific Health and Safety Plan. The project specific HASP shall cover all work activities associated with the planned project work. The HASP will identify all the potential hazards associated with work activity, and list the control measure(s) to be used to mitigate the potential hazard(s). Follow AMS-710-00-PR-01750 Health and Safety Plan (HASP).

- 4.2.5.1 The project specific HASP shall be reviewed with project personnel and subcontractors before work begins, to allow sufficient time for them to review and sign the HASP. New site personnel shall be given a copy of the HASP and are required to read and sign the HASP acknowledging their acceptance of site rules and understanding of site hazards prior to beginning work.
- 4.2.5.2 Periodic reviews shall be conducted by the site HSE Manager and Project Manager to ensure the HASP covers all the work activities, organization structure, chemical & physical hazards, PPE requirements, site control measures, exposure control measures, training & medical requirements, and emergency procedures.

All project HASPs shall be reviewed whenever work conditions change, and should be reviewed periodically during the project. No active project may go longer than 1 year without a formal review of the HASP. Whenever the plan must be modified to fit current site conditions, these changes shall be made as an amendment to the HASP. The original text shall not be deleted, but can be lined through to indicate that it is no longer applicable

4.2.6 Job Safety Analysis (Step Four)

The fourth step in the Work Area Hazard Analysis/Recognition Process is to develop a JSA for each key activity to be performed, during the shift. A JSA shall document each step of the activities, identify potential hazards associated with each step, and list the control measure(s) to be used to mitigate the potential hazard(s). Follow AMS-710-00-WI-01701 Job Safety Analysis Work Instruction. Several JSA templates are available for use.

- 4.2.6.1 Periodic reviews shall be conducted by the site HSE Manager and Senior Level Site Manager to ensure the integrity of the JSA process.
- 4.2.6.2 JSA's are to remain with the work crew(s) until the task(s) are completed at which time they shall be submitted to the site HSE Manager for inclusion in the site HSE files.

WORK AREA HAZARD ASSESSMENT

4.2.6.3 These steps identified in the JSA shall serve as the basis for development of job step specific worker completed assessments.

1. PPE Hazard Assessment

- The PPE Hazard Assessment form (AMS-710-00-FM-01711) can be used to determine the required PPE by identifying hazards to the employees performing the task and the required PPE. The form is grouped according to the body part requiring PPE.
- The form can serve as a written certification of the PPE Hazard Assessment.
- Conduct a PPE Hazard Assessment initially, when tasks or conditions change, or when PPE is deemed ineffective

2. Perform a walkthrough of the work area and task or job to be performed. Identify hazards that the employee may be exposed to while performing work activities or while present in the work area.

3. Describe the hazards that are present

4. If the hazards cannot be eliminated or controlled without the use of PPE then indicate which type of PPE will be required to protect the employee from the hazard

- PPE alone should not be relied on to provide protection against hazards but should be used in conjunction with guards, engineering controls and good operating practices.
- When selecting PPE select the most protective type available
- The supervisor shall fit the worker with the PPE and give instructions on its use and care.
- The supervisor shall also ensure the employee understands the manufacturer's warning labels and provide training on the limitations of the PPE

5. Make sure that you complete the following fields on the form (indicated by *)

- Name of the worksite or task
- Name of person certifying that a workplace PPE hazard assessment was performed
- Date the PPE hazard assessment was performed

6. Document and certify the PPE Hazard Assessment and maintain documentation for reference and employee training.

4.2.7 5 x 5 Analysis/STARRT (Step Five - Optional)

The fifth step in the Work Area Hazard Analysis/Recognition Process is to develop a 5 X 5 Analysis/Safety Task Analysis and Risk Reduction Talk (STARRT) Card or equivalent form just prior to the performance of the work. The job or task specific analysis is performed by the

WORK AREA HAZARD ASSESSMENT

individual who is to perform the work. This is the individual's opportunity to confirm that he has everything needed to perform the work in a safe manner.

4.2.7.1 The individual shall prepare job step specific analysis, using one of the following:

- AMS-710-00-FM-01706—Sample 5x5 Analysis
- AMS-710-00-FM-01707—Sample STARRT Card
- Or an equivalent form

4.2.7.2 The work crew shall be actively involved in conducting a 360° review of their specific work area, identifying hazards of their work and the hazards of work activities that surround them. The work crew lead and the work crew shall collectively review the means of mitigation and ensure proper controls and measures are in place.

4.2.7.3 The job or task specific analysis is a tool for the individual to identify any unaccounted hazards that one may encounter associated with the tasks they shall actually be performing.

4.3 Conducting Reviews

A review must be conducted when site-specific hazard assessments, inspections or investigations identify a previously unrecognized hazard.

5.0 TERMINOLOGY

Term	Definition
Hazard	A condition, practice, behavior or situation, or a combination of these, that can cause injury or illness in people, or damage to the environment or property.
HASP	Project-Specific Health and Safety Plan, plan that addresses all the hazards involved in the work and mitigation measures to perform the work safely.
JSA	Job Safety Analysis, technique that focuses on job tasks as a way to identify hazards before they occur
Site	Any location, facility or project where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities and/or project sites.
PPE Assessment	Evaluation of your workspace that helps determine what hazards employees are exposed to and what PPE they need to protect themselves.
Work Area Hazard Assessment	Evaluation of a work place condition, practice, behavior or situation that an employee may encounter while performing a job/task that has the potential for risks/hazards.



WORK AREA HAZARD ASSESSMENT

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-00-FM-01701	Sample Method Statement 1
AMS-710-00-FM-01702	Sample Method Statement 2
AMS-710-00-FM-01706	Sample 5x5 Card
AMS-710-00-FM-01707	Sample STARRT Card
AMS-710-00-FM-01711	PPE Hazard Assessment Form
AMS-710-00-FM-01704	Sample Job Safety Analysis (JSA) 1
AMS-710-00-FM-01705	Sample Job Safety Analysis (JSA) 2
AMS-710-00-FM-01708	Sample Job Safety Analysis (JSA) 3
AMS-710-00-FM-01709	Sample Job Safety Analysis (JSA) 4
AMS-710-00-FM-01710	Sample Job Safety Analysis (JSA) 5

6.2 Other Internal References

AMS-710-00-PR-01750	Health & Safety Plan (HASP)
AMS-710-00-WI-01701	Job Safety Analysis (JSA)

6.3 Other External References

None

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
Health & Safety Plan	Duration of Project unless otherwise noted	Project Files
Job Safety Analysis (AMS-710-00-WI-01701)	Duration of Project unless otherwise noted	Project Files
PPE Hazard Assessment (AMS-710-00-FM-01711)	Duration of Project unless otherwise noted	Project Files



Procedure Number: AMS-710-00-PR-01700

Revision: 3

Approval Date: 8/4/2023

WORK AREA HAZARD ASSESSMENT

8.0 ATTACHMENTS

Attachment	Attachment Title
None	

PROCEDURE

Procedure Number:

AMS-710-04-PR-00300

Revision:

New

Procedure Owner:

HSE

Issuing Authority:

Sr. HSE Manager

Approval Date:

5/18/2021



HAZARDOUS WASTE OPERATIONS

0	Initial Issue	J. Milliner	5/18/2021
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

HAZARDOUS WASTE OPERATIONS

1.0 PURPOSE

The purpose of this procedure is to establish the minimum requirements for developing and implementing a written health and safety program for APTIM employees involved in hazardous waste operations conducted at treatment, storage, and disposal (TSD) facilities.

2.0 SCOPE

This procedure applies to personnel who develop and implement written HSE Programs for employees involved in hazardous waste operations.

3.0 RESPONSIBILITIES

The following personnel have responsibilities defined in this procedure:

- APTIM Managers
- APTIM Supervisors
- APTIM Employees
- Project Manager
- HSE Representative

3.1 Project Manager

The Project Manager shall:

- Verify compliance with the appropriate regulatory standard(s)
- Ensure project-specific Health and Safety Program (HASP) documents are applicable health and safety requirements

3.2 HSE Representative

The HSE Representative shall:

- Verify compliance with the appropriate regulatory standard(s) (AMS-710-04-WP-00001 Implement Environmental Management System (EMS)).
- Ensure project-specific Health and Safety Program (HASP) documents are applicable health and safety requirements
- Ensure medical and exposure records are handled correctly (AMS-710-01-PR-03500)

4.0 PROCEDURE

4.1 General

The Site HSE Manager shall develop and implement a written safety and health program for employees involved in hazardous waste operations (AMS-710-04-WI-00301 Health and Safety

HAZARDOUS WASTE OPERATIONS

Plans for Hazardous Waste Operations Sites). The program shall be designed to identify, evaluate, and control safety and health hazards in the facility for the purpose of employee protection. The program shall provide for emergency response and shall address, as appropriate, site analysis, engineering controls, maximum exposure limits, hazardous waste handling procedures, and the use of new technologies (AMS-710-04-WI-00302 Emergency Response at Hazardous Waste Sites).

4.2 Hazard Communication

The safety and health program shall contain a hazard communication program. Refer to AMS-710-01-PR-00400 Hazard Communication.

4.3 Emergency response

The safety and health program shall contain Emergency Response requirements or shall reference the Emergency Preparedness Plan (AMS-710-03-PR-00400).

4.4 Medical Surveillance

A medical surveillance program shall be developed and implemented. All employees who are or may be exposed to health hazards or hazardous substances at or above the permissible exposure limits or, if there is no permissible exposure limit, above the published exposure levels without regard to the use of respirators for thirty (30) days or more in a calendar year shall be included in the program at no cost to the employee.

4.5 Decontamination

4.5.1 A decontamination program shall be developed, communicated to employees, and implemented before any employees or equipment enters an area on site where potential exposure to hazardous substance(s) exists (AMS-710-04-WI-00305 Hazardous Waste Decontamination).

4.5.2 All employees leaving a contaminated area shall be appropriately decontaminated. All contaminated clothing and equipment leaving a contaminated area shall be appropriately disposed of or decontaminated (AMS-710-04-PR-04113 Waste Characterization).

4.5.3 Decontamination shall be performed in geographical areas that will minimize cross contamination or the exposure of uncontaminated employees or equipment.

4.5.4 The Site HSE Manager shall monitor all methods of decontamination and determine their effectiveness. If methods are found to be ineffective, appropriate steps will be taken to correct the deficiencies.

4.5.5 Regular showers and changing rooms shall be provided outside the contaminated area.

4.6 New Technology

A program shall be developed and implemented to introduce new and innovative equipment for employee protection into the work place.

HAZARDOUS WASTE OPERATIONS

4.7 Material Handling

Where employees handle drums or containers, AMS-710-02-PR-00300 Material Storage and Handling shall be implemented prior to starting such work.

4.8 Engineering Controls

Engineering controls work practices, personal protective equipment, or a combination of these shall be implemented in accordance with 29 CFR 1910.120 (g) to protect employees from exposure to hazardous substances and safety and health hazards.

4.9 Monitoring

4.9.1 General

Monitoring shall be performed in accordance with 29 CFR 1910.120 (h) to prevent employee exposure to hazardous concentrations of hazardous substances and to assure proper selection of engineering controls, work practices, and personal protective equipment (AMS-710-04-WI-00304 Hazardous Waste Site Control).

4.9.2 Air Monitoring

Air monitoring shall be used to identify and quantify airborne levels of hazardous substances and safety and health hazards in order to determine the appropriate level of employee protection.

4.9.3 Initial Entry

Upon initial entry, representative air monitoring shall be conducted to identify any immediately dangerous to life and health (IDLH) condition, exposure over Permissible Exposure Limits (PELs) or if other dangerous condition(s) exist (i.e., the presence of flammable atmosphere or oxygen deficient environments).

4.9.4 Periodic Monitoring

Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed, or when there is indication that exposure may have risen over PELs. Periodic monitoring shall be considered when the PELs have risen and one or more of the following scenarios occur:

- Beginning of new work on a different portion of the site
- Contaminates other than those previously identified are being handled
- When a different type of operation is initiated
- When obvious liquid contamination is present

4.10 Training

All employees working on sites or at treatment, storage, and disposal (TSD) operations where they may be exposed to health hazards or hazardous substances must receive training to enable the employees to perform their assigned duties and functions in a safe and healthful manner so

HAZARDOUS WASTE OPERATIONS

as not to endanger themselves or other employees (AMS-710-04-WI-00303 Hazardous Waste Operations Training).

4.10.1 New Employees

Employees engaged in hazardous substance removal or other activities, which expose or potentially expose them to hazardous substances and health hazards shall receive initial training which consists of a minimum of 40 hours of instruction off-site and three days of field experience, under direct supervision of a trained, experienced supervisor as described in 29 CFR 1910.120.

4.10.2 Current Employees

Current employees whose previous work experience and/or training are equivalent to the initial training requirement shall be considered as having met the initial training requirements. The Training Manager or his/her designee shall make the determination of equivalency. Current employees shall receive 8 hours of refresher training annually as described in 29 CFR 1910.120.

4.10.3 Trainers

Trainers shall be qualified to instruct employees on the subject matter presented in training. Such trainers shall have satisfactorily completed a training program for teaching their subjects, or they shall have the academic credentials and instructional experience necessary to teach as described in 29 CFR 1910.120.

5.0 TERMINOLOGY

Term	Definition
Buddy System	A system of organizing employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide rapid assistance to employees in case of an emergency.
Clean-up Operation	An operation where hazardous substances are removed, contained, incinerated, neutralized, cleared-up, or in any manner processed or handled with ultimate goal of making the site safer for people or the environment.
Decontamination	The removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects.
Emergency Response or Responding to Emergencies	A response effort by employees from outside the immediate release area or by designated responders to an occurrence which results, or is likely to result, in an uncontrolled release of a hazardous substance. Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered emergency responses. Responses to releases of hazardous substances where there

HAZARDOUS WASTE OPERATIONS

	is no potential safety or health hazard are not considered to be emergency responses.
Facility	Any building, structure, installation, equipment, pipe or pipeline, well, pit, pond, lagoon, impoundment, ditch, storage container, motor vehicle, rolling stock, or aircraft, or any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any water-borne vessel.
Hazardous Substance	A substance which results or may result in adverse effects on the health or safety of employees.
Health Hazard	A chemical, mixture of chemicals, or a pathogen for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. Health hazards include: chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system and agents which damage the lungs, skin, eyes, or mucous membranes.

6.0 REFERENCES

6.1 Required Forms/Checklists

None	

6.2 Other Internal References

AMS-710-01-PR-00400	Hazard Communication
AMS-710-03-PR-00400	Emergency Preparedness Plan
AMS-710-01-PR-03500	Medical and Exposure Records
AMS-710-02-PR-00300	Material Storage and Handling
AMS-710-04-PR-04113	Waste Characterization
AMS-710-04-WI-00301	Health and Safety Plans for Hazardous Waste Operations Sites
AMS-710-04-WI-00302	Emergency Response at Hazardous Waste Sites
AMS-710-04-WI-00303	Hazardous Waste Operations Training
AMS-710-04-WI-00304	Hazardous Waste Site Control
AMS-710-04-WI-00305	Hazardous Waste Decontamination



Procedure Number: AMS-710-04-PR-00300

Revision: New

Approval Date: 5/18/2021

HAZARDOUS WASTE OPERATIONS

6.3 Other External References

29 CFR 1910.1200 Hazard Communication

29 CFR 1910.141 Sanitation

7.0 ATTACHMENTS

Attachment	Attachment Title
None	



Form Number: AMS-710-00-FM-01906

Revision: 2

Approval Date: 7/12/2023

PROJECT/FACILITY WEEKLY MEETING MINUTES

Construction
Manager:

PROJECT/FACILITY

MEETING AGENDA & TOPICS

DISCUSSION ITEMS FROM LAST WEEK'S INSPECTION:

PARTICIPANT SUGGESTIONS AND COMMENTS:

COMMENTS FROM TARGET OBSERVATIONS, LEADING INDICATOR OBSERVATIONS, ENVIRONMENTAL, HEALTH AND/OR SAFETY QUESTIONS, CONCERNS OR RECOMMENDATIONS & ACTION TAKEN

HSE MTG./SAFETY MTG. MINUTES

NUMBER OF EMPLOYEES ACTIVELY PARTICIPATING IN MEETING:

VIDEOS/DEMONSTRATIONS, ETC. USED IN MEETING:

SIGNATURES:

ORIG: GENERAL FOREMAN -

ORIG: SITE HSE MGR. -

Parent Document: AMS-710-00-WI-01903 Craft Supervisor Meeting

Page 1 of 3

A PRINTED FORM WITH DATA ENTERED IS A RECORD.
CONTROL IN ACCORDANCE WITH DOCUMENT MANAGEMENT REQUIREMENTS.

**PROJECT/FACILITY WEEKLY MEETING MINUTES****COPY:** POST AT SITE

MEETING CONDUCTED BY:

DATE:

TIME:

ATTENDANCE**PRINT NAME HERE**

(Do not use nicknames)

SIGNATURE**I.D. NUMBER**

(Employee)

1			
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PROJECT/FACILITY WEEKLY MEETING MINUTES

Total Observations

Category						
Safe						
At Risk						
% Safe						

**TRAINING ATTENDANCE RECORD**

TITLE OF TRAINING COURSE & APPLICABLE AMS OR OSHA STANDARD

DESCRIPTION

TIME:

DATE

START

END

DURATION

LOCATION

ROOM

NAME OF TRAINER

TRAINER'S EMPLOYEE NUMBER (if applicable)

TRAINING VENDOR NAME (if not APTIM)

EMPLOYEE'S ACKNOWLEDGEMENT:

This is to acknowledge that I have received the training & materials as defined above.

	EMPLOYEE NUMBER	NAME (PLEASE PRINT)	DEPT./CO.	SIGNATURE
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Print multiple sheets if more than 20 attendees. Upon completion, please submit the signed and scanned roster, as well as this Excel file with **ONLY** attendee's information to learning@aptim.com. **DO NOT INCLUDE SUBCONTRACTORS IN YOUR ELECTRONIC SUBMITTAL.** Attendees will receive credit based on the listing of their employee numbers on the submitted spreadsheet. If an employee is not present, do not list their employee number. If the employee number is unknown, HR can provide an up to date roster for your location prior to submittal. If the employee is new, please request the employee number from HR prior to submitting. Please type in as much information into rosters as possible.

TRAINER'S SIGNATURE

DATE

PROCEDURE

Procedure Number:

AMS-710-02-PR-03000

Revision:

3

Procedure Owner:

HSE

Issuing Authority:

HSE Education & Training Manager

Approval Date:

5/8/2023



PERSONAL PROTECTIVE EQUIPMENT (PPE)

3	Added that safety toe shoes must be high enough to cover the ankle and have a defined heel.	M. Dotson	5/8/2023
2	Revised section 4.8.10.6 to include "overhead work"	M. Dotson	1/6/2023
1	Revised section 4.8.10.6 to include "cutting".	M. Dotson	11/1/2022
0	Initial Issue	M. Dotson	6/30/2022
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

PERSONAL PROTECTIVE EQUIPMENT (PPE)

1.0 PURPOSE

To establish the minimum requirements for the following Personal Protective Equipment (PPE) on APTIM sites:

- Head protection
- Foot protection
- Eye protection
- Hand protection
- Basic work clothing
- Flagman & traffic vest
- Personal flotation devices

2.0 SCOPE

This procedure, along with any associated guidance identified applies to and shall be followed by all subsidiaries and affiliates of APTIM at all worksites and locations, foreign and domestic, for the public (government) and private (commercial) contracts.

2.1 Exceptions

No Exceptions.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Site Managers
- HSE Managers
- Site Safety and Health Officers
- Supervisors
- Employees
- Contractors/Subcontractors
- Site/project Visitors

4.0 PROCEDURE

4.1 PPE Requirements

- 4.1.1 PPE is the last line of defense against hazards and is not to be used as a substitute for engineering, work practice, and/or administrative controls. PPE includes all clothing or other work accessories designed to create a barrier against workplace hazards and is

PERSONAL PROTECTIVE EQUIPMENT (PPE)

used in conjunction with implemented controls. Employees must be made aware that PPE does not fully eliminate hazards and if PPE fails, hazard exposure will occur.

- 4.1.2 APTIM reserves the right to select and/or approve all PPE issued and used by its employees, visitors, and/or subcontractors. Only approved PPE will be allowed on APTIM jobsites.
- 4.1.3 Failure to follow this procedure and the requirements for PPE may result in disciplinary action per AMS-500-01-PL-00200.
- 4.1.4 Hazard Assessments are conducted either by SSHO or Project Manager on all APTIM work sites to assess hazards present or likely to be present.
 - 4.1.4.1 Hazard Assessments document the workplace location, the person(s) evaluating the workplace, the dates of the assessment, and the hazards identified, if any.

4.2 Identifying PPE Required

- 4.2.1 Project HSE Managers approve the completed hazard assessment as per AMS-710-05-PR-01700 Work Area Hazard Assessment and review hazards identified for additional controls to eliminate or reduce the hazard. PPE hazard assessment will be conducted as part of the work area hazard assessment. If controls are not available and/or the hazard is not eliminated, requisite PPE shall be used.
- 4.2.2 The Project and Site Safety Manager review the assessment and define PPE requirements and employees who need to be accommodated.
- 4.2.3 If required, employees are issued a hard hat, protective eyewear, hearing protection, hand protection and/or respiratory protection (AMS-710-02-PR-03500), fall protection (AMS-710-02-PR-00900), personal flotation devices and flagmen and traffic vests as needed.
- 4.2.4 Employee wishing to use their own PPE must be able to demonstrate it meets APTIM requirements and must approved by the Site Manager.

4.3 Purchasing PPE

- 4.3.1 The HSE Manager along with Site Management will authorize the purchase of proper types and models of PPE.
- 4.3.2 The company provides all PPE to the employee at no cost to the employee with exception of items considered to be personal in nature to include, but not limited to:
 - Prescription Safety Eyewear
 - Thermal undergarments
 - Protective Footwear

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- 4.3.3 PPE shall be provided, used, and kept in a sanitary and reliable condition wherever it is necessary by reason of hazards.

4.4 Training

Once PPE is selected, training is provided to employees on approved PPE, proper usage of the required PPE, and required maintenance/storage.

Provide employees with reporting process for reporting any damaged or defective PPE and how to remove from service so it is not reused.

4.4.1 Project PPE training

Project PPE Training for employees includes the following:

- When PPE is necessary and what types are approved
- How to put on, take off, adjust, and wear the PPE.
- The limits of the PPE.
- The proper care, maintenance, useful life, inspection, and disposal of the PPE.
- The proper practices for keeping the PPE clean and hygienic.
- The proper use to ensure the PPE is not misused or damaged.

- 4.4.2 Each affected employee shall demonstrate an understanding of the training and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE. Upon completion, training will be documented using AMS-710-02-FM-03001 Personal Protective Equipment (PPE) Training Records).

- 4.4.3 When there is reason to believe that any affected employee who has already been trained does not have the understanding and skill required, the employee shall be retrained. Circumstances where retraining is needed include, but are not limited to, the following:

- Changes in the workplace which makes previous training obsolete.
- Changes in the type of PPE to be used which makes previous training obsolete.
- Inadequacies in an affected employee's knowledge or use of assigned PPE.

- 4.4.4 PPE shall be inspected regularly to ensure reliable and sanitary conditions.

- 4.4.5 The site shall document each affected employee has been trained using the Project Specific PPE Training Record form, AMS-710-01-FM-03001. The written documentation shall include the name of each employee trained, the dates of the training, and the subject of the training.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

4.5 Employee-owned Equipment

Employees provide their own work clothes and work boots that meet APTIM's PPE safety toe requirements. Should an employee report for work with unsatisfactory PPE, the employee will not be permitted to work until APTIM's requirements are met.

4.6 Head Protection

- 4.6.1 Company approved hard hats are provided to employees, visitors, and contractors/subcontractors and shall be always worn while working in construction areas/projects or areas designated as a "Hard Hat Area." When APTIM activities require establishment of a hard hat area in an area that typically does not require hard hats, signs shall be posted to inform others that hard hats are required.
- 4.6.2 Hard hats shall meet the specifications of ANSI Z89.1, as required by OSHA or the equivalent recognized "CE", "AS/NZS" standards.
- 4.6.3 Hard hats are grouped into three classes (G, E, and C) and two types (I and II) according to how they meet various criteria for protection from impact, penetration, electrical conductivity, flammability, and other safety hazards.
- Class G - reduce the danger of contact with low voltage conductors
 - Class E - reduce the danger of contact with exposed high voltage conductors.
 - Class C - not intended to provide protection against contact with electrical hazards.
 - Type I - reduce the force of impact resulting from a blow only to the top of the head.
 - Type II - reduce the force of impact resulting from a blow to top or sides of the head.
- 4.6.4 Hard hats are permitted to be worn in the reverse position when welding hoods or face shield are donned for work activities. Outside of those activities, hardhats shall be worn forward facing where the brim provides protection above safety glasses.
- Hard hats can only be reversed if the manufacturer shows reverse donning is acceptable.
- 4.6.5 Bump Caps and metallic hard hats shall not be used at APTIM sites. Soft cap welding shall not be permitted.
- 4.6.6 Hard hats will be marked with APTIM approved logo prominently displayed.
- 4.6.7 Hard hats that have been altered by drilling or cutting shall not be allowed.
- 4.6.8 Stickers shall not be placed on hard hats where they will interfere with the inspection for defects. APTIM will allow the placing of stickers on the sides of a hard hat no higher

PERSONAL PROTECTIVE EQUIPMENT (PPE)

than the APTIM logo. When it is necessary to use added PPE that must be attached to the hard hat, only those hard hats designed for this purpose shall be used.

- 4.6.9 When using a face shield or welding hood, protection that is compatible with a hard hat shall be used.
- 4.6.10 Vehicles/equipment operators shall wear protective headgear during the operation of such equipment except in enclosed cabs.
- 4.6.11 Hard hats shall also be required in areas that typically would not require the use of a hard hat (examples include offices, break areas, and barracks) when the work activity creates an overhead hazard.
- 4.6.12 The use of hard hats in radiation areas shall be sufficient to protect personnel. A limited number of hard hats shall be kept in a radiation work area for general use.
- 4.6.13 Hard Hat Inspection
 - 4.6.13.1 Hard hats shall be inspected regularly for signs of chalking (loss of surface gloss), expiration date, cracking, chips, or other visible defects and replaced when damaged or expired. Headband assemblies must be in good condition and should be exchanged whenever they become broken or weakened.
 - 4.6.13.2 The area between the top of the headband and the top of the hard hat shall not be used for storage. Hard hat suspension shall not be modified. The space or clearance dimension between the shell and the suspension provided by the manufacturer shall be maintained.

4.7 Foot Protection

- 4.7.1 HSE Managers shall conduct a detailed, documented hazard assessment of the site and the work activities conducted at the location and determine if additional foot protection is required beyond the protection specified in this Procedure. When additional foot protection is necessary to protect employees from the hazards identified, the employees assigned to those areas and/or tasks shall be required to wear the specified protection that provides the necessary protection and that meets the specifications of the latest version of ASTM-F2413 (American Society of Testing and Measuring).
- 4.7.2 Personnel at work locations shall wear protective footwear with ASTM-F2413 approved safety toe design. The work boot shall have an upper that covers the ankle when the hazards warrant such protection. Safety toed tennis shoes are prohibited.
- 4.7.3 Open toe shoes, high heel shoes, sandals, hush puppies, tennis shoes, jogging or athletic looking shoes, and other such footwear is prohibited on APTIM sites.
- 4.7.4 Some synthetic materials can have chemical absorption rate issues and care should be given to ensure boots made of synthetic material meet or exceed the absorption qualities of leather boots.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- 4.7.5 Personnel who perform work within the confines of an office and will periodically leave their work area and conduct business where field activities are taking place shall wear work boots that meet the requirements of 4.1.2 of this procedure.
- 4.7.6 In addition to the above minimum requirements, specific job hazards shall be analyzed, and appropriate footwear shall be utilized. For example:
- 4.7.7 When working with wet concrete, workers shall wear rubber boots.
- 4.7.8 Safety toe shoes must be high enough to cover the ankle and have a defined heel.
- 4.7.9 Electrical hazards require the use of nonconductive boots.
- 4.7.10 Operating a ground compactor, pneumatic drill to break concrete, jack hammers, etc. requires metatarsal guards.
- 4.7.11 Shoes and boots shall be kept in good repair, and those with worn heels or thin or worn soles shall not be permitted.
- 4.7.12 Safety-toed footwear which has been subjected to a heavy blow should be replaced even if there are no signs of damage.

4.8 Eye Protection

- 4.8.1 The Site HSE Manager, with assistance from the Site Manager, is responsible for creating the site-specific procedure for eye protection.
- 4.8.2 **Eye protection is required in all designated work areas.** All APTIM employees, contractors, subcontractors, and visitors shall wear only company approved protective eyewear. Protective eyewear will meet the minimum requirements of ANSI Z87.1, to include glasses (Prescription and non-prescription), special purpose goggles, and standard goggles.
- 4.8.3 Protective eye wear shall also meet the following requirements:
- Provide adequate protection against the hazards for which they are designed
 - Comfortable when worn under the designated conditions
 - Fit firmly and do not unduly interfere with the movements of the wearer
 - Durable
 - Capable of being disinfected and cleaned
- 4.8.4 Tinted safety glasses are not permitted inside closed structures or at night. Tints designed to brighten the work area are acceptable.
- 4.8.5 Operators of vehicle and equipment must wear protective eyewear while operating such equipment unless they are in enclosed cabs.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- 4.8.6 Daily checks are made by the employee so that damaged or badly pitted lenses will be replaced.
- 4.8.7 Face and eye protection equipment shall be kept clean and in good repair. The use of face and eye equipment with structural or optical defects shall be prohibited.
- 4.8.8 Attachment 8.1 shall be used as a guide in the selection of face and eye protection for the hazards and operations noted.
- 4.8.9 Employees with Corrective Lenses

Employees whose vision requires the use of corrective lenses in spectacles, shall be protected by one of the following:

- Spectacles whose protective lenses provide optical correction.
- Goggles that can be worn over corrective spectacles without disturbing the adjustment of the spectacles.
- Goggles that incorporate corrective lenses mounted behind protective lenses.
- Employees who wear contact lenses shall wear safety glasses in addition to the contact lenses where safety glasses are required. Wearing of contact lenses is not permitted in areas with potential for chemical exposure (liquid, mists, vapors or fumes).
- ANSI-approved safety glasses with full side shields shall be worn in all circumstances. Employees requiring corrective lenses shall have glasses in which the frames and lenses meet ANSI specifications, or they shall be required to wear protective eyewear over their corrective lenses. The addition of side shields to non-safety glasses shall not be permitted.

4.8.10 Requirements During Welding, Cutting, Chipping, and Grinding

- 4.8.10.1 Welders shall wear a welder's hood with lenses that have the correct shade for the type of welding involved.
- 4.8.10.2 Welder's helpers and other employees exposed to the welding flash or flying particles, slag and dust projectiles shall wear a level of eye protection for the hazard exposure.
- 4.8.10.3 Welding hoods and lens requirements are contained in AMS-710-02-PR-02300 Welding, Cutting, and Heating.
- 4.8.10.4 During welding operations, welders must wear company approved, tight fitting protective eyewear such as spoggles, monogoggles, goggles, etc. in addition to the welding hood while welding, or a faceshield while cutting, grinding, chipping, or performing other tasks that create flying debris. Safety glasses as the secondary layer of eye protection during these activities is prohibited.
- 4.8.10.5 Requirements for burning/cutting goggles/face shields are contained in AMS-710-02-PR-02300 Welding, Cutting, and Heating.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

4.8.10.6 Tight fitting protective eyewear (spoggles, monogoggles, goggles and not safety glasses) and full-face shields or welding hood (double eye protection) shall be worn when performing grinding, chipping, cutting or similar activities such as compressed air or overhead work, that could cause a potential for flying particles. Other employees in the area (that is in any area in which grinding dust is falling/flying) shall be protected by screens or shall wear tight fitting protective eyewear and face shields. Employees must evaluate the need for added eye and face protection when approaching within 10 feet (3.05 m) of any work activity. If added eye/face protection is warranted, then don the appropriate protection prior to approaching this work activity. Employees in transit are to remain at 10 feet (3.05 m) or take another route of travel unless the appropriate eye/face protection is utilized.

4.8.10.7 When doffing, the last PPE to be removed is the tight-fitting eyewear to prevent any small debris from entering the eyes.

4.8.11 Requirements for Abrasive Blasting

PPE for abrasive blasting is contained in AMS-710-02-PR-02900 Abrasive Blasting.

4.9 Hand Protection

4.9.1 For help in the selection of proper gloves refer to AMS-710-02-WI-03401 Hand Protection Selection Guide.

4.9.2 Employees are responsible for inspection of their gloves and notification of their supervisor when replacements are needed. The supervisor is responsible to ensure replacement gloves are obtained immediately.

4.9.3 Employees who operate drill presses, power saws, bench grinders, and similar rotating machinery must be aware of the hazards of rotating equipment while wearing gloves. Specific requirements will be addressed in the task specific Job Safety Analysis (JSA).

4.9.4 The employee shall at no point during their work use damaged or worn gloves. The supervisor will conduct "spot checks" to ensure their workers have undamaged gloves in good repair.

4.9.5 Workers shall wear appropriate, work gloves during all work activities, unless the gloves would increase the hazard potential of the task. The employee shall select gloves that are properly suited to the type of work involved and workplace hazards identified.

4.9.6 Gloves such as neoprene, nitrile, butyl rubber, polyvinyl alcohol, "Silver-Shield", or "Black Knight" may be required when handling specific chemicals. When working with chemicals employees shall review the appropriate Safety Data Sheet (SDS) and implement the manufacturer recommended protective measures.

4.9.7 Cut resistant gloves or Kevlar gloves shall be required when working around sharp edges or hot surfaces or when using tools such as utility/razor knives. Examples of Kevlar gloves include Bear Kat or HyFlex Superior. Where indicated through the risk

PERSONAL PROTECTIVE EQUIPMENT (PPE)

assessment Kevlar sleeves or gauntlets will also be used. Cut Level 3 gloves are the minimum requirement unless site HSE approves. PPE Hazard Assessment will be conducted as part of the Work Area Hazard Assessment.

- 4.9.8 When the hazard assessment/JSA indicates that specialized gloves are required, they shall be issued to the employee(s) exposed to the hazard.
- 4.9.9 Welders shall wear the proper gloves during all welding operations.
- 4.9.10 Whenever possible, tool holders shall be used to prevent hand injuries and keep hands/fingers out of the line of fire. The use of tool holders will be addressed in the task specific JSA.
- 4.9.11 Color coding the fingertips of gloves a bright orange or yellow and stenciling the phrase "Watch Your Hands" on the back of each glove is a good reminder to everyone to keep your hands out of the line of fire.
- 4.9.12 Watches, rings, or other jewelry shall not be worn while working with or around machinery with moving parts in which such objects may be caught or subjected to extreme heat.
- 4.9.13 Employees shall exercise proper body position and identify positions in the line of fire and pinch point areas. Do not put hands between anything that can move and a fixed object or two items that can move and come together.

4.10 Hearing Protection

- 4.10.1 Each location, with the assistance of the Site Safety and Health Officer (SSHO) and the Health, Safety, and Environmental (HSE) Manager, shall develop a list of high noise activities and require the use of hearing protection for all employees engaged in those activities, regardless of the duration of the activity.
- 4.10.2 APTIM provides employees with hearing protection from exposure to occupational noise more than the permissible levels.
- 4.10.3 In all cases where the sound levels exceed the permissible exposure limit, a continuing, effective Hearing Conservation Program shall be administered. Refer to AMS-710-01-PR-00900 Noise Control and Hearing Conservation.
- 4.10.4 Consideration will be given to the use of effective engineering and administrative controls to reduce employee exposure to occupational noise hazards. However, when these controls are infeasible or ineffective, appropriate PPE will be provided to reduce noise levels to the permissible range.
- 4.10.5 The use of hearing protective devices will be required for employees who are exposed to an average of 90 dBA or more during an eight- (8) hour period at construction sites or 85 dBA at active facilities.

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- 4.10.6 Canadian locations require the use of hearing protection devices for employees who are exposed to 85 dBA (90 in Quebec) or more during an eight- (8) hour, period 84 dBA or more in a ten – (10) hour period, or 83 dBA in a twelve-hour forty-one-minute (12:41) period. Double hearing protection must be used for any noise exposure greater than or equal to 110 dBA. Double hearing protection must equal CSA Class A earplug + A or B earmuff and limited exposure time to keep sound reaching the worker's ear drum below 85 dBA
- 4.10.7 Hearing protectors shall be replaced, as necessary.
- 4.10.8 At least three types of HPD's offering adequate attenuation shall be made available so that employees may select the more comfortable style.
- 4.10.9 HPDs will be provided at no cost to the employee and shall be replaced, as necessary.
- 4.10.10 Employees will be monitored to ensure proper use of HPDs.

4.11 Basic Work Clothing

- 4.11.1 Minimum acceptable work clothing for all employees working on APTIM sites shall provide adequate protection against anticipated hazards at the worksite, such as concrete splash, abrasions to the skin, oil or grease spills, and slag from welding or cutting. Minimum clothing shall include:
- Long pants
 - Safety toed boots (meets ASTM-F2413);
 - Shirt (sleeve length and shirt material established by hazard assessment (JSA) or client requirement)
 - Hard hat (meets ANSI Z89.1 – Project approved styles only)
 - Eye protection (meets ANSI Z87.1 – must be stamped on the frame)
 - Hand protection
- 4.11.2 Employees working around ignition sources shall be cautioned against wearing highly flammable clothing, such as polyesters, or double-knits.
- 4.11.3 Clothing that has become torn, ragged, or frayed is not acceptable, since it presents a hazard of catching on rough corners or machine parts and could cause the wearer to trip or fall.
- 4.11.4 Clothing soaked with grease, oil, paint, thinners, solvents or similar materials shall be removed from service and cleaned/decontaminated or disposed of.
- 4.11.5 Construction and maintenance workers should wear clothing that is snug/form fitting—particularly about the neck, wrists, and ankles. Workers shall be cautioned against wearing loose clothing, rings, watches, or necklaces—all of which may catch in power-driven equipment.

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- 4.11.6 Hair, which extends beyond the collar of a shirt, shall be neat and contained in a manner as to not cause a risk to the employee.
- 4.11.7 Shirts must be tucked in unless the employee is flame cutting or welding. Shirts must be tucked back in before grinding or working around other rotating equipment.
- 4.11.8 In some instances, and certain facilities Fire-Retardant Clothing (FRC) must be worn. When Fire Retardant Clothing is required, it shall be worn as the outer most garment.
 - 4.11.8.1 FRC fabric must be rated for industrial use and be made of flame retardant material. Garments must be clearly labelled by the manufacturer.
 - 4.11.8.2 Flame retardant cotton is recommended for welders and those employees performing "hot work" because of its durability.
 - 4.11.8.3 FRC garments made of flame retardant cotton should be periodically replaced since repeated washing reduces the fire-retardant properties of the fabric. (Refer to manufacturer's recommendations.)
 - 4.11.8.4 FRC garments shall be long sleeved and secured at the wrists. They must remain closed in the front when working in FRC designated areas. Legs must be fully covered.
 - 4.11.8.5 Name tags, company logos, etc. that are sewn into the garment should be fabricated of fire-retardant materials. If non-fire-retardant materials are used, they must be attached in a fashion that does not compromise the protection afforded by the garment.
 - 4.11.8.6 FRC will be worn as the outermost garment, except when other PPE is required to guard against a greater hazard (i.e., chemical exposure). Non-fire-retardant clothing, coats, etc. may not be worn over FRC. Any undergarments and street clothes may be worn under FRC.
 - 4.11.8.7 Rain suits may be worn over FRC during inclement weather. FRC shall not be altered in any way that would diminish its retardant properties.
 - 4.11.8.8 FRC must always remain in good repair. Repairs to clothing must be made per manufacturer's recommendations.
 - 4.11.8.9 FRC shall be inspected by the employee prior to use. Damaged garments or those which fail inspections shall be repaired or replaced immediately. Site Supervision shall audit FRC use in the field periodically to determine the effectiveness of employee inspections.

4.12 Flagman and Traffic Vests

- 4.12.1 Whenever employees must work in the immediate vicinity of moving traffic or other operations that require a high degree of visibility, all personnel must wear, as a minimum, a fluorescent orange or red traffic safety vest, which will be provided by APTIM. If such activities are conducted at night, the vests shall be reflective.

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- 4.12.2 Whenever it is necessary for equipment to cross railroads, public roads or heavily travelled roads within plants at least one flagman shall be used during crossings.
- 4.12.3 If hoisting equipment must cross under overhead electrical lines and it is possible for the boom to contact or be near the line, then a line watchman in addition to a flagman controlling movement shall be used to eliminate the potential for contact.
- 4.12.4 If the flagman will be hand signaling, then he shall use red flags at least eighteen (18) in2 (116 cm²). In periods of darkness red lights shall be used.
- 4.12.5 Flagmen shall wear distinctive clothing or other designations to highlight their function to others who may have to take instruction.
- 4.12.6 In general, whenever signs or barricades do not provide adequate protection then flagmen should be used.
- 4.12.7 Signaling direction by flagmen should conform to ANSI D-6.1 – Current Issue, Manual of Uniform Traffic Control Devices for Streets and Highways.

4.13 Personal Flotation Devices

- 4.13.1 Employees working over or near water, where the danger of drowning exists, shall be provided with United States Coast Guard-approved life jacket or buoyant work vests.
 - 4.13.1.1 Prior to and after each use, the buoyant vests or life preservers shall be inspected for defects which would alter their strength or buoyancy. Defective units shall be red tagged, removed from service, and not used.
 - 4.13.1.2 Ring buoys with at least 90 ft. (m) of line are provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 ft. (m).
 - 4.13.1.3 At least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water.
- 4.13.2 When employees working over water on barges, floating pipelines or plants, or structures that extend over water more than 36 inches (91 cm) deep and are not protected by standard handrails, they shall be provided and wear U.S. Coast Guard (USCG) pursuant to 46 CFR (Code of Federal Regulations) Part 160 (type I, II, III or V PFD)-approved flotation vests and marked for use as a work vest, for commercial use, or for use on vessels.
- 4.13.3 When working above water, employers must provide fall protection if the distance from the walking/working surface (horizontal and vertical surface) to the water's surface is 6 feet (1.8 m) or more pursuant to 29 CFR 1926.501(b)(1).
- 4.13.4 When fall protection is provided on walking/working surfaces located above water, and no drowning hazard exists, employees do not need to wear U.S. Coast Guard-approved life jackets or buoyant work vests pursuant to 29 CFR 1926.106(a).

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- The use of safety nets as fall protection during marine construction activities usually will not eliminate the drowning hazard. In many cases there is a risk that materials heavy enough to damage the nets may fall. In such cases personal flotation devices and the other applicable requirements of §1926.106 apply. Also, the §1926.106 requirements apply during the installation of the nets.

4.13.5 An approved method for retrieving a worker in the water shall be immediately available. There shall be ring buoys available for non-entry rescue.

4.13.6 If employees are capable of being in the water farther than a ring buoy can be easily tossed, a boat and motor shall be stationed in the water and ready for instant use.

4.13.7 Work on Floating Vessels (29 CFR 1915.158)

4.13.7.1 When work is being performed on a floating vessel 200 feet (61 m) in length, at least one 30-inch (0.76 m) U.S. Coast Guard approved ring life buoy with line attached shall be located at gangway.

4.13.7.2 At least one 30-inch (0.76 m) U.S. Coast Guard approved ring life buoy with a line attached shall be located on each staging alongside of a floating vessel on which work is being performed.

4.13.7.3 At least 90 feet (27.43 m) of line shall be attached to each ring life buoy.

4.13.7.4 There shall be at least one portable or permanent ladder in the vicinity of each floating vessel on which work is being performed. The ladder shall be of sufficient length to assist employees to reach safety in the event they fall into the water.

4.13.8 All personnel shall be trained on the use and limitations of Personal Flotation devices prior to working in areas around or over water.

4.14 Miscellaneous

4.14.1 Sweat Pads

When weather or working conditions cause perspiration, sponge pads can be worn on the forehead to prevent perspiration from seeping into eyes or fogging safety goggles.

4.14.2 Sunscreen

Clothing, hats and shade are best for protecting skin from ultraviolet (UV) rays. Any remaining exposed skin may be protected by applying sunscreen with approval from the Site HSE Manager. In active facilities approval for use of sunscreen must be obtained from the client.

5.0 TERMINOLOGY

Term	Definition
PFD – Personal Flotation Device	Includes life preservers, life jackets, or inflatable Work vest.

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Site	Any location, facility or project where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities and/or project sites.

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-02-FM-03001	Personal Protective Equipment (PPE) Training Record

6.2 Other Internal References

AMS-710-02-PR-02900	Abrasive Blasting
AMS-710-02-PR-03500	Respiratory Protection
AMS-710-02-PR-00900	Fall Protection
AMS-710-01-PR-00900	Noise Control and Hearing Conservation
AMS-710-02-WI-03401	Hand Protection Selection Guide

6.3 Other External References

29 CFR 1926.100 Head Protection
29 CFR 1910.136, 29 CFR 1926.96 Foot Protection
29 CFR 1910.133 Eye and Face Protection
29 CFR 1926.102 Acetylene
29 CFR 1910.138 Hand Protection
29 CFR 1926.201 Signaling
ANSI Z89.1 American National Standard for Industrial Head Protection
ASTM-F2413 American Society of Testing and Measuring

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
Project Specific PPE Training Records (AMS-710-02-FM-03001)	Duration of project	Project HSE training file
HSE Education and Training (AMS-710-05-PR-01900)	Seven years	Project HSE Training Records and APTIM LMS System



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PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	Eye and Face Protector Selection Guide



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PERSONAL PROTECTIVE EQUIPMENT (PPE)

ATTACHMENT 8.1 EYE AND FACE PROTECTOR SELECTION GUIDE

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye and Face Protector Selection Guide

TABLE E-1—EYE AND FACE PROTECTOR SELECTION GUIDE



1. Goggles, Flexible fitting, Regular ventilation
2. Goggles, Flexible fitting, Hooded ventilation
3. Goggles, Cushioned fitting, Rigid body
4. Spectacles, Metal frame, with Sideshields
5. Spectacles, Plastic frame, with Sideshields
6. Spectacles, Metal-Plastic frame, with Sideshields
7. Welding Goggles, Eyecup type, Tinted lenses
- 7a. Chipping Goggles, Eyecup type, Clear safety lenses (Not Illustrated)
8. Welding Goggles, Coverspec Type, Tinted Lenses
- 8a. Chipping goggles, Coverspec type, clear safety lenses (Not Illustrated)
9. Welding Goggles, Coverspec type, Tinted Plate Lens
10. Face shield
11. Welding Helmet

APPLICATIONS

Operation	Hazards	Recommended protectors: Bold type numbers signify preferred protection
Acetylene—Burning, Acetylene—Cutting, Acetylene—Welding	Sparks, harmful rays, molten metal, flying particles	7, 8, 9.
Chemical Handling	Splash, acid burns, fumes	2, 10 (For severe exposure add 10 over 2).
Chipping	Flying particles	1, 3, 4, 5, 6, 7A, 8A.
Electric (arc) welding	Sparks, intense rays, molten metal	9, 11, (11 in combination with 4, 5, 6, in tinted lenses, advisable).
Furnace operations	Glare, heat, molten metal	7, 8, 9 (For severe exposure add 10).
Grinding—Light	Flying particles	1, 3, 4, 5, 6, 10.
Grinding—Heavy	Flying particles	1, 3, 7A, 8A (For severe exposure add 10).
Laboratory	Chemical splash, glass breakage	2 (10 when in combination with 4, 5, 6).
Machining	Flying particles	1, 3, 4, 5, 6, 10.
Molten metals	Heat, glare, sparks, splash	7, 8, (10 in combination with 4, 5, 6, in tinted lenses).
Spot welding	Flying particles, sparks	1, 3, 4, 5, 6, 10.

PROCEDURE

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AMS-710-05-PR-02200

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6

Procedure Owner:

HSE

Issuing Authority:

HSE Education & Training Manager

Approval Date:

8/31/2022



INCIDENT REPORTING

6	Updated section 4.5.6.1 to include client notification and other minor edits.	M. Dotson	10/18/2022
5	Added Exceptions and Recordkeeping sections, and a couple of forms that may be utilized to assist with Incident Reporting, additional minor edits.	M. Dotson	8/31/2022
4	Removed reference in Section 5 to voided procedure AMS-100-00-PR-00080 Crisis Management Plan.	J. Milliner	8/9/2021
3	Added reference to new company wide Incident Review Board Process procedure. Update to section 4.3. Other Minor updates throughout document.	J. Milliner	8/5/2021
2	Updated sections to match new APTIM procedure template, removed section 8.0 Deliverables and Inputs table, added sections 4.3.1 and 4.5.6.1. Removed Incident Investigation reference. Removed Attachments.	M. Karr	2/27/2020
1	Added section 4.1.6 - 4.1.9 to give more clarity on existing requirements. Added 4.5.6 regarding applicable regulatory reporting requirements. Added "Client" in all sections under 4.2 as a potential recipient of incident notification.	M. Hetzler	5/31/2018
0	Revised 3.0, 4.2, 4.3, 4.4, 4.5, 4.6, and 6.0. Removed Exhibits 7.1, 7.2, 7.3 after revising section 4.3 to eliminate internal duplication. Revisions also align with APTIM processes, general position titles, and the implementation of AIM. Title has been updated from Incident Notification to Incident Reporting. Incorporated pertinent content from AMS-710-05-PR-02300 Incident Investigation. Incident Investigation PR is void with issuance of this PR.	M. Hetzler	2/20/2018
INT	Issued for interim use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

INCIDENT REPORTING

1.0 PURPOSE

This procedure guides the methods used by APTIM to report and document safety incidents and injuries and the methods used to collect information for tracking of corrective actions.

Deliverables are listed in the table below:

Deliverable	Producer	Customer
Report of Incident	APTIM Employee or APTIM Subcontractor	Supervisor / HSE Representative
Incident Report	Designated HSE Representative	AIM
Notice of Violation (NOV) Report	Designated HSE Representative	AIM
Near Miss/ Great Catch Report	Designated HSE Representative	AIM
Corrective Action Reporting	APTIM HSE Managers	AIM

2.0 SCOPE

This procedure applies to APTIM employees as well as non-APTIM personnel that are supervised on a day-to-day basis by APTIM personnel. Day-to-day supervision occurs when in addition to specifying the output, product or result to be accomplished by the person's work, APTIM supervises the details, means, methods and processes by which the work is to be accomplished.

2.1 Exceptions

No exceptions.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Managers
- Supervisors
- Employees
- Subcontractors
- Visitors
- HSE Managers
- HSE Representatives
- Legal

INCIDENT REPORTING

4.0 PROCEDURE

Project leadership on all sites will plan work focused on the prevention of incidents to employees and the environment. This can reasonably be achieved through compliance with APTIM Health, Safety, and Environmental procedures, training employees to properly perform their job activities, and employee involvement in safe work activities. If an incident does occur reporting follows the following requirements:

4.1 General

- 4.1.1 Employees and Subcontractors are required to report all incidents, injuries and illnesses, as well as instances where work is stopped due to HSE concerns to their respective APTIM supervisor, regardless of severity.
- 4.1.2 When an incident occurs, the primary focus shall be obtaining treatment for injured people and securing the scene to allow the incident investigation to proceed and prevent additional hazards.
- 4.1.3 Once the injured employee(s) have been cared for and the scene has been secured or the spill is controlled, an incident investigation shall be initiated in accordance with section 4.3.
- 4.1.4 All incidents will be documented on an Incident Report Form (AMS-710-05-FM-02401) or Near Miss / Great Catch Form (AMS-710-05-FM-02301) and entered into the APTIM Incident Management (AIM) system.
- 4.1.5 The Incident Report Form and AIM record will both be used to facilitate reporting of incidents. However, due to the time required to complete paperwork and data entry, alternative methods of reporting shall be required in some instances. Reporting requirements are outlined in section 4.2.
- 4.1.6 Identification of evidence immediately following an incident may include a listing of people, equipment, and materials involved and a recording of environmental factors such as weather, illumination, temperature, noise, ventilation, and physical factors such as fatigue, age, and medical conditions.
- 4.1.7 Witness interview(s) and statements must be collected. (AMS-710-05-02205 Incident Witness Statement form may be used or attorney's preferred method) Locating witnesses, limiting interaction between witnesses (ensuring unbiased testimony), obtaining appropriate interview locations, and use of trained interviewers should be detailed. The need for follow-up interviews should also be considered.
- 4.1.8 Corrective actions should be identified, logged in the AIM system as per AMS-710-05-PR-01600 HSE Corrective Action Tracking, and updated until completion.
- 4.1.9 Lessons learned should be reviewed and communicated to applicable groups. Changes to processes must be placed into effect to prevent reoccurrence or similar events.

INCIDENT REPORTING

4.2 Incident Reporting Requirements

A summary of incident reporting requirements can be found in Attachment 8.1, Incident Reporting Table.

4.2.1 Level I Incidents shall be reported as follows:

4.2.1.1 When an incident occurs site personnel shall immediately notify, either verbally or in writing, the Site Manager and HSE Representative.

4.2.1.2 Within 24 hours the Site Manager or HSE Representative shall notify, either verbally or in writing, Strategic Business Unit (SBU) Management and SBU HSE Management. Within 24 hours site personnel shall complete Section 1 of the Incident Report Form and ensure the same data is entered into AIM. This represents the minimum initial incident data.

4.2.1.3 Where applicable, the incident must be reported to the client within the required timeframe.

4.2.1.4 HSE Manager will coordinate with project management on investigation status assess requirement for an IRB. IRB will be scheduled to be held within 3 days according to Incident Review Board Process, (AMS-710-05-PR-02250).

4.2.1.5 The incident investigation shall be completed within five business days of the incident date. For more complex incident investigations, additional time may be granted by the respective HSE Lead.

4.2.1.6 The AIM incident record shall be closed in AIM once the investigation is completed, all required documentation has been obtained, and corrective actions have been accomplished and validated.

4.2.2 Level II Incidents shall be reported as follows;

4.2.2.1 When an incident occurs site personnel shall immediately notify, either verbally or in writing, the Site Manager and HSE Representative.

4.2.2.2 Within 2 hours the Site Manager or HSE Representative shall notify, either verbally or in writing, SBU Management and SVP of HSE.

4.2.2.3 Within 24 hours site personnel shall complete Section 1 of the Incident Report Form and ensure the same data is entered into AIM. This represents the minimum initial incident data.

4.2.2.4 Where applicable, the incident must be reported to the client within the required timeframe.

INCIDENT REPORTING

- 4.2.2.5 The incident investigation shall be completed within five business days of the incident date. For more complex incident investigations, additional time may be granted by the respective SVP of HSE.
- 4.2.2.6 HSE Manager will coordinate with project management on investigation status assess requirement for an IRB. IRB will be scheduled to be held within 3 days according to Incident Review Board Process, (AMS-710-05-PR-02250).
- 4.2.3 Level III Incidents shall be reported as follows:
 - 4.2.3.1 When an incident occurs site personnel shall immediately notify, either verbally or in writing, the Site Manager and HSE Representative.
 - 4.2.3.2 Within 2 hours the Site Manager or HSE Representative shall notify, either verbally or in writing, SBU Management and Area HSE Manager. Additional notifications shall be made to General Counsel, Human Resources, Executive Management, and others as required.
 - 4.2.3.3 Within 24 hours site personnel shall complete Section 1 of the Incident Report Form and ensure the same data is entered into AIM. This represents the minimum initial incident data.
 - 4.2.3.4 Where applicable, the incident must be reported to the client within the required timeframe.
 - 4.2.3.5 The incident investigation shall be completed within ten business days of the incident date. For more complex incident investigations, additional time may be granted by the respective SVP of HSE. The AIM incident record shall be closed in AIM once the investigation is completed and all required documentation has been obtained.
 - 4.2.3.6 HSE Manager will coordinate with project management on investigation status assess requirement for an IRB. IRB will be scheduled to be held within 3 days according to Incident Review Board Process, (AMS-710-05-PR-02250).
- 4.2.4 Level IV Incidents shall be reported as follows:
 - 4.2.4.1 When an incident occurs site personnel shall immediately notify the Site Manager and HSE Representative.
 - 4.2.4.2 The Site Manager or HSE Representative shall immediately notify SBU Management and Area HSE Manager. Additional notifications shall be made to General Counsel, Human Resources, Executive Management, and others as required.
 - 4.2.4.3 Within 24 hours site personnel shall complete Section 1 of the Incident Report Form and ensure the same data is entered into AIM. This represents the minimum initial incident data.

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- 4.2.4.4 Where applicable, the incident must be reported to the client within the required timeframe.
- 4.2.4.5 The incident investigation shall be completed within ten business days of the incident date. For more complex incident investigations, additional time may be granted by the respective SVP of HSE. The AIM incident record shall be closed in AIM once the investigation is completed and all required documentation has been obtained.
- 4.2.4.6 HSE Manager will coordinate with project management on investigation status and assess requirement for an IRB. IRB will be scheduled to be held within the appropriate time after discussion with Corporate Leadership and Legal.
- 4.2.4.7 The incident shall be recorded in AIM and closed upon completion of corrective actions and root causes
- 4.2.5 Near Misses (NM) and Great Catches (GC)
 - 4.2.5.1 Within 24 hours site personnel shall complete the Near Miss / Great Catch Form (AMS-710-05-FM-02301) and ensure the same data is entered into AIM. This represents the minimum initial incident data.
 - 4.2.5.2 The AIM incident record shall be closed in AIM once the investigation is completed, if applicable, and all required documentation has been obtained.
 - 4.2.5.3 If at any time an employee observes any condition or practice in which danger exists that could reasonably be expected to cause death or serious harm to people or the environment, he/she shall immediately stop the work, contact a supervisor, and ensure the condition is corrected before work continues.
- 4.2.6 The designated HSE Representative for each site/facility shall maintain a list in the Site Specific HSE Plan identifying each appropriate individual to be notified by name, location, and phone number for the notifications.
- 4.3 Root Cause Analysis of Incidents**
 - 4.3.1 Workplace incidents including injuries, illnesses, near misses, and stop work interventions should be investigated to identify the root cause in order to prevent future occurrences.
 - 4.3.2 At a minimum, Level 2 incidents shall require a “5 Why” or similar process to identify contributing factors and root causes. A TapRoot, or more detailed investigation technique may be requested by the SVP of HSE.
 - 4.3.3 Level 3 Incidents will require a more detailed investigation technique such as TapRoot, or similar.
 - 4.3.4 Those leading investigations should be trained in the methods used.

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- 4.3.5 Prior to starting an RCA for a Level 3 incident or above, the RCA Team leader shall coordinate with Legal and follow protocols defined by Legal and the SVP of HSE will coordinate with Legal and Quality to ensure appropriate processes are utilized.

4.4 Record Retention

- 4.4.1 All applicable forms and supporting documents shall be uploaded into the system or, if no access to AIM, maintained in the site HSE Department files for the duration of the project.
- 4.4.2 Supporting documentation may include, but is not limited to, the following: initial investigation details/documents such as: photographs, sketches, training records, JSA, risk assessment, method statement, standard operating procedure, maintenance records, and or other pertinent information.
- 4.4.3 Personally Identifiable Information (PII) shall not be included in the AIM incident record in any form (i.e. text or attached files). Any correspondence including PII shall be provided to and maintained by the respective Case Manager / Workers' Comp personnel.

4.5 Correspondence with Regulatory Bodies or non-APTIM Legal Counsel

- 4.5.1 When contacted or visited by a regulatory authority or any outside legal counsel, the site personnel shall immediately notify, either verbally or in writing, the Site Manager and HSE Representative. Examples of regulatory authorities may include, but is not limited to, the following:
- Occupational Health and Safety Administration (OSHA)
 - Department of Transportation (DOT)
 - Environment Protection Authority (EPA)
- 4.5.2 In the case of unplanned visits, Site personnel shall accommodate visitors and gain an understanding of the scope of the visit.
- 4.5.3 In all circumstances, site personnel shall consult with APTIM Legal prior to providing documentation or written responses to any requests from a regulatory body or non-APTIM Legal Counsel. In addition, the Site Manager or HSE Representative shall also notify SBU Management and HSE Management.
- 4.5.4 APTIM's policy is to meet the requirements of all rules and regulations while ensuring we handle each visit or request with the appropriate level of diligence. If unsure about how to proceed, personnel should contact APTIM Legal and/or the designated HSE Representative.
- 4.5.5 Within 24 hours site personnel shall complete Section 1 and the NOV/Agency Visit Section of the Incident Report Form and ensure the same data is entered into AIM. This represents the minimum initial incident data.

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4.5.6 Where required, incidents must be reported to applicable regulatory agency(s) within the required timeframe.

4.5.6.1 HSE and Legal will coordinate to make required notifications to OSHA and client within the prescribed timelines. (In-patient hospitalizations, amputations, or eye loss within 24 hours and workplace fatalities within 8 hours)

4.6 Training

4.6.1 Site personnel shall receive incident notification requirements as part of their site-specific orientation.

4.6.2 Supervision shall receive incident investigation training in accordance with AMS-710-05-PR-01900 HSE Education and Training.

5.0 TERMINOLOGY

Term	Definition
APTIM Employees	Persons who are full time or part time employed by APTIM.
APTIM Subcontractor	Subcontractors whose employees' daily work is supervised by APTIM (i.e., details, means, methods and processes by which the work is to be accomplished).
Environmental Spill	Any release, in any amount, that contaminates soil, surface water, groundwater, and/or air.
Equipment Damage/Property Damage (ED/PD)	An incident with vehicles or heavy equipment that occurs on site while off a designated roadway, or an incident with a parked vehicle. Examples include bulldozer clipping another piece of equipment, backhoe handling debris that breaks a window, pickup bending a bumper on a stump, vandalism, and parked company vehicle hit by non-company vehicle.
Fatal Incidents	Fatalities (deaths) occurring directly as a result of a work-related incident, including those that occur sometime after the incident as a direct result of the injuries sustained. Excluded are fatalities arising from natural causes, unless there is evidence of a failure in the application of health and safety procedures (e.g., inadequate provision of emergency first aid).
Great Catch (GC)	Condition identified/observed prior to any incident occurring which may have resulted in property damage or personal injury, but where given a slight shift in time or position, damage to property and/or personal injury could have easily occurred. This may also include instances where Stop Work Authority is used to address an at-risk condition.
High Potential Incidents (HiPo)	Incidents that can cause a fatality or serious injuries irrespective of whether the event resulted in an actual incident. The list below is not all-inclusive, but does provide a few examples of incidents that would be a serious injury:

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	• Amputation • Serious or multiple fractures • Loss of sight in one or both eyes • Serious burns Any other injury or incident that has/had the potential to result in unconsciousness, resuscitation, or admission to hospital for more than 24 hours
Incident	An unplanned event that either caused or may have caused personal injury, property damage, impact on the environment, or interference with production.
Level I Minor Incident	Any event that causes or has the potential to cause only minor damage and/or citation or an injury/illness requiring only first aid treatment. This level includes incidents in which the employee has a non-work- related event requiring utilization of first aid supplies. • A small fire not requiring assistance to extinguish. • Motor Vehicle Incident with damage less than \$5K • Fall into water or resulting in deployment of lanyard. • Environmental spill less than 25 gallons; ○ That does not violate any reportable quantity ○ And does not contact a navigable waterway. “Report Only” incidents: minor incidents in which injury occurred but no medical treatment of any kind was rendered.
Level II Serious Incident	Any event that required or had the potential to require emergency services for the treatment of an injury or control of hazards to personnel or the environment to include: • Recordable injuries/illnesses • Restricted workday injuries/illnesses • Any incident that causes damage to equipment requiring extensive repair or causes a disruption in work progress • Serious environmental consequences (any quantity of release to the environment requiring reporting to relevant governmental agencies). • Reputation or community relations affected • Environmental spill of 25 to 1000 gallons; ○ That does not contact a navigable waterway ○ And does not require regulatory notification • High potential incidents as defined above • Could affect reputation or community relations
Level III Major Incident	Any event causing or having the potential to cause multiple injured/ill personnel requiring emergency services, permanently disabling injuries/illness, lost workday injuries/illnesses, fatalities, property damage in excess of \$50K, disruption of critical plant systems, or environmental impacts requiring regulatory notifications to include: • Injuries/illnesses that cause lost work time • Fatality

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	• Hospital admittance (excluding emergency room outpatient care) • Major fire or chemical spill, greater than 1 000 gallons, or a spill of any amount that contacts a navigable waterway, • Radiation exposure • Lost radioisotope • Bomb threat, weapons discharge, terrorist act, NGO confrontation • ISOS evacuation • Any injury or illness meeting the definition of lost time • Any incident causing damage to equipment or resources that will disrupt work activities • Environmental spill that reaches the environment outside the site's boundaries. • Any incident requiring the use of outside services (e.g., spill response contractor) • Any incident receiving news coverage
Level IV Crisis	The trigger point for any natural crisis is the loss of life, hospitalization of multiple personnel, significant destructive impact to work activities, or a delay in the resumption of work activities for 24 hours or more. In addition to the Natural Crisis, many of the countries in which APTIM operates have actual or potential areas of risk due to political instability, war, terrorism, or high crime rates; these include: • Airline Incident - The trigger point is an airline incident with APTIM employees or assets involved. • Bomb Threat - The trigger point is a direct or indirect bomb threat against employees, the facility, or its assets. • War or Military Conflict - The trigger point is a war or military conflict that directly or indirectly affects personnel and assets. • Acts of Terrorism - The trigger point is an act of terrorism that directly or indirectly affects personnel and assets. • Civil Disturbances (including demonstrations, protests, and other confrontations) - The trigger point is a civil disturbance that directly or indirectly affects personnel and assets. • Kidnap and Ransom - trigger point is an act of kidnap and/or ransom demand that directly or indirectly affects personnel and assets. • Extortion Demands – The trigger point is an act of extortion made against APTIM personnel to perform acts of kidnapping, injury, and assassination. • Detention by Host Government - The trigger point is an act of detention by a host government that directly or indirectly affects personnel and assets.
Motor Vehicle Incident	An incident with a street legal vehicle on a designated roadway

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	that is being actively operated, i.e., not parked. This includes incidents with moving vehicles in parking lots.
Near Miss (NM)	Incident where no property was damaged, and no personal injury was sustained. However, given a slight shift in time or position, damage to property and/or personal injury could have occurred. A Near Miss differs from a Great Catch due to the fact that there has been a release of energy (i.e., an incident). This may also include instances where Stop Work Authority is used.
Site	Any location, facility, or project where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities, and/or project sites.

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-05-FM-02301	Near Miss / Great Catch Form
AMS-710-05-FM-02401	Incident Report Form

6.2 Other Internal References

AMS-710-05-PR-01900	HSE Education and Training
AMS-710-05-PR-02251	Incident Review Board Process
AMS-710-05-FM-02204	Checklist for Incident Investigations
AMS-710-05-FM-02205	Incident Witness Statement
AMS-710-05-PR-01600	HSE Corrective Action Tracking

6.3 Other External References

None

7.0 RECORDKEEPING

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
Incident Report (AMS-710-05-FM-02401)	1 year to length of employment plus 30 years	AIM
Notice of Violation (NOV) Report	1-7 years	AIM
Near Miss/ Great Catch Report (AMS-710-05-FM-02301)	3 months	AIM

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Corrective Action Reporting	3 years	AIM
HSE Education and Training (AMS-710-05-PR-01900)	7 years	HSE Learning Management System

8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	Incident Reporting Table



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ATTACHMENT 8.1 INCIDENT REPORTING TABLE

**INCIDENT REPORTING**

Incident Reporting Table

	Near Miss/Great Catch	Level 1	Level 2	Level 3	Level 4
Site Manager & Site HSE Notification	Commensurate with Potential Incident Level	Immediate	Immediate	Immediate	Immediate
Initial Incident Information Entered Into AIM	Within 24 Hours	W/in 24 Hours	Within 24 Hours	Within 24 Hours	Within 24 Hours
Notification of SBU Management and SBU HSE Management	Commensurate with Potential Incident Level	Within 24 Hours	Within 2 Hours	Within 2 Hours	Immediate
Reported to Client	Client-Dictated	Client-Dictated	Client-Dictated	Client-Dictated	Client-Dictated
Incident Investigation Completed	Commensurate with Potential Incident Level	Within 5 Business Days	Within 5 Business Days	Within 10 Business Days	As appropriate with coordination with Corporate and Legal.
Incident Review Board	Determined by SBU Operational & HSE Leadership	Determined by SBU Operational & HSE Leadership	Within 3 Days	Within 3 Days	As appropriate with coordination with Corporate and Legal.
Notification to General Counsel, HR, Executive Leadership, etc.	Not Required	Not Required	Not Required	Within 2 Hours	Immediate

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General Information – Applicable to All Incidents			*Required Fields
*Type of Incident: ☐ Information Only ☐ Illness ☐ NOV/Agency Visit ☐ Vehicle Incident ☐ First Aid ☐ Complaint ☐ Property Damage ☐ Non-Work ☐ Injury ☐ Spill ☐ Fire			
*Incident Category: Level I ☐ II ☐ III ☐ IV ☐		*Severity Consequence Matrix: Low ☐ Medium ☐ High ☐	
*Incident Date:		*Project Number:	
*Project Name:		*Incident Time:	
*Did incident occur on employer premises? Yes ☐ No ☐		*Date Incident Reported:	
*High Potential Incident? Yes ☐ No ☐		Work Shift: Day ☐ Night ☐	
Part of Shift: Before ☐ During ☐ After ☐		*Injured/Primary Party Name:	
Injured/Primary Party Employee Number:		Injured/Primary Party Title:	
*Employee Type:		*Employer (if other than APTIM):	
Employee Supervisor:		Drug/Alcohol Test Administered? Yes ☐ No ☐ If yes, type:	
*Specific Location (Loading Dock, etc.):		*Brief Description of the Incident:	
*Detailed Description of What Happened:			
Immediate Actions Taken:			
Time Employee Began Work:		What was the task being performed?	
Experience with this task? Months Years		How often does Employee perform this task?	
Working with what part/model number?		Injury/Illness – If Applicable	
*Injury/Illness Description: (Body Part/Nature of Injury, DO NOT Diagnose or Give Diagnosis Unless Documented by HC Professional)			
Was injured treated in an emergency room? Yes ☐ No ☐		Was injured hospitalized overnight as an inpatient? Yes ☐ No ☐	
Was employee sent off site for treatment? Yes ☐ No ☐		*Was medical treatment provided on site? Yes ☐ No ☐	
Was employee seen by a licensed health care provider? (i.e., clinic, ER, doctor, nurse, physician's assistant) Yes ☐ No ☐			
Treatment provided:		Provided By: (Name)	
Hospital/Treatment Facility:		Physician/Health Care Professional: (Name)	
Hospital/Treatment Facility Address (Street, City, State, Zip):			



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Does employee have lost days? Yes ☐ No ☐		How many days? Est ☐ Actual ☐	Time period:
Does employee have restrictions? Yes ☐ No ☐		Describe: When are they to be lifted?	
*Classification:	☐ First Aid	☐ Medical Treatment – Recordable	☐ Restricted Work Duty - Recordable
	☐ Lost Time – Recordable	☐ Occupational Illness – Recordable	☐ Non Work Related ☐
Fatality			
*Reasoning for Injury Classification:			
*What was the employee doing just before the incident occurred?			
*How did the accident occur?			
*What object(s) or substance(s) directly harmed the employee?			
*What was the injury or illness?			
* Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill. (OSHA 300 Column F)			
*Body Part:		*Side of Body:	
*Accident Type:			
☐ Absorption Ingestion Or Inhalation Noc	☐ Exposure to particles or contaminants	☐ Single contact with chemical or substance - excludes insect and spider bites and stings	
☐ Burn,Contact W/Welding Objects	☐ Exposure to radiation	☐ Slide or Cave-In	
☐ Burn,Inhale,Contact W Chemicals	☐ Exposure to sharp, sudden sound	☐ Strain By Holding Or Carrying	
☐ Burn,Scald,Cont. W/Dust,Gases,Fumes,Vapor	☐ Exposure to variations in pressure - other than sound	☐ Strain By Pushing Or Pulling	
☐ Burn,Scald,Contact Abnormal Air Pressure	☐ Fall Or Slip-From Different Level	☐ Strain Or Inj By Continual Noise	
☐ Burn,Scald,Contact Electric Current	☐ Fall Or Slip-From Ladder Or Scaffolding	☐ Strain Or Inj By Jumping	
☐ Burn,Scald,Contact Fire/Flame	☐ Fall Or Slip-From Liquid Or Grease Spill (Same Level)	☐ Strain Or Inj By Lifting	
☐ Burn,Scald,Contact Steam/Cold Objects	☐ Fall Or Slip-Into Openings	☐ Strain Or Inj By Reaching	
☐ Burn,Scald,Contact Steam/Hot Fluid	☐ Fall Or Slip-Miscellaneous	☐ Strain Or Inj By Twisting	
☐ Burn,Scald,Contact W Hot Object	☐ Fall Or Slip-On Ice Or Snow (Same Level)	☐ Strain Or Inj By Using Tool Or Machine	
☐ Burn,Scald,Contact W Temp. Extremes	☐ Fall Or Slip-On Same Level	☐ Strain Or Inj By Welding Or Throwing	
☐ Burn,Scald,Contact With Radiation	☐ Fall Or Slip-On Stairs	☐ Striking Against Moving Parts Of Machine	
☐ Burn,Scald-Miscellaneous	☐ Fall Or Slip-Slipped,Did Not Fall	☐ Striking Against Object Being Lifted/Han	
☐ Caught In Or Between-Collapsing Material	☐ Foreign Body In Eye	☐ Striking Against Sand/Scrap/Oper.	
☐ Caught In Or Between-Machine	☐ Long term contact with chemical or substance	☐ Striking Against Stationary Object	
☐ Caught In Or Between-Miscellaneous	☐ Long term exposure to sounds	☐ Striking/Stepping On Miscellaneous	
☐ Caught In Or Between-Object Handled	☐ Misc Cases-Animal Or Insect	☐ Striking/Stepping On Sharp Objects	
☐ Crash Of Rail Vehicle	☐ Misc Cases-Explosion Or Flareback	☐ Struck Or Inj By Falling Or Flying Objec	
☐ Crash Of Water Vehicle	☐ Misc Cases-Robbery/Criminal Assault	☐ Struck Or Inj By Fellow Worker,Patien	
☐ Cut By Hand Tool,Utensil Not Powered	☐ Mold	☐ Struck Or Inj By Hand Tool/Machine	
☐ Cut By Powered Hand Tool,Appliance	☐ Motor Vehicle - Collision With Fixed Object	☐ Struck Or Inj By Motor Vehicle	
☐ Cut/Puncture By Broken Glass	☐ Motor Vehicle Collision W/Another Vehicle	☐ Struck Or Inj By Object Handled By Other	
☐ Cut/Puncture By Object Being Lifted	☐ Motor Vehicle-Crash Of Airplane	☐ Struck Or Inj By Object Lifted/Handled	
☐ Cut/Puncture/Scrape By Misc.	☐ Motor Vehicle-Miscellaneous	☐ Struck Or Injured By-Moving Parts	
☐ Exposure to mechanical vibration	☐ Natural Disasters	☐ Terrorism	
☐ Exposure to mental stress factors	☐ Repetitive Motion	☐ Other:	
☐ Rubbed Or Abraded By Repetitive Motion			
*Agency/Source of Injury:			
☐ Awkward Position of Wrist, Neck, Back, Arms	☐ Forklift-powered industrial truck	☐ Materials on Floor	
☐ Blade	☐ Hand Tools	☐ Non-Adjustable Workstation	
☐ Box	☐ Hand Truck	☐ Non-Living Animals	
☐ Chemicals-Dust	☐ Hot Oil	☐ Poor Condition of Safety Equipment	
	☐ Housekeeping	☐ Poor Lighting	

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☐ Chemicals-liquid or gas	☐ Human Source	☐ Poor Ventilation
☐ Defective Motor Vehicle Equipment	☐ Ice or Snow on Walking Surface	☐ Power Hand Tool
☐ Drum	☐ Improper Design or Poor Design	☐ Repetitive Motion or Forceful Motion
☐ Electrical	☐ Improper method	☐ Roll
☐ Electrical Cord	☐ Improper Piling or Storing	☐ Slippery Floors
☐ Electrical Outlet	☐ Improper Tool	☐ Steam
☐ Energy –Electrical	☐ Keyboard	☐ Unguarded Equipment
☐ Energy – Hydraulic	☐ Lack of Safety Awareness	☐ Unsafe Act
☐ Energy – Pneumatic	☐ Ladder	☐ Unsafe Condition Caused by Contractor or Customer
☐ Ergonomics-repetitive motion	☐ Lifting	☐ Unsafe Equip or Material of Contractor or Customer
☐ Excessive Pinch Grip	☐ Live Animals	☐ Vehicles
☐ Excessive Use of The Power Grip	☐ Machine Guarding	☐ Other:
☐ Faulty Layout of Plant Facilities	☐ Manual Materials Handling-lifting	

***Nature of Injury:**

☐ Amputation	☐ Dislocation	☐ Lung Problem, Toxic Agent Related
☐ Angina Pectoris (Chest Pain/Decr Blood)	☐ Electric Shock	☐ Myocardial Infarction- (Heart Attack)
☐ Asbestosis- (Asbestos Fibers)	☐ Enucleation- (Removal Of An Organ)	☐ No Physical Injury
☐ Asphyxiation-(Suffocation)	☐ Exhaustion	☐ Poisoning and toxic effects
☐ Bite, Sting	☐ Foreign Body, Sliver, Chip, Dust	☐ Radiation
☐ Black Lung- (Coal Dust)	☐ Fracture, Chip	☐ Respiratory Disorders- (Gases, Fumes, Chem)
☐ Burn - Hot, Cold, Chemical, Radiation, Frostbite	☐ Hearing Loss	☐ Rupture
☐ Byssinosis- (Cotton Dust)	☐ Heat Prostration- (Overcome By Heat)	☐ Silicosis- (Silicon Fibers)
☐ Carpal Tunnel Syndrome	☐ Hepatitis C	☐ Sprain, Strain, Torn
☐ Concussion	☐ Infection	☐ Suffocation
☐ Contusion	☐ Infectious and Parasitic Diseases	☐ Syncope
☐ Crushing	☐ Inflammation	☐ Vascular- (Blood Vessels)
☐ Cut, Laceration, Puncture	☐ Internal Injury, Hernia	☐ VDT Disease
☐ Dermatitis	☐ Loss of Consciousness	☐ Vision Loss
	☐ Lung Problem, Dust Related	☐ Other:

Vehicle Incident – If Applicable

*Vehicle Make:	*Vehicle Model:	Vehicle Year:	Vehicle ID:
Vehicle Type: Car ☐ Truck ☐ Other ☐	VIN:	License Plate #:	
Road Type:	Driving Conditions:	Traffic Area:	
Action of Company Vehicle: Being Passed ☐ Moving Forward ☐ Passing Others ☐ Reversing ☐ Stationary ☐ Turning ☐			
Company Vehicle Collision With: Animal ☐ Non-Collision ☐ Object ☐ Other Vehicle ☐ Pedestrian ☐ Struck by Other Vehicle ☐			
Damage to Company Vehicle:		☐ Front ☐ Side-Driver ☐ Side-Passenger	
☐ Roof ☐ Rear		☐ Undercarriage ☐ Trailer	
Citation issued to company driver? Yes ☐ No ☐		Third party involved? Yes ☐ No ☐	

Spill – If Applicable

*Material Spilled:	*Amount:	*Units:
Processes:	Equipment:	Outcome Result:
Business interruption? Yes ☐ No ☐ If yes, how long?		*Spill go off site? Yes ☐ No ☐ *Reportable? Yes ☐ No ☐
Affected Media: ☐ Soil ☐ Water ☐ Air ☐ Fauna ☐ Flora ☐ Public ☐ Employee		
Causation:		☐ Natural
☐ Cleanup ☐ Maintenance	☐ Refueling ☐ Handling	Phenomenon ☐ Weather
	☐ Excavation ☐ Human Activities	☐ Transportation ☐ Other
Site Activity:	☐ Construction ☐ Maintenance	☐ Remediation ☐ Fabrication
☐ Operation	☐ Land Clearing ☐ Air Monitoring	☐ Wetland
		Restoration ☐ Other
Number of Employees Affected:	Soil sample collected? Yes ☐ No ☐	Water sample collected? Yes ☐ No ☐

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Fire – If Applicable

*Ignition Source:	*Item/Equipment:
*Method Used to Extinguish:	
☐ AFFF	☐ Extinguisher
☐ Hydrant	☐ Mobile Equip
☐ Fire Blanket	☐ Sprinkler System
☐ Fire Department	☐ Suppression Sys
☐ Fire Hose Reel	☐ Water truck
☐ Fire Tender	☐ Other
Business interruption? Yes ☐ No ☐ If yes, how long?	*Facility Evacuated? Yes ☐ No ☐
	*Reportable? Yes ☐ No ☐

NOV/Agency Visit – If Applicable

*Type: Scheduled ☐ Unscheduled ☐ Response to Complaint ☐	*Issuing Agency:	Agency Contact:	
*Agency Findings/Observations:			
Number of Citations:	*Date of Citation:	Date Response Due:	Date Responded:

Complaint – If Applicable

*Complaint Type: Customer Service ☐ Appearance ☐ Environmental ☐ Other ☐	
*Complaint Details:	
Name of Complainant:	Complainant Contact Number:

Causal Analysis – If Applicable

What was the immediate cause(s) of the incident? (Describe all unsafe conditions / unsafe acts in detail):			
Unsafe Condition (Check All That Apply)			
☐ Action of Fellow Associate	☐ Ergonomically Poor Methods	☐ Inadequate Housekeeping	☐ Inexperience
☐ Chemical or Physical Hazards	☐ Improper Body Positioning	☐ Inadequate Isolation (LOTO)	☐ Noise
☐ Congested Work Area	☐ Improper Housekeeping	☐ Inadequate Lighting	☐ Physical Condition
☐ Defective/Inadequate Tools	☐ Improper Tool/Equipment	☐ Inadequate PPE Provided	☐ Slippery Floors/Walkways
☐ Dress/Hair Violation	☐ Inadequate Clearance	☐ Inadequate Ventilation	☐ Temperature Extremes
☐ Equip Provided But Not Used	☐ Inadequate Guarding	☐ Inadequate Warning Systems	☐ Other
Unsafe Act (Check All That Apply)			
☐ Disconnecting or Impeding Safety Device Operation	☐ Horseplay	☐ Inattention/Lack of Awareness	☐ Poor Job Planning
☐ Failure to Follow Procedures or Standards	☐ Ignoring Safety Rules	☐ JSA Not Followed	☐ Servicing of Adjusting Equipment While in Operation

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Form Number: AMS-710-05-FM-02401

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Approval Date: 10/6/2022

APTIM INCIDENT REPORT

☐ Failure to Identify Hazard or Risk	☐ Improper Body Mechanics or Position for Task	☐ Not Wearing/Improperly Wearing PPE	☐ Using Wrong or Defective Tools/Equipment
☐ Haste or Shortcuts	☐ Improper Method of Performing Job	☐ Operating Equipment Improperly	☐ Other

What was the underlying cause(s) of the incident? (Describe all personal factors / job factors in detail):

Job Factors (Check All That Apply)

☐ Communication - Horizontal	☐ Failure to Correct Reported Hazard	☐ Inadequate Workstation / Equipment Maintenance	☐ Poor Previous Incident Reporting/Investigations
☐ Communication – Job Turnover	☐ Inadequate Engineering or Workstation Design	☐ Infrequently Performing the Activity	☐ Work Planning / Preventative Maintenance
☐ Communications - Vertical	☐ Inadequate Initial or Refresher Training/Instruction	☐ Lack of or Incomplete Work Methods	☐ Other
☐ Contractor Pre-Qualification Process	☐ Inadequate Policies, Standards or Procedures	☐ Materials / Equipment Purchasing/Vendor Issues	
☐ Duration of Activity Too Long	☐ Inadequate Supervision for the Activity	☐ Non-Approved Contractor	

Personal Factors (Check All That Apply)

☐ External Motivation	☐ Inexperience	☐ Physical Capability Issue	☐ Time/Cost Restraints
☐ Fears or Phobias	☐ Internal Motivation	☐ Physical Stress/Fatigue	☐ Under Influence of Alcohol
☐ Frustration	☐ Lack of Knowledge/Skill	☐ Poor Judgment	☐ Under Influence of Drugs
☐ Inattention	☐ Mental Stress	☐ Poor Reaction Time	☐ Other

What failure in the safety management system resulted in the immediate and underlying causes of the incident?

☐ Cutting Corners	☐ Poor Quality Safety Equipment	☐ Violation of Company Policy
☐ Inadequate Supervision of Employees	☐ Poor Workplace Training	☐ Other

Form Originator

Name	Title	Date

PROCEDURE

Procedure Number:

AMS-710-02-PR-00300

Revision:

1

Procedure Owner:

HSE

Issuing Authority:

HSE Education & Training Manager

Approval Date:

8/16/2022



MATERIALS STORAGE AND HANDLING

1	Annual review complete. Added exceptions and Recordkeeping sections.	M. Dotson	8/16/2022
0	Initial Issue	J. Milliner	9/14/2021
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

MATERIALS STORAGE AND HANDLING

1.0 PURPOSE

The purpose of this procedure is to establish the minimum requirements for Material Storage and Handling on APTIM sites.

2.0 SCOPE

This procedure applies to all APTIM employees, contractors, subcontractors, and visitors associated with a APTIM site.

2.1 Exceptions

No Exceptions.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Managers
- Supervisors
- Employees
- Contractors
- Subcontractors
- Visitors

4.0 PROCEDURE

All materials shall be properly stored to prevent displacement, explosion, fire, or other hazard to employees, personnel associated with work activities, and the site.

4.1 General

4.1.1 Both temporary and permanent storage shall be neat and orderly. When planning material storage, a minimum of 36 in (91 cm) of clearance must be allowed under sprinkler heads. Automatic sprinkler controls and electrical panel boxes shall be kept free and unobstructed.

4.1.2 There shall be unobstructed access to emergency response equipment (e.g., fire hoses, fire extinguishers, first aid kits, emergency showers, eye wash stations). Permanently stationed fire hoses and extinguishers shall be clearly identified with a sign. Clear access to emergency exits and aisles shall be maintained. Areas immediately outside emergency exits shall be left clear for egress. Exit routes shall be kept free of potentially explosive, highly flammable materials or other items that may present an additional hazard during egress or impede egress.

MATERIALS STORAGE AND HANDLING

- 4.1.3 Materials shall be placed in neat, orderly piles that will not fall. As space allows, material piles shall be sorted by type, size, and length of the material to avoid double handling materials. The piles shall be stepped back as the height increases and shall be secured by cross piling or cross tying. Piles of material shall be arranged to allow for clear access and egress.
- 4.1.4 Storage bins and racks that are in good condition shall be used to make storing materials easier and reduce hazards. Storage racks shall be secured to the wall and/or floor as well as to each other. Damaged racks shall not be used for storage. Employees shall not be allowed to climb racks. Racks and bins shall have a weight limit and shall be prominently labelled. Elevated floors shall also be labelled indicating their load capacities.

4.2 Lumber Storage

Lumber shall be stacked on solid, level sills. Cross-strips or cross-pilings shall be used where the pile is more than 4 feet high (1.2 m). The top of each pile shall be kept as level as possible when lumber is being removed. Used lumber shall have nails removed before it is piled. Employees shall wear puncture resistant gloves when handling lumber.

4.3 Steel Storage

Reinforcing steel shall be stored in separate piles according to size and length. Corrugated and sheet steel must be stacked in flat piles. Spacing strips shall be placed between each bundle. Employees shall wear cut resistant gloves when handling sheet steel.

4.4 Pipe Storage

Pipe shall be stored on pipe sills or racks and shall be blocked to prevent rolling. When removing pipe, employees shall work from the end of the pile as much as possible. Pipe pieces weighing more than 100 pounds (45.4 kg) shall be handled using mechanical equipment.

4.5 Petroleum Product Storage

- 4.5.1 Petroleum products shall be stored in accordance with corresponding safety data sheets (SDS).
- 4.5.2 Petroleum products delivered to the jobsite and stored in drums shall be protected during handling to prevent loss of identification through damage to drum markings, and tags. Unidentified petroleum products may result in improper use, with possible fire hazard, damage to equipment, or operating failure. Barrels shall be protected to prevent any physical damage or weather deterioration.
- 4.5.3 Bulk delivery and storage of petroleum products require care in identification and particular attention to fire hazards during handling and storage. Legible D.O.T. labels shall remain on the bulk containers until the container is empty or removed. Appropriate fire extinguishers must be easily accessible between 25 ft (7.6 m) and 75 ft (22.86 m) of the storage location and warehouse personnel must be trained in their use. The storage area is to be diked to prevent the spread of accidentally released

MATERIALS STORAGE AND HANDLING

material (outside storage of bulk material). The dike and diked area shall be able to contain 110% of the contents of the largest container and must prevent the petroleum product from being absorbed into the soil. Spills shall be cleaned up and removed immediately by trained personnel.

- 4.5.4 The storage area for flammable materials shall be posted as a "No Smoking" area. In addition, the storage area for flammable materials shall have a sign stating "flammable". Avoid using signs stating "inflammable" since the word inflammable is easily misinterpreted to mean "not flammable". Any Hot-work in the area shall be conducted under a Hot-Work/Flame permit.

4.6 Flammable Liquid and Gas Storage

- 4.6.1 All gases and liquids should be considered flammable unless the label clearly indicates that no such hazard exists. Conditions change so rapidly that extreme care is necessary whenever flammable liquids or gases are being used. Open flames, sparks, or excessive heat can ignite flammable liquids, vapors and gases. It is necessary to consider each of these factors when setting up safe storage facilities for these items. Oxygen cylinders shall be separated from all fuel gases by a distance of 20 feet or a firewall that is five feet (1.52 meters) in height with a 1/2 hour fire rating and stored outside of buildings.
- 4.6.2 No other equipment or materials should be contained in the area where flammable or combustible liquids or gases are stored. This is especially true for compressed gases and petroleum products.
- 4.6.3 All areas for storing of flammable liquids and gases shall be designated as such, and "No Smoking" and "Flammable" signs must be posted. DOT (Department of Transportation) labels are required on all shipping/transporting containers. Combustible or flammable materials shall not be stored within 20 feet of any fuel gas or oxygen cylinder storage area.
- 4.6.4 "No Smoking Areas" shall be located so that local fire protection will always have access to the material. The "No Smoking Areas" shall be located in accordance with local code; at a minimum, 35 feet (10.67 m) from any flammable or combustible materials and 25 feet (7.62 m) from any entry or exit, whichever is greater. Designated smoking areas shall be identified and marked.
- 4.6.5 Only approved containers shall be used for storing flammable liquids. Bulk storage tanks must be equipped with an emergency-venting device. All bulk containers, including mobile bulk containers, from which flammable liquids are dispensed, shall be grounded. When transferring flammable liquids, the dispensing container shall be bonded to the receiving container.
- 4.6.6 On-site bulk storage of liquid fuels should be avoided whenever possible.

MATERIALS STORAGE AND HANDLING

4.7 Material Handling

- 4.7.1 Supervisors shall give advance consideration to the size, shape, and weight of materials to be handled and plan the most efficient and safest method to accomplish the task. Proper tools shall be provided for the job, and alternate methods should be considered.
- 4.7.2 Supervisors shall ensure that the work fits the employee in terms of knowledge and physical abilities. When unusual or hazardous operations are required, before beginning the work, employees shall be warned about all possible hazards and given specific safety instructions by their immediate supervisor.
- 4.7.3 Special precautions shall be taken to prevent injuries that can result from improper material handling techniques (e.g., hernias and back strains). Employees will be instructed in proper manual lifting techniques and when getting help is necessary.
- 4.7.4 Instructions for Manual Handling of Materials
- 4.7.4.1 When implementing control measures to minimize the risk of musculoskeletal injuries, the following should be taken into account:
- Postures, movements, forces, and vibration relating to the hazardous manual task
 - The duration and frequency of the hazardous manual task
 - Workplace environmental conditions that may affect the hazardous manual task or the worker performing it
 - The design of the work area
 - The layout of the workplace
 - The systems of work used
 - The nature, size, weight, and shape of the items
 - The number of manual material handling cycles
- 4.7.4.2 The supervisor should, as far as reasonably practicable, identify hazardous manual tasks that may give rise to musculoskeletal disorders.
- 4.7.4.3 If a manual handling task is assessed as being a risk to health and safety, the supervisor should take steps, as reasonably practicable, to control the risk. This can be accomplished by the use of mechanical equipment or reducing the size or weight of the load to be handled (e.g., breaking down a bundle of material into single items or the like).

4.8 Temporary Buildings

Buildings located within another building or structure shall be constructed of either non-combustible material or combustible material having a fire resistance of not less than 1 hour.

MATERIALS STORAGE AND HANDLING

4.9 Safe Practices

4.9.1 The following general safety material storage and handling practices will be followed:

4.9.1.1 Chock and block tires of trucks during loading and unloading.

4.9.1.2 Provide proper personal protective equipment.

4.9.1.3 Ensure that only properly trained personnel are used to handle hazardous materials and to oversee material handling methods.

4.9.1.4 Report any unsafe condition or practice that cannot be corrected within the scope of your authority.

4.9.1.5 Label floors and storage racks with maximum capacities.

4.9.2 Train warehouse and craft personnel responsible for storing and handling material.

5.0 TERMINOLOGY

Term	Definition
Combustible Liquid	Liquid having a flash point at or above 140 °F (60 °C).
Combustible Material	Liquids, solids, or gases that are relatively difficult to ignite and that burn relatively slowly (such as paper, wood)
Flammable Liquid	Liquid having a flash point below 100 °F (37.8 C) and a vapor pressure not exceeding 40 pounds per square inch (absolute) at 140 °F (37.8 C).
Flammable Material	Liquids, solids, or gases that are capable of being easily ignited, burning intensely, or having a rapid rate of flame spread (usually dusts, fine powders, or substances that ignite spontaneously at low temperatures)
Site	Any location, facility, or project where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities, and/or project sites.

6.0 REFERENCES

6.1 Required Forms/Checklists

None	

6.2 Other Internal References

None	

MATERIALS STORAGE AND HANDLING

6.3 Other External References

Title 29 Code of Federal Regulations (CFR) Part 1926 Subpart C (1926.34)

Title 29 CFR (Code of Federal Regulations) Part 1926 Subpart H (1926.250)

Title 29 CFR (Code of Federal Regulation) Part 1926 Subpart F (1926.152)

Title 29 CFR (Code of Federal Regulation) part 1926 Subpart F (1926.153)

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
HSE Education and Training (AMS-710-05-PR-01900)	Seven Years	Project Site / APTIM Learning Management System

8.0 ATTACHMENTS

Attachment	Attachment Title
None	

PROCEDURE

Procedure Number:

AMS-710-00-PR-00400

Revision:

4

Procedure Owner:

HSE

Issuing Authority:

Sr. Director- Quality

Approval Date:

7/12/2023



STOP WORK AUTHORITY

4	Annual review completed. Exceptions and Recordkeeping sections added.	M. Dotson	8/28/2023
3	No content changes; updated document number and applicable references.	M. Dotson	7/12/2023
2	Updated Stop Work Cards and reporting information.	T. Felt	11/18/2021
1	Added sections 4.5.3.7 and 4.5.3.8 to give more clarity on existing requirements.	M. Hetzler	5/31/2018
0	Updated to incorporate the APTIM branded STOP WORK Authority Card	M. Hetzler	2/9/2018
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

STOP WORK AUTHORITY

1.0 PURPOSE

The purpose of this procedure is to outline the requirement of all employees to stop an unsafe act or condition in the workplace.

2.0 SCOPE

This procedure applies to all APTIM employees, contractors, subcontractors, vendors, and site visitors associated with an APTIM site.

2.1 Exceptions

No Exceptions.

3.0 RESPONSIBILITIES

The following personnel have responsibilities defined in this procedure:

- APTIM Managers
- APTIM Supervisors
- APTIM Employees
- APTIM Contractors
- APTIM Subcontractors
- APTIM Vendors
- APTIM Site Visitors

4.0 PROCEDURE

- 4.1 As an APTIM representative, employees have the responsibility and the authority, without fear of reprimand or retaliation, to immediately stop any work activity that presents a danger to themselves, co-workers, clients, the public, or the environment.
- 4.2 It is each employee's responsibility to get involved by questioning and rectifying any situation that is an at-risk behavior or condition. If the employee does not feel the issue is addressed adequately, the employee has the responsibility to raise it to a higher level.
- 4.3 No work will resume until all stop work issues and concerns have been adequately addressed.
- 4.4 Any form of retribution or intimidation directed at any individual or company for exercising their authority as outlined in this program will not be tolerated.
- 4.5 Follow the three steps identified on the Stop Work Authority (SWA) Card (Attachment 8.1)

STOP WORK AUTHORITY

- 4.5.1 Recognize the hazard that could bring harm to you, fellow employees or the environment.
- 4.5.2 When a person identifies a perceived unsafe condition, act, error, omission, or lack of understanding that could result in an undesirable event, a “stop work intervention shall be immediately initiated with the person(s) potentially at risk.
- 4.5.3 Stop the task before an incident happens. This may be the most difficult part, but it is a responsibility and an expectation. Remember, every employee has the authority to do so.
 - 4.5.3.1 If the supervisor is readily available and the affected person(s) are not in immediate risk, the “stop work action” should be coordinated through the supervisor.
 - 4.5.3.2 If the supervisor is not readily available or the affected person(s) are in immediate risk, the “stop work” intervention should be initiated directly with those at risk.
 - 4.5.3.3 “Stop work” interventions should be initiated in a positive manner by briefly introducing yourself and clarifying the intent and set expectations of the Stop Work events.
 - 4.5.3.4 Notify all affected personnel and supervision of the stop work issue. If necessary, stop associated work activities, remove person(s) from the area, stabilize the situation and make the area as safe as possible.
- 4.5.4 Discuss the hazardous condition or behavior and share the information with others to help avoid similar situations. Develop a plan to eliminate or mitigate the hazard.
 - 4.5.4.1 All parties shall discuss and gain agreement on the stop work issue.
 - 4.5.4.2 If determined and agreed that the task or operation is okay to proceed as is (i.e., the stop work initiator was unaware of certain facts or procedures), the affected persons should thank the initiator for their concern and proceed with the work.
 - 4.5.4.3 If determined and agreed that the stop work issue is valid, then every attempt should be made to resolve the issue to all affected person’s satisfaction prior to the commencement of work.
 - 4.5.4.4 If the stop work issue cannot be resolved immediately, work shall be suspended until proper resolution is achieved. When opinions differ regarding the validity of the stop work issue or adequacy of the resolution actions, the location’s “person in charge” shall make the final determination.
 - 4.5.4.5 Positive feedback should be given to all affected employees regarding resolution of the stop work issue. Under no circumstances should retribution be directed at any person(s) who exercise in good faith their stop work authority as detailed in this program.

STOP WORK AUTHORITY

4.5.4.6 All stop work interventions and associated detail shall be documented and reported via the behavior-based safety observation processes.

4.5.4.7 SWA cards are reported through AIM via Target Observation Cards and Near misses. The cards shall be reviewed by a supervisor or manager in order to measure participation, determine quality of interventions and follow-up, trend common issues, identify opportunities for improvement, and facilitate sharing of lessons learned.

4.5.4.8 It is the desired outcome of any Stop Work Intervention that the identified safety concern(s) have been addressed to the satisfaction of all involved persons prior to the resumption of work. Most issues can be adequately resolved in a timely manner at the job site, occasionally additional investigation and corrective actions may be required to identify and address root causes.

4.6 Training

4.6.1 All employees and contractors shall be trained in the use of Stop Work Authority during new employee training.

4.6.2 Upon completion of training, employees and contractors shall be issued a SWA card.

5.0 TERMINOLOGY

Term	Definition
Site	Any location, facility, or project where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned or leased facilities, and/or project sites.
Supervisor	Person in control of the work and the personnel conducting the work (foreman, general foreman, superintendent)

6.0 REFERENCES

6.1 Required Forms/Checklists

None	

6.2 Other Internal References

AMS-710-00-PR-01900	HSE Education and Training

6.3 Other External References

None	

STOP WORK AUTHORITY

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
HSE Education and Training (AMS 710-00-PR-01900)	Duration of Project	Project Site

8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	Stop Work Authority Card (English and Spanish versions)



Procedure Number: AMS-710-00-PR-00400

Revision: 4

Approval Date: 8/28/2023

STOP WORK AUTHORITY

ATTACHMENT 8.1 STOP WORK AUTHORITY CARD (ENGLISH AND SPANISH VERSIONS)

STOP WORK AUTHORITY

Stop Work Authority Card English

STOP WORK AUTHORITY



I will **IDENTIFY** hazards that could cause harm to me, my fellow employees, others in the surrounding area, or to the environment.



I will **STOP** the task before a harmful event might occur. While this can be difficult or uncomfortable, I commit to using my authority to stop work in a respectful and timely manner.



I will **DISCUSS** the hazardous condition or behavior, share information with others to help avoid similar situations, and help develop a plan to eliminate or mitigate the hazard.

APTIM Ethics Line 1-800-461-9330



APTIM is dedicated to performing work in a quality manner and in compliance with applicable regulations, policies, and ethics. As an APTIM employee, you are responsible for reporting safety and quality issues that could cause harm to you, others around you, the public, or the environment.

Stopping work to discuss a hazard can be done without fear of retaliation or reprimand, and must be done as soon as work is put into safe condition. If you do not feel the safety/quality issue is being addressed, it is your responsibility to raise the issue to a higher level or use an alternate method to report your issue.

No other company policy may supersede, limit, or otherwise discourage your responsibility to raise a safety or quality concern.



MARK D. FALLON Chairman & CEO

STOP WORK AUTHORITY

Stop Work Authority Card Spanish

AUTORIDAD PARA DETENER EL TRABAJO



Yo **IDENTIFICARÉ** los peligros que podrían dañarme o dañar a mis compañeros, a otros en los alrededores o al medioambiente.



Yo **DETENDRÉ** la tarea antes de que ocurra un evento dañino. A pesar de que esto puede ser difícil o incómodo, me comprometo a usar mi Autoridad para Detener el Trabajo de manera oportuna y respetuosa.



Yo **CONVERSARÉ** sobre el comportamiento o condición peligrosa, compartiré información con los demás para evitar situaciones similares y ayudaré a desarrollar un plan para eliminar o mitigar el peligro.

Línea de ética de APTIM
1-800-461-9330



APTIM está dedicada a realizar los trabajos con ética, calidad y en cumplimiento con las regulaciones y políticas aplicables. Como trabajador de APTIM, usted es responsable de reportar problemas de seguridad y calidad que pudiesen dañarlo, dañar a otros a su alrededor o al medioambiente.

El detener el trabajo para tratar un peligro se puede hacer sin temor a represalias o sanciones, y se debe hacer de manera segura tan pronto como sea posible. Si no cree que se está tratando el problema de seguridad/calidad, es su responsabilidad elevar el problema a un nivel más alto o utilizar un método alternativo para reportar el problema.

Ninguna otra política de la compañía puede reemplazar, limitar o evitar que usted cumpla con su responsabilidad de reportar e intervenir ante un problema de seguridad o calidad.

MARK D. FALLON Chairman & CEO



Form Number: AMS-710-00-FM-01705

Revision: 1

Approval Date: 7/12/2023

SAMPLE JOB SAFETY ANALYSIS (JSA) 2

JSA NUMBER:					Date:				
PRINCIPAL CONTRACTOR:					CONTRACTOR NAME:				
PROJECT:									
LOCATION:					THIS JSA IS TO BE REVIEWED ON:				
JOB DESCRIPTION:									
PLANNED HIGH RISK CONSTRUCTION ACTIVITY:									
☐ Work at Heights			☐ Work on Umbrella Roof			☐ Entering Excavation (1 M+ Deep)		☐ Entry into a Confined Space	
☐ Using a Hazardous Substance			☐ Demolition Work			☐ Bodily Injury		☐	
EMERGENCY ACTION:									
In the event of injury is a member of the work team First Aid Qualified? ☐ YES ☐ NO If yes, their Name? _____									
Point where an injured person may receive treatment: MINOR INJURY: _____ SERIOUS INJURY: _____									
JSA STATEMENT DEVELOPED BY:					REVIEWED BY THE FOLLOWING PERSONNEL:				
No	Name	Signature	Position	Employee No.	No	Name	Signature	Position	Date.
1					1				
2					2				
3					3				
4					4				
5					5				
6					6				

Approved by: _____ Position: _____ JSA Review Date: _____



Form Number: AMS-710-00-FM-01705

Revision: 1

Approval Date: 7/12/2023

SAMPLE JOB SAFETY ANALYSIS (JSA) 2

P.P.E REQUIREMENTS				PLANT, EQUIPMENT & TOOLS FOR JOB				TAGGING & SIGNS		PERMITS & INSTRUCTION	
Use ☒				Use ☒				Use ☒		Use ☒	
Safety Harness	☐	Hearing Protection	☐	Ladder	☐	Fire Blanket	☐	Men Working Above	☐	MSDSs	☐
Static Line	☐	SCBA	☐	Hand Tools	☐	Excavator	☐	Barrier Mesh	☐	Instruction Manuals	☐
Steel Capped Boots	☐	Airline	☐	Shovel	☐	Winch	☐	Flagging	☐	Procedures	☐
Hard Hat	☐	Air Purifying Respirator	☐	Welding Machine	☐	Extension Leads	☐	Personal Locks	☐	Work Instructions	☐
Tinted Safety Glasses	☐	Confined Space Harness	☐	Compactor	☐	Power Source	☐	Personal Danger Tags	☐	Hot Work Permit	☐
Clear Safety Glasses	☐	Gloves – PVC	☐	Drill	☐	Crane	☐	Out of Service Tags	☐	Isolation Permit	☐
Monogoggles	☐	Gloves – Hyflex (Nitrile)	☐	Grinder	☐	EWP	☐	Information Tags	☐	Excavation Permit	☐
Face Shield	☐	Gloves – Leather Riggers	☐	Scaffold	☐	Fans	☐		☐	Confined Space Permit	☐
Sun Screen	☐		☐	Fire Extinguisher	☐	Scissor Lift	☐		☐		☐

HAZARD PROMPT – “check ☒ ”. Identify the job hazards and assess the RISK personnel may be exposed to before safeguards are implemented:													
Electrical	☐ N/A ☐ Low ☐ Med ☐ High	Vehicles	☐ N/A ☐ Low ☐ Med ☐ High	Pressure	☐ N/A ☐ Low ☐ Med ☐ High	Weather	☐ N/A ☐ Low ☐ Med ☐ High	Radiation (Hot Work / Sun)	☐ N/A ☐ Low ☐ Med ☐ High	Heat	☐ N/A ☐ Low ☐ Med ☐ High	SMF or Asbestos	☐ N/A ☐ Low ☐ Med ☐ High
Chemical	☐ N/A ☐ Low ☐ Med ☐ High	Height	☐ N/A ☐ Low ☐ Med ☐ High	Access	☐ N/A ☐ Low ☐ Med ☐ High	Bacteria	☐ N/A ☐ Low ☐ Med ☐ High	Rotating Equipment	☐ N/A ☐ Low ☐ Med ☐ High	Dehydration	☐ N/A ☐ Low ☐ Med ☐ High	Engulfment	☐ N/A ☐ Low ☐ Med ☐ High



SAMPLE JOB SAFETY ANALYSIS (JSA) 2

Tools	☐ N/A ☐ Low ☐ Med ☐ High	Depth	☐ N/A ☐ Low ☐ Med ☐ High	Vibration	☐ N/A ☐ Low ☐ Med ☐ High	Dust	☐ N/A ☐ Low ☐ Med ☐ High	Moving Equipment	☐ N/A ☐ Low ☐ Med ☐ High	Hot / Cold Objects	☐ N/A ☐ Low ☐ Med ☐ High	Lighting	☐ N/A ☐ Low ☐ Med ☐ High
Gases	☐ N/A ☐ Low ☐ Med ☐ High	Weight	☐ N/A ☐ Low ☐ Med ☐ High	Noise	☐ N/A ☐ Low ☐ Med ☐ High	Slip / Trip	☐ N/A ☐ Low ☐ Med ☐ High	Lifting Equipment	☐ N/A ☐ Low ☐ Med ☐ High	Overhead Hazards	☐ N/A ☐ Low ☐ Med ☐ High	Manual Handling	☐ N/A ☐ Low ☐ Med ☐ High

RISK SCORE CALCULATOR

Use The Risk Score Calculator To Determine The Level Of Risk Of Each Hazard

What would the CONSEQUENCE of an occurrence be?	What is the LIKELIHOOD of an occurrence?					Hierarchy of Controls
	Almost Certain	Likely	Possible	Remotely Possible	Practically Impossible	
Disaster Multiple Fatalities	<i>Very High (1)</i>	<i>Very High (1)</i>	<i>Very High (1)</i>	<i>High (2)</i>	<i>Medium (3)</i>	Can the hazard be eliminated or removed from the work place?
Very Serious Permanent disability or ill health, Fatality	<i>Very High (1)</i>	<i>Very High (1)</i>	<i>High (2)</i>	<i>Medium (3)</i>	<i>Low (4)</i>	Can the product or process be substituted for a less hazardous alternative?
Serious Serious but non-permanent injury or ill health Work days lost	<i>Very High (1)</i>	<i>High (2)</i>	<i>High (2)</i>	<i>Medium (3)</i>	<i>Low (4)</i>	Can the hazard be engineered away with guards or barriers?
Substantial Medical attention needed. No work restrictions.	<i>High (2)</i>	<i>Medium (3)</i>	<i>Medium (3)</i>	<i>Low (4)</i>	<i>Low (4)</i>	Can Administration Controls be adopted i.e. procedures, job rotation etc.
Minor Minor cuts & bruises or sickness	<i>High (2)</i>	<i>Medium (3)</i>	<i>Low (4)</i>	<i>Low (4)</i>	<i>Low (4)</i>	1.0 Can Personal Protective Equipment & Clothing be worn to safe guard against hazards?

IF ITS NOT SAFE – FIX IT

**SAMPLE JOB SAFETY ANALYSIS (JSA) 2**

No.	Job Step <i>What you do, NOT how you do it</i>	Hazard / Risk Exposure <i>What are the hazards of each job step?</i>	Risk Score	Work Method Statement For Control of Hazard Exposures <i>What hazard controls will be used? Who will check the effectiveness of the controls? What checks will be undertaken? E.g. (Inspection & ongoing monitoring)</i>	New risk score After controls applied	Action By

IF ITS NOT SAFE – FIX IT

**SAMPLE JOB SAFETY ANALYSIS (JSA) 2**

No.	Job Step <i>Describe the job step by step?</i>	Hazard / Risk Exposure <i>What are the hazards of each job step?</i>	Risk Score	Work Method Statement For Control of Hazard Exposures <i>What hazard controls will be used? Who will check the effectiveness of the controls? What checks will be undertaken? E.g. (Inspection & ongoing monitoring)</i>	New risk score After controls applied	Action By

LABOR

-
-
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PLANT AND EQUIPMENT

-
-
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IF ITS NOT SAFE – FIX IT



Form Number: AMS-710-00-FM-01705

Revision: 1

Approval Date: 7/12/2023

SAMPLE JOB SAFETY ANALYSIS (JSA) 2

SIGN ON SHEET

Date	Name	Signature	Date	Name	Signature

IF IT'S NOT SAFE – FIX IT

COMPANY POLICY

Policy Number:

AMS-500-01-PL-00200

Revision:

0

Policy Owner:

Human Resources

Issuing Authority:

Vice President, Human Resources

Approval Date:

11/10/2021



EMPLOYEE WORK RULES

0	Initial Issue	E. Reed	11/10/2021
Rev	Changes	Approved	Date

Parent Document:

Employee Handbook (TBD)

EMPLOYEE WORK RULES

1.0 POLICY

Your Safety is Our Number One Concern

APTIM commits to provide you with a workplace free of unsafe conditions to the full extent of APTIM's control. Where hazards inherently exist due to the environment, nature of the work, industry, or other factors beyond our control, we will exhaust all remedies to either eliminate the hazards or mitigate them through our job-safety analysis / planning process, safety procedures, engineering controls, training and supervision. Your role in the process is to work smartly, prevent unsafe behaviors, guard against complacency, report unsafe conditions, and look out for your coworkers.

2.0 REQUIREMENTS

2.1 Raising Concerns About Safety – How Do I Report a Safety Concern?

If you identify a safety concern, APTIM requires you to report it. APTIM takes employee-reported concerns seriously, and we have an obligation to work with you to resolve your concerns professionally, promptly, and with discretion.

APTIM has robust policies designed to protect all employees from discrimination, harassment, or retaliation for identifying or reporting workplace concerns.

You can report safety concerns to your supervisor, site safety professional, or the APTIM site leader. Alternatively, you can also report any safety concern to HSE through your onsite safety committees or by completing a Target observation card.

Additionally, APTIM has a 24/7 Ethics Line that you can call to report (anonymously if you wish) any concern. Call 1.800.461.9330 or file a concern on-line at www.convercent.com/report.

2.2 Safety Rules

APTIM provides services to a diverse range of clients and industries, so our Health, Safety, and Environmental (HSE) policies and procedures cover an equally wide scope of topics, including, but not limited to, Working at Heights, Scaffold Use, Confined Space Entry, Lock-Out / Tag-Out, Bloodborne Pathogens, Excavations, Asbestos / Lead Awareness, Heat Stress, and many more.

You should receive HSE-policy orientation, task-related training, and project-specific instructions on safety compliance requirements when hired, and then periodically during your employment. Our safety culture depends on your engagement in the training process and the application of the policies and procedures. Ask questions when you do not understand and never proceed with an assignment or task in the face of uncertainty. Every employee is held equally accountable for compliance to APTIM's HSE program. Every employee has the authority to stop work if proceeding with a certain task presents hazards.

2.4 Reporting an Injury

Immediately report any work-related injury or illness, regardless of severity, to your APTIM supervisor. Delaying the report of an injury or illness, no matter how minor, results in delayed

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evaluation and treatment, which may lead to serious medical consequences (e.g., infection, aggravation, etc.). APTIM prohibits any kind of retaliation for reporting an injury or illness.

If you have any pre-existing medical condition(s) or doctor-imposed restrictions that might be aggravated by your APTIM job assignment, or if you are taking medication(s) that might impact your ability to safely perform the functions of your job, you must notify your supervisor and HSE as soon as possible. APTIM will work with you, in accordance with applicable laws, to determine reasonable and appropriate accommodations, if any.

2.3 Medical Treatment/Return to Work

If you require off-site medical attention, you will be transported to the office of a company-selected doctor during normal working hours and to a company-selected hospital or clinic during after-hours or on weekends.

Any subsequent doctor visits will be on your own time unless authorized by the company. You may choose to seek medical attention elsewhere, but you will be responsible for providing transportation and you will not be paid for time away from work.

APTIM requires you to submit information from your treating health care provider to show that you are able to return to work and perform the essential functions of your job.

Refer to procedures AMS-710-01-PR-01600 First Aid and Medical Services and AMS-710-01-PR-01900 Return to Work Program for additional guidance.

2.3.1 Declaration of Prescription Medication

APTIM requires you to confidentially report to the HSE department your use of any prescribed or over-the-counter medication (or change in the dosage requirements of previously reported medication) if the label on the medication container (or information pamphlet for the prescription or over-the-counter medication) indicates that using the medication may impair on-the-job alertness, judgment, or cause any other symptom that may affect your ability to safely perform your job duties.

2.4 Attendance

If you are unable to report for work or will arrive late, notify your supervisor or the site Payroll office, as applicable, as soon as possible before the start of your shift.

2.5 Absenteeism

If you do not report to work on a scheduled workday for three consecutive workdays without notifying your supervisor or the project at the designated site telephone number, your employment will be subject to termination for voluntary abandonment of position, without progressive discipline. Management will consider, in consultation with HR, any special circumstances you present regarding your inability to contact the project site (for example, a note from a healthcare provider indicating that you were hospitalized and unable to communicate).

2.5.1 Unexcused absences, tardiness, or early departures

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Unexcused absences, tardiness, or early departures will be handled as follows:

- Step 1 – Three violations in a 20-workday period will result in a written warning lasting 60 workdays.
- Step 2 – Next violation (in 60 workdays) will result in suspension for five days and a written warning lasting 60 workdays. (Reissued the day of Step 2 violation.)
- Step 3 – Next violation (within 60 workdays of the issuance of the Step 2 notice) will result in termination of employment.

All disciplinary warning letters issued under Step 2 will remain active in the personnel file for the full period of issuance.

APTIM may terminate your employment for repeated or chronic absences or lateness, for falsifying information about your reason for absence or lateness, or for other unacceptable conduct with respect to attendance or lateness.

The following are examples of types of time off that will not be considered grounds for disciplinary action under these work rules:

- Time off that was previously approved, including vacation;
- Paid sick and safe time provided under a mandatory sick and safe time leave law;
- Approved leaves of absence under the law, including but not limited to jury duty leave, military leave, leave protected under Canadian law or the Family and Medical Leave Act or similar state or provincial laws, and time off or leave specifically approved by APTIM as an accommodation under the Americans with Disabilities Act or similar laws applicable where you work; or
- Time off due to a work-related injury that is covered by workers' compensation.

2.5.2 Duty to Report Odor of Alcohol, Suspicious Behavior

If you detect the odor of alcohol coming from another individual on the project, or you suspect that another person's behavior indicates that that person may be under the influence of controlled substances, or experiencing fatigue that is impacting their ability to work safely, you are required to report this information to your supervisor immediately.

2.6 Work Practices

2.6.1 Performance Expectations

APTIM expects you to produce the highest quality work and product.

If your work task or scope includes paper-based or electronic instructions, you are expected to adhere to these written instructions without deviation. If the written instructions are unclear, or cannot be performed as written, stop the work and see your supervisor for guidance. Do not proceed with the work until all the discrepancies are resolved.

If you have doubt as to APTIM's expectations for the quality of your work, please contact your supervisor before proceeding. Your supervisor can work with you to review your job description,

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consider additional training relevant to the task, or other review of information about performance expectations. Poor quality work will not be tolerated and may result in disciplinary action up to and including termination of employment.

2.7 Discipline Policy

Certain conduct is serious enough to warrant disciplinary action. Violations such as those listed below will result in discipline that may, progressively, take the form of a verbal warning, written warning, suspension, or discharge, depending on the facts and severity of the event.

Writing rules to cover every situation imaginable is virtually impossible, therefore the following list is intended to be representative but not all-inclusive in an attempt to list some examples of conduct that are unacceptable and actionable:

1. Failure to follow or adhere to APTIM rules, policies, and procedures, especially those designed to prevent serious personal injury.
2. Careless or willful disregard of work rules, policies, and procedures, including, but not limited to, failure to wear and use proper personal protection equipment; failure to follow rules for working at heights; failure to use tools in accordance with manufacturer specifications.
3. Failure to follow or adhere to applicable APTIM project procedures and instructions.
4. Violation of APTIM's Substance Abuse Policy, AMS-710-01-PR-03600 or AMS-710-02-PR-03610 (Canada)
5. Intentional disruption of work or production activities, as in an illegal job action.
6. Substandard work quality, including the failure to follow work package instructions as written or concealing defective work.
7. Failure to provide a full day's work for a full day's pay (e.g., napping, sleeping, loafing, being out of one's assigned work area).
8. Failure to comply with APTIM timekeeping rules, including misrepresenting the actual time worked by yourself or someone else.
9. Early quitting, extending lunch, dinner, or break period, and unauthorized work breaks.
10. Unexcused or chronic absenteeism or lateness.
11. Dishonesty or falsification of employment records, employment information or other records.
12. Unauthorized removal of tools, vehicles, equipment, or other property.
13. Theft or the deliberate or careless damage of any APTIM property or the property of any employee or client.
14. Use of APTIM materials, supplies, tools or products for personal reasons without permission from your supervisor.
15. Insubordination or refusal to accept a work assignment without a good-faith reason.
16. Violence, threats of violence, harassment, or fighting on the premises.

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17. Using abusive, violent, threatening or disrespectful or vulgar language at work or directed toward co-workers.
18. Bullying (use of force, threats, or coercion to abuse, intimidate or humiliate another employee).
19. Engaging in harassment, intimidation, retaliation or discrimination.
20. Displaying offensive or graphic messages or images of a sexual, racial, or vulgar nature on clothing or other personal items brought to work.
21. Practical joking or horseplay.
22. At-work possession of alcohol, illegal controlled substances, weapons, ammunition, explosives or any incendiary devices.
23. Leaving your assigned work area or the jobsite during work periods without your immediate supervisor's authorization.
24. Failure to maintain work area, muster area, and lunchrooms in a neat and orderly manner.
25. Failure to follow fire protection rules and standards.
26. Falsifying non-work-related injuries or illnesses as work related.
27. Smoking in an unauthorized area or during an unauthorized time, or creating a fire hazard using open fires, cooking or heating food on the premises in unauthorized areas.
28. Using mobile devices during work for non-work-related activities, outside of your work site's approved acceptable times and places to use mobile devices. (Acceptable use of mobile devices for non-work-related activities varies based upon the type of work environment and the type of work being performed. Please see AMS-710-02-PR-05600 Cellular Device Use or your supervisor for more information.)

2.8 Disciplinary Action

If you don't follow work rules, APTIM may take disciplinary action. Site management may suspend you immediately pending an investigation. Reviews conducted include HR, and other appropriate management or coworkers for consideration of the facts and circumstances surrounding employee misconduct or poor performance. An investigative suspension may last for a maximum of 5 days.

You should expect that severe misconduct (e.g., fighting, theft, harassment, violence or threats of violence) will automatically be grounds for discipline.

Management will make a fair and objective investigation of the facts prior to administering any discipline. Management should consult with HR before making the final decision to terminate employment.

APTIM intends to apply rules and disciplinary actions in a consistent and non-discriminatory manner to all affected employees.

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APTIM will take disciplinary action that is reasonably related to the seriousness of the offense. Management should consider an employee's past work record when determining disciplinary action.

Disciplinary action may include a verbal warning, written warning, suspension or termination of employment. All steps are not required, however, and more serious offenses can result in immediate termination of employment, depending on the circumstances.

Not every instance of misconduct can be listed in this policy and there are many other occurrences not described in these work rules. APTIM reserves the right to impose discipline where company management considers it appropriate and necessary to do so.

Management should document disciplinary action and counseling using the Employee Counseling Record form, AMS-500-01-FM-00201.

2.9 Conclusion

Failure to comply with any of these Rules or failure to professionally perform your assignments as a competent supervisor or craftsperson will result in disciplinary action, which may include termination of your employment.

Serious violations of Client/Owner rules can also result in additional consequences like revocation of your site access by the Owner.

These Rules are effective immediately and supersede any previous versions of similar rules or policies. If you have a question about any of them, please contact your supervisor.

2.10 Important APTIM Policies

The APTIM Management System ("AMS") contains policies, procedures and forms applicable to APTIM employees. You can find all of this information at our APTNet site, <https://aptimcorp.sharepoint.com/AMS/Pages/Home.aspx>. If you need help finding or accessing this information, contact your supervisor.

Some important policies and procedures include:

- AMS-300-04-PL-00004 Code of Conduct
- AMS-500-01-PL-00006 Preventing Harassment, Intimidation, Discrimination and Retaliation
- AMS-300-05-PL-00005 Social Media Policy
- AMS-710-01-PR-03600 Substance Abuse
- AMS-710-01-PR-03610 Substance Abuse - Canada
- AMS-710-00-FM-00003 Health, Safety, and Environmental Policy,
- AMS-710-02-PR-05600 Cellular Device Use,
- AMS-715-00-PL-00200 Workplace Violence Prevention

EMPLOYEE WORK RULES

3.0 RESPONSIBILITIES

The following personnel have responsibilities defined in this policy:

- Department Managers
- HSE Managers/Site Safety Professionals
- Supervisors, APTIM Site Leaders/Management
- Human Resources
- Employees

4.0 TERMINOLOGY

Term	Definition
None	

5.0 REFERENCES

5.1 Required Forms/Checklists

AMS-500-01-FM-00201	Employee Discipline/Counseling Record

5.2 Other Internal References

AMS-300-04-PL-00004	Code of Conduct
AMS-500-01-PL-00006	Preventing Harassment, Intimidation, Discrimination and Retaliation
AMS-300-05-PL-00005	Social Media Policy
AMS-710-01-PR-03600	Substance Abuse
AMS-710-01-PR-03610	Substance Abuse - Canada
AMS-710-00-FM-00003	Health, Safety, and Environmental Policy
AMS-710-02-PR-05600	Cellular Device Use
AMS-715-00-PL-00200	Workplace Violence Prevention
AMS-710-01-PR-01600	First Aid and Medical Services
AMS-710-01-PR-01900	Return to Work Program

5.3 Other External References

None



Policy Number: AMS-500-01-PL-00200

Revision: 0

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EMPLOYEE WORK RULES

6.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 6.1	Aptim Work Rules Receipt Acknowledgement



Policy Number: AMS-500-01-PL-00200

Revision: 0

Approval Date: 11/10/2021

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ATTACHMENT 6.1 APTIM WORK RULES RECEIPT ACKNOWLEDGEMENT



Policy Number: AMS-500-01-PL-00200

Revision: 0

Approval Date: 11/10/2021

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APTIM WORK RULES RECEIPT ACKNOWLEDGEMENT

I acknowledge that I have received a copy of the Aptim Work Rules and that I agree to comply with these rules.

Name (Print)

Signature

Date

Trade

[month, year]

PROCEDURE

Procedure Number:

AMS-710-02-PR-00800

Revision:

0

Procedure Owner:

HSE

Issuing Authority:

HSE Education & Training Manager

Approval Date:

8/4/2022



LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

0	Initial Issue	M. Dotson	8/4/2022
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

1.0 PURPOSE

To establish the minimum requirements for Lift Trucks (Forklifts) and Powered Industrial Trucks on APTIM sites.

2.0 SCOPE

This procedure, along with any associated guidance identified applies to and shall be followed by all subsidiaries and affiliates of APTIM at all worksites and locations, foreign and domestic, for the public (government) and private (commercial) contracts.

2.1 Exceptions

No Exceptions.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Managers
- Supervisors
- Employees

4.0 PROCEDURE

All APTIM sites shall establish proper lift truck practices and training. This procedure contains the minimum requirements to be followed at each location.

4.1 General Requirements

- 4.1.1 All lift trucks in use shall meet the applicable requirements of design, construction, stability, inspection, testing, maintenance, and operation, as defined in ASME B56.1-2020 Safety Standards for Low Lift and High Lift Trucks. Attachment 8.1 (Forklift Classifications) can be used to determine the type of lift truck to be used based on location and hazard.
- 4.1.2 All nameplates and markings shall remain in place and shall be legible.
- 4.1.3 Only trained and authorized operators shall be permitted to operate lift trucks. Operators shall be trained in the safe operation of each model/type of lift truck used at the site.
- 4.1.4 All lift trucks shall have a service brake system, an emergency brake system, and a parking brake system. These systems may use common components and shall be maintained in operable condition.

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

- 4.1.5 Where general lighting is less than 2 lumens per square foot, auxiliary directional lighting shall be provided on the truck. Whenever visibility conditions warrant additional light is required, all lift trucks in use shall be equipped with at least two headlights and two taillights in operable condition.
- 4.1.5.1 All lift trucks equipped with brake lights by manufacturer shall be in operable condition regardless of ambient lighting.
- 4.1.5.2 All lift trucks shall be equipped with an adequate audible warning device at the operator's station and in an operable condition.
- 4.1.5.3 No lift truck having an obstructed view to the rear shall be used unless:
- It has a reverse signal alarm audible above the surrounding noise level or
 - Is backed up only when an observer signals that it is safe to do so.
- 4.1.6 Seat belts and anchorages meeting the requirements of 49 CFR Part 571 (Department of Transportation, Federal Motor Vehicle Safety Standards) shall be installed in all lift trucks provided with rollover protection. The seat belt must be worn by the operator at all times during operation.
- 4.1.7 No person can ride on the lifting mechanism of a lift truck or use the lift truck as a work platform. Manufacturer-approved personnel baskets may be used if all manufacturer's specifications and limitations are met. Also see 4.3 of this procedure for additional requirements for lifting personnel.
- 4.1.8 Unauthorized personnel shall not be permitted to ride on lift trucks. A safe place to ride shall be provided where riding of trucks is authorized.
- 4.1.9 All lift trucks left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment.
- 4.1.10 Whenever the lift truck is parked, the parking brake shall be set. Lift trucks parked on inclines shall have the wheels chocked and the parking brake set.
- 4.1.11 All cab glass must be safety glass, or equivalent, that introduces no visible distortion affecting the safe operation of any machine.
- 4.1.12 Fire extinguishers shall be provided and maintained on all company owned or leased mobile equipment.
- 4.1.13 All lift trucks must comply with the requirements of AMS-710-02-PR-06600 Equipment Operation Around Overhead Power Lines when working or being moved near power lines or energized transmitters.

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

- 4.1.14 Lift trucks, stackers, and similar equipment shall have the rated capacity clearly posted on the vehicle clearly visible to the operator. When auxiliary removable counterweights are provided by the manufacturer, corresponding alternate rated capacities also shall be clearly shown on the truck. These ratings shall not be exceeded.
- 4.1.15 No modifications or additions that affect the capacity or safe operation of the lift truck can be made without the manufacturer's written approval. If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly. In no case shall the original safety factor of the lift truck be reduced.
- 4.1.16 If a load is lifted by two or more lift trucks working in unison, the two lift trucks must comply with AMS-710-02-PR-02100 Lift and Rigging Safety and AMS-830-17-PR-60001 Lift, Rigging and Transport Plans.
- 4.1.17 Steering or spinner knobs shall not be attached to the steering wheel unless the steering mechanism is of a type that prevents road reactions from causing the steering hand wheel to spin. The steering knob shall be mounted within the periphery of the wheel.
- 4.1.18 All high lift rider lift trucks shall be equipped with overhead guards which meet the configuration and structural requirements as defined in paragraph 421 of American National Standards Institute B56.1-2020, Safety Standards for Powered Industrial Trucks.
- 4.1.19 Wheel stops or other recognized positive protection shall be provided to prevent railroad cars from moving during loading or unloading operations.
- 4.1.20 Positive protection shall be provided to prevent railroad cars from being moved while dock boards or bridge plates are in position.
- 4.1.21 Fixed jacks may be necessary to support a semi-trailer and prevent upending during the loading or unloading when the trailer is not coupled to a tractor.
- 4.1.22 Stunt driving and horseplay are prohibited.
- 4.1.23 Personnel shall not be permitted to stand, pass, or work under the elevated portion of any forklift, loaded or empty.

4.2 Inspection

- 4.2.1 All lift trucks in use shall be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use:
 - service brakes
 - parking system (hand brake)

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

- emergency stopping system (brakes)
 - tires
 - horn
 - steering mechanism
 - seat belts
 - operating controls
 - safety devices
- 4.2.2 During the inspection conducted at the beginning of each shift, lift truck operators shall verify that the lift truck has no fluid leaks.
- 4.2.3 Written daily (pre-shift), monthly and annual inspections shall be conducted by an Authorized Operator. See AMS-710-02-FM-00801 - Lift Truck/Telehandler Inspection Schedule and Report for listing of items to be inspected and documented. The complete inspection shall be given to the Site HSE Manager to keep in site records.
- 4.2.4 All defects shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, where such equipment is necessary.
- 4.2.5 If a lift truck is found to need repair, is defective, or is unsafe in any way, the truck shall be taken out of service until it has been restored to safe operating condition. All repairs shall be made by authorized personnel.
- 4.2.6 Check forks visually prior to use for evidence of obvious significant damage or defect.
- Surface Cracks - The fork shall be thoroughly examined visually for cracks and, if considered necessary, subjected to non-destructive crack detection process, special attention being paid to the heel and welds attaching all mounting components to the fork blank. The forks shall not be returned to service if surface cracks are detected.
 - Straightness of Blade and Shank - The straightness of the upper face of the shank shall be checked. If the deviation from straightness exceeds 0.5% of the length of the blade and/or height of the shank respectively, the fork shall not be returned to service.
 - Fork Angle (Upper Face of Blade to Load Face of the Shank) - Any fork that has a deviation of greater than 3 degrees from the original specification shall not be returned to service.
 - Difference in Height of Fork Tips - The difference in height of one set of forks when mounted on the fork carrier shall be checked. If the difference in tip heights exceeds 3% of the length of the blade, the set of forks shall not be returned to service.

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

- Positioning Lock (when originally provided) - It shall be confirmed that the positioning lock is in good repair and correct working order. If any fault is found, the fork shall be withdrawn from service.
- Wear - Fork Blade and Shank - The fork blade and shank shall be thoroughly checked for wear; special attention being paid to the vicinity of the heel. If the thickness is reduced to 90% of the original thickness, the fork shall not be returned to service.
- Wear - Fork Hooks (when originally provided) - The support face of the top hook and the retaining faces of both hooks shall be checked for wear, crushing and other local deformations. If these are apparent to such an extent that the clearance between the fork and the fork carrier becomes excessive, the fork shall not be returned to service.
- Legibility of Marking (when originally provided) - If the fork marking is not clearly legible, it shall be renewed. Markings shall be renewed per instructions from original supplier.

4.3 Elevating Platforms

- 4.3.1 Only approved platforms shall be used to elevate personnel. Approved platforms shall have the following minimum design specifications:
 - 4.3.1.1 Structural safety factor of 3:1.
 - 4.3.1.2 Slip resistant floor.
 - 4.3.1.3 Means to securely attach the platform to the lifting carriage or forks.
 - 4.3.1.4 Minimum floor space of 18in x18in (457mm X 457mm) per occupant.
 - 4.3.1.5 Guard rail with a height above the platform floor not less than 36 inches (914mm) or more than 42 inches (1067mm) and including a midrail.
 - 4.3.1.6 Toe plate with minimum height of 4 inches (102mm).
 - 4.3.1.7 Guarding of moving parts e.g., mast chains. Such guarding (usually expanded metal) shall be installed on the platform between the employee(s) and the lift truck and shall extend 7 feet (2.3m) high from the platform floor.
 - 4.3.1.8 The platform floor shall not be more than 8 inches (20.32cm) above the upper surface of the fork blades.
 - 4.3.1.9 The floor dimensions shall not be more than two (2) times the maximum load center of the lift truck.
 - 4.3.1.10 Marking that indicate the maximum load, platform weight, and minimum capacity of truck to be used.

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

4.3.2 Whenever a lift truck is equipped with vertical only or vertical and horizontal controls that can be elevated with the lifting carriage or forks for lifting personnel, the following additional precautions shall be taken for the protection of personnel being elevated:

- Means shall be provided whereby personnel on the platform can shut off power to the truck.
- Such protection from falling objects, as indicated necessary by the operating conditions shall be provided.

4.4 Exceptions for Overhead Protection

4.4.1 Where overhead obstructions limit the overall lowered height of the lift truck and the normal overhead guard height, operation without a guard may be permitted.

4.4.2 A lift truck may be operated without the overhead guard, providing all of the following conditions are met:

4.4.2.1 Vertical movement of the lifting mechanism is restricted to 72 inches (1.8m) or less from the ground.

4.4.2.2 The lift truck will operate only in an area where:

- the bottom of the top tiered load is not higher than 72 inches (1.8m) and the top is not more than 120 inches (3m) from the ground when tiered.
- only stable loads are handled.
- there is protection against falling objects from adjacent high stack areas.
- the lift truck is marked to identify where it can be operated.

4.4.2.3 The above exceptions do not apply for rough terrain lift trucks.

4.5 Safe Operation Rules and Practices

Hands and feet shall be kept inside the operator's designated area or compartment.

4.5.1 Operators shall use manufacturer-provided restraint system (i.e., seatbelts) at all times when the equipment is in operation.

4.5.2 No part of the body shall be put into the mast structure or between the mast and the lift truck.

4.5.3 A lift truck shall not be driven up to anyone standing in front of an object.

4.5.4 The operator shall ensure that personnel shall stand clear of the rear swing area before conducting turning maneuvers.

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

- 4.5.5 Particular care (i.e., sounding horn) shall be exercised at cross aisles, doorways, and other locations where pedestrians may step into the path of travel of the lift truck.
- 4.5.6 The operator shall not allow anyone to stand or pass under the elevated portion of any lift truck, whether empty or loaded
- 4.5.7 A width of one foot shall be the minimum distance maintained from the forklift and the leading edge of any elevated platform, dock, freight car, or truck.
- 4.5.8 Per APTIM, a lift truck is unattended when the operator leaves the lift truck or the lift truck is not in his/her control.

4.6 Picking Up Loads

- 4.6.1 No part of the body shall be put into the mast structure or between the mast and the lift truck.
- 4.6.2 A lift truck shall not be driven up to anyone standing in front of an object.
- 4.6.3 The operator shall ensure that personnel shall stand clear of the rear swing area before conducting turning maneuvers.
- 4.6.4 Particular care (i.e., sounding horn) shall be exercised at cross aisles, doorways, and other locations where pedestrians may step into the path of travel of the lift truck.
- 4.6.5 The operator shall not allow anyone to stand or pass under the elevated portion of any lift truck, whether empty or loaded
- 4.6.6 A width of one foot shall be the minimum distance maintained from the forklift and the leading edge of any elevated platform, dock, freight car, or truck.
 - 4.6.6.1 Only manufacturer's supplied attachments shall be used
 - 4.6.6.2 All field/shop manufactured attachments shall be approved by manufacturer and Construction Technology Group (CTG) prior to use.
- 4.6.7 The operator shall not lift unstable loads.
- 4.6.8 Loads that can fall towards the operator shall not be lifted.
- 4.6.9 Loads shall be centered on the load-engaging means (e.g., forks).
- 4.6.10 The forks shall be properly adjusted to fit under the center of the load. The forks should also be set as wide as possible.
- 4.6.11 The forks shall be positioned under the load square to the load. After positioning the forks under the load, the forks can then be tilted back to reduce the load center.

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4.7 Traveling

- 4.7.1 A safe distance shall be maintained from the edge of ramps, platforms, and other similar working surfaces.
- 4.7.2 The forks, with or without load, shall be kept low (just enough to clear rough spots). A load carried high is more likely to spill when traveling or turning and pedestrians may be struck by the forks.
- 4.7.3 Speed limits shall be approximately 3 mph (4.8kph) when operating in shops and near pedestrians. Some speed limits can be project or client site specific.
- 4.7.4 The ground and/or floor (inside buildings) shall be strong enough to support the lift truck and the weight of the load. The weight of the lift truck should be listed on the manufacturer's nameplate.
- 4.7.5 When loading and unloading a truck/trailer, the truck/trailer shall be secured (e.g., wheeled chocks) to prevent it from moving when traveling across the dock bridge.
- 4.7.6 An assistant shall be used as a spotter or the operator shall travel in reverse when the load obstructs his/her view.
- 4.7.7 Railroad tracks shall be crossed in a diagonal direction (e.g., one wheel crosses the track at a time).
- 4.7.8 Lift trucks shall not be traveled across slopes which will cause the lift truck to become unstable and likely tip over. Grades shall be ascended or descended slowly, and with caution. When ascending or descending grades in excess of 5%, lift trucks shall be driven with the load pointing uphill. However, unloaded lift trucks should be operated on all grades with the forks pointing downgrade.

4.8 Stacking and Unstacking

- 4.8.1 When stacking or unstacking loads, the mast should be high enough to ensure that the stack is not likely to be pushed over.
- 4.8.2 Stacks shall be stable; uneven stacks and unstable loads are likely to collapse, causing danger to the operator and other person in the vicinity.
- 4.8.3 Broken pallets shall not be used for carrying nor stacking loads and forks should not be used to push, poke, or compress materials.

4.9 Parking

- 4.9.1 A lift truck is unattended when the operator leaves the lift truck, or the lift truck is not in his/her control.
- 4.9.2 Before leaving the operator's position, the operator shall:

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- bring the lift truck to a complete stop.
- place directional controls in neutral;
- the mast brought to the vertical position; apply the parking brake; and
- lower the load-engaging means fully.

4.9.3 In addition, when leaving the lift truck unattended, the operator shall:

- stop the engine or turn off the controls.
- remove keys from ignition and leave in custody of a qualified operator or supervisor.
- if the lift truck must be left on an incline, block the wheels; and
- fully lower the load-engaging means.

4.9.4 Lift trucks shall be parked no closer than 8 feet (2.44 meters) from the center of railroad tracks or a greater distance as dictated by the railroad authority's right-of-way if more stringent.

4.10 Operators Basic Rules

Operators shall adhere to the following basic rules:

- Keep to the right on roadways and in wide aisles.
- Drive at a reasonable rate of speed. Do not exceed posted speed limits and operate at lower speeds when necessary due to conditions of the work area.
- Slow down at intersections, corners, ramps, and other danger points.
- Use the horn in blind spots.
- Give pedestrians the right of way.
- Maintain a clear field of vision.
- When parking, do not block traffic.
- Do not use cell phones or other hand-held devices when operating powered industrial trucks.

4.11 Hazardous Materials and Areas

4.11.1 Operators who are required to carry chemical loads must know the hazards, possible health effects, personal protective equipment required, and action required in case of a spill. This information is available in the safety data sheets.

4.11.2 Lift trucks with internal-combustion engines creates carbon monoxide due to incomplete combustion; therefore, ventilation shall be provided in enclosed areas where internal-combustion powered equipment is used.

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- 4.11.3 Lift trucks can provide a source of ignition for a flammable mixture. Only "approved" lift trucks shall be used in locations where fire hazards exist (see 4.12 Designations). The following lift trucks are "approved" for areas where volatile flammable liquids or flammable gases are handled, processed or used, but in which they will normally be confined in closed containers.

4.12 Lift Truck Designations and Designated Locations

Lift Truck Designations and Designated Locations may be found in 29 CFR 1910.178 (b). They are also available in Attachment 8.3.

4.13 Fuel Handling and Storage

- 4.13.1 Fuel handling and storage shall be conducted in accordance with AMS-710-04-PR-05105 (Equipment Fueling).
- 4.13.2 For Gasoline and Diesel-powered lift trucks, the engines shall be turned off when refueling and no smoking or open flame is allowed in the fueling area.
- 4.13.3 The storage and handling of liquid fuels such as gasoline and diesel fuel shall be in accordance with NFPA Flammable and Combustible Liquids Code (NFPA No. 30-2021) and 29 CFR 1910.110 for fixed sites.
- 4.13.4 The storage and handling of liquefied petroleum gas fuel shall be in accordance with NFPA Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58-2020).
- 4.13.4.1 Outside storage of LP-Gas containers awaiting use shall be located in accordance with Table H-33 (Attachment 8.2) with respect to:
- The nearest important building or group of buildings;
 - Busy thoroughfares;
 - Storage locations shall be provided with at least one portable fire extinguisher having a rating not less than 20 ABC (See AMS-710-02-PR-02300 Welding, Cutting and Heating Section 4.15.1 for extinguisher location requirements).
- 4.13.5 The following apply to all LP-Gas fueled equipment:
- 4.13.5.1 Filling of fuel containers for industrial trucks or motor vehicles from industrial bulk storage containers shall be performed not less than 10 feet from the nearest important masonry-walled building or not less than 25 feet from the nearest important building or other construction and, in any event, not less than 25 feet from any building opening.
- 4.13.5.2 Fuel valve shall be closed except when fuel is required for engine operation.
- 4.13.6 Changing and charging storage batteries
- 4.13.6.1 All construction sites shall be compliant with 29 CFR 1926.441.

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- 4.13.6.2 Battery charging installations shall be located in areas designated for that purpose.
- 4.13.6.3 Facilities shall be provided for flushing and neutralizing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by trucks, and for adequate ventilation for dispersal of vapors from gassing batteries.
- 4.13.6.4 A conveyor, overhead hoist, or equivalent material handling equipment shall be provided for handling batteries.
- 4.13.6.5 Reinstalled batteries shall be properly positioned and secured in the lift truck.
- 4.13.6.6 A carboy tilter or siphon shall be provided for handling electrolyte.
- 4.13.6.7 When charging batteries, acid shall be poured into water; water shall not be poured into acid.
- 4.13.6.8 Trucks shall be properly positioned, and parking brake applied before attempting to change or charge batteries.
- 4.13.6.9 Care shall be taken to assure that vent caps are functioning. The battery (or compartment) cover(s) shall be open to dissipate heat.
- 4.13.6.10 Smoking shall be prohibited in the charging area.
- 4.13.6.11 Precautions shall be taken to prevent open flames, sparks, or electric arcs in battery charging areas.
- 4.13.6.12 Tools and other metallic objects shall be kept away from the top of uncovered batteries.

4.14 Lift Trucks (Forklift) Training

- 4.14.1 Prior to permitting an employee to operate a lift truck (except for training purposes under supervision), the employer shall ensure that each operator has successfully completed the training.
- 4.14.2 Each operator shall be trained and responsible for the safe operation, inspection, maintenance, and safety features of the lift truck used.
- 4.14.3 The employer shall ensure that each lift truck operator is competent to operate a lift truck safely, as demonstrated by the successful completion of the training.
- 4.14.4 Training program implementation
 - 4.14.4.1 Trainees may operate a lift truck only when they are:
 - Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence; and

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- Where such operation does not endanger the trainee or other employees.

4.14.4.2 Training shall consist of a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material), practical training (demonstrations performed by the trainer and practical exercises performed by the trainee), and evaluation of the operator's performance in the workplace.

4.14.4.3 All operator training and evaluation shall be conducted by persons who have the knowledge, training, and experience to train lift truck operators and evaluate their competence.

4.14.5 Training Program Content

Lift truck operators shall receive initial training in safe operation of the machine, required by 29 CFR 1910.178 and per the manufacturer's instruction, unless the employer can demonstrate that the topic or topics are not applicable to safe operation of the lift truck in the employer's workplace. Training shall be conducted by a qualified trainer.

4.15 Operator Certification and Training

4.15.1 Personnel shall pass the written evaluation/exam with a score of 80% or greater prior to being certified to operate the equipment.

4.15.2 The operator's knowledge of safe operating procedures for this equipment shall be verified by a functional test and by observation of his or her performance during the first month of operation.

4.15.3 A competent person (such as an equipment superintendent) shall be designated at each site by the Site Manager (CM) and are transferrable between APTIM sites. The competent person shall administer the functional test to determine an applicant's/employee's operating ability.

4.15.4 'Form AMS-710-02-FM-00802 Operator Functional Test (Lift Trucks) shall be used to document each operator's functional test for each type and model of equipment to be operated.

4.15.5 If deemed competent in the safe operation of the equipment the applicant/employee shall be issued a Type B Wallet Card.

4.16 Refresher Training and Evaluation

4.16.1 Refresher training, including an evaluation of the effectiveness of that training, shall be conducted to ensure that the operator has the knowledge and skills needed to operate the lift truck safely.

4.16.2 Refresher training in relevant topics shall be provided to the operator when:

4.16.2.1 The operator has been observed to operate the lift truck in an unsafe manner.

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- 4.16.2.2 The operator has been involved in an incident or near-miss incident.;
- 4.16.2.3 The operator has received an evaluation that reveals that the operator is not operating the lift truck safely.
- 4.16.2.4 The operator is assigned to drive a different type of lift truck.
- 4.16.2.5 A condition in the workplace changes in a manner that could affect safe operation of the lift truck.
- 4.16.2.6 An evaluation of each lift truck operator's performance shall be conducted at least once every three (3) years.
- 4.16.2.7 If an operator has previously received training in a topic and it has been this practice, and such training is appropriate to the lift truck and working conditions encountered, additional training in that topic is not required if the operator has been evaluated and found competent to operate the lift truck safely.
- 4.16.2.8 Site management shall certify that each operator has been trained and evaluated as required by this Procedure. The certification shall include the name of the operator, the date of the training, the date of the evaluation, and the identity of the person(s) performing the training or evaluation.
- 4.16.2.9 An equipment superintendent or general foreman shall verify that an operator is qualified to operate each piece/type of equipment that she/he is required to operate.

5.0 TERMINOLOGY

Term	Definition
ASME	American Society of Mechanical Engineers
Cantilever Truck	A self-loading lift truck equipped with cantilever load-engaging means such as forks.
Center of Gravity	The point where the shape's weight is spread evenly in all directions. For a uniform load, the Center of Gravity is located at the Center of the object.
Counterbalanced Truck	A lift truck equipped with load-engaging means where the complete load during normal transport is external to the polygon formed by the wheel contacts.
Counterweight	The weight that is part of the basic structure of a lift truck that is used to offset the weight of a load and to maximize the resistance of the lift truck to tipping over.
Fork Extension	A lift truck attachment that is added to the fork to increase the fork's effective length for handling oversized uniformly distributed loads.

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Front/Side Loading Lift Truck	A self-loading lift truck, generally high lift, having load-engaging means mounted in such a manner that it can be extended laterally under control to permit a load to be picked up and deposited in the extended position and transported in the retracted position.
High-Lift Truck	A self-loading lift truck equipped with an elevating mechanism designed to permit tiering (i.e., placing one load on or above another).
Lateral Stability	The resistance of a lift truck to tipping over sideways.
Load Capacity	The weight at a specified load center that a given lift truck can transport in a carry position and stack at the specified elevation.
Load Center	The horizontal distance from the faces of the load-engaging e.g., forks to the Center of Gravity of the load.
Load Backrest	The portion of the carriage and forks serving to restrain the load when the load is tilted rearward or upward.
Longitudinal Stability	The resistance of a lift truck to overturning forward or rearward.
Operator-up Truck	A lift truck controllable by an operator stationed on a platform that is elevated.
Overhead Guard	A framework fitted to a truck over the head of a riding operator for the purpose of providing protection for the operator from falling objects.
NFPA	National Fire Protection Association
Qualified Operator	A trained and authorized person who controls any function(s) of a lift.
Reach Truck	A self-loading lift truck, generally high lift, having a load-engaging means mounted so it can be extended forwardly under control to permit a load to be picked up and deposited in the extended position and transported in the retracted position.
Rough Terrain Lift Truck	A wheeled-type lift truck designed primarily as a forklift truck. This lift truck is intended for operation on unimproved natural terrain as well as the disturbed terrain of construction sites.
Site	Any location, facility or project where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities and/or project sites.
Track	The distance between wheels on the same axle of a lift truck.
Wheelbase	The distance between the centerline of the front and rear wheels of a lift truck



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6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-02-FM-00801	Lift Truck/Telehandler Inspection Schedule and Report
AMS-710-02-FM-00802	Operator Functional Test (Lift Trucks)

6.2 Other Internal References

AMS-710-02-PR-02300	Welding, Cutting, and Heating
AMS-710-04-PR-05105	Equipment Fueling
AMS-710-02-PR-02100	Lift and Rigging Safety
AMS-830-17-PR-60001	Lift, Rigging and Transport Plans
AMS-710-02-PR-06600	Equipment Operation Around Overhead Power Lines

6.3 Other External References

American National Standards Institute B56.1-2020 Safety Standards for Powered Industrial Trucks
29 CFR (Code of Federal Regulation) 1910.178 Powered Industrial trucks
49 CFR Part 571 Department of Transportation, Federal Motor Vehicle Safety Standards
NFPA No. 58-2020 NFPA Storage and Handling of Liquefied Petroleum Gases
NFPA No. 30-2021 NFPA Flammable and Combustible Liquids
29 CFR 1926.441 Batteries and Battery Charging

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
AMS-710-05-PR-01900 HSE Education and Training	Seven Years	Project site – APTIM LMS System
29 CFR 1910.178 Powered Industrial Trucks	Three Years	Project site – APTIM LMS System

8.0 ATTACHMENTS

Attachment	Attachment Title
Attachment 8.1	Forklift Classifications
Attachment 8.2	Table H-33 Outdoor LP-Gas Storage



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Attachment 8.3

Lift Truck Designations and Designated Locations as per 29 CFR 1910.178 (b)



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LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

ATTACHMENT 8.1 FORKLIFT CLASSIFICATIONS

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

Forklift Classifications

Table N-1 - Summary Table on Use of Industrial Trucks in Various Locations¹

Classes	Unclassified	Class I locations				Class II locations			Class III locations
Description of classes	Locations not possessing atmospheres as described in other columns.	Locations in which flammable gases or vapors are, or may be, present in the air in quantities sufficient to produce explosive or ignitable mixtures.				Locations which are hazardous because of the presence of combustible dust.			Locations where easily ignitable fibers or flyings are present but not likely to be in suspension in quantities sufficient to produce ignitable mixtures.
Groups in classes	None	A	B	C	D	E	F	G	None
Examples of locations or atmospheres in classes and groups.	Piers and wharves inside and outside general storage, general industrial or commercial properties.	Acetylene	Hydrogen	Ethyl ether	Gasoline Naphtha Alcohols Acetone Lacquer solvent Benzene	Metal dust	Carbon black coal dust, coke dust	Grain dust, flour dust, starch dust, organic dust	Baled waste, cocoa fiber, cotton, excelsior, hemp, jute, kapok, oakum, sisal, Spanish moss, synthetic fibers, tow.

	Unclassified	Class I locations				Class II locations			Class III locations								
		1	2			1	2		1	2							
Divisions (nature of hazardous conditions)	None	Above condition exists continuously, intermittently, or periodically under normal operating conditions.	Above condition may occur accidentally as due to a puncture of a storage drum.			Explosive mixture may be present under normal operating conditions, or where failure of equipment may cause the condition to exist simultaneously with arcing or sparking of electrical equipment, or where dusts of an electrically conducting nature may be present.	Explosive mixture not normally present, but where deposits of dust may cause heat rise in electrical equipment, or where such deposits may be ignited by arcs or sparks from electrical equipment.		Locations in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.	Locations in which easily ignitable fibers are stored or handled (except in the process of manufacture).							
Authorized uses of trucks by types in groups of classes and divisions																	
Groups in classes	None	A	B	C	D	A	B	C	D	E	F	G	E	F	G	None	None
Type of truck authorized:																	
Diesel:																	
Type D	D*																
Type DS									DS						DS		DS
Type DY									DY						DY	DY	DY
Electric:																	
Type E	E*																E
Type ES									ES						ES		ES
Type EE									EE						EE	EE	EE
Type EX					EX				EX		EX	EX			EX	EX	EX
Gasoline:																	
Type G	G*																
Type GS									GS						GS		GS
LP-Gas:																	
Type LP	LP*																
Type LPS									LPS						LPS		LPS
Paragraph Ref. in No. 505**	210,211		201 (a)		203 (a)		209 (a)		204 (a)-(b)		202 (a)	205 (a)		209 (a)	206 (a)-(b)	207 (a)	208 (a)

* Trucks conforming to these types may also be used — see subdivision (c)(2)(x) and (c)(2)(xii) of this section.

** Editor's Note: NFPA 505-1969 Standard for Type Designations, Areas of Use, Maintenance, and Operation of Powered Industrial Trucks.

† Editor's Note: This row was added for further clarification.

1. Editor's Note: Please refer to STD 1-11.6A in the Addendum for further clarification of N-1 Table.



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LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

ATTACHMENT 8.2 TABLE H-33 OUTDOOR LP-GAS STORAGE

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

TABLE H-33 OUTDOOR LP-GAS STORAGE

TABLE H-33	
Quantity of LP-Gas Stored	Distance
500 pounds or less.....	0
501 to 2,500 pounds.....	(1)0
2,501 to 6,000 pounds.....	10 feet
6,001 to 10,000 pounds.....	20 feet
Over 10,000 pounds.....	25 feet

Footnote(1) Container or containers shall be at least 10 feet from any building on adjoining property, any sidewalk, or any of the exposures described in 1910.110(f)(6)(i) (c) or (d) of this paragraph.



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ATTACHMENT 8.3 LIFT TRUCK DESIGNATIONS AND DESIGNATED LOCATIONS AS PER 29 CFR 1910.178 (B)

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

DESIGNATIONS AND DESIGNATED LOCATIONS AS PER 29 CFR 1910.178 (B)

LIFT TRUCK DESIGNATIONS

For the purpose of this standard there are eleven different designations of lift trucks as follows: D, DS, DY, E, ES, EE, EX, G, GS, LP, and LPS.

1. The D designated units are units similar to the G units except that they are diesel engine powered instead of gasoline engine powered.
2. The DS designated units are diesel powered units that are provided with additional safeguards to the exhaust, fuel and electrical systems. They may be used in some locations where a D unit may not be considered suitable.
3. The DY designated units are diesel powered units that have all the safeguards of the DS units and in addition do not have any electrical equipment including the ignition and are equipped with temperature limitation features.
4. The E designated units are electrically powered units that have minimum acceptable safeguards against inherent fire hazards.
5. The ES designated units are electrically powered units that, in addition to all of the requirements for the E units, are provided with additional safeguards to the electrical system to prevent emission of hazardous sparks and to limit surface temperatures. They may be used in some locations where the use of an E unit may not be considered suitable.
6. The EE designated units are electrically powered units that have, in addition to all of the requirements for the E and ES units, the electric motors and all other electrical equipment completely enclosed. In certain locations the EE unit may be used where the use of an E and ES unit may not be considered suitable.
7. The EX designated units are electrically powered units that differ from the E, ES, or EE units in that the electrical fittings and equipment are so designed, constructed and assembled that the units may be used in certain atmospheres containing flammable vapors or dusts.
8. The G designated units are gasoline powered units having minimum acceptable safeguards against inherent fire hazards.
9. The GS designated units are gasoline powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of a G unit may not be considered suitable.
10. The LP designated unit is similar to the G unit except that liquefied petroleum gas is used for fuel instead of gasoline.
11. The LPS designated units are liquefied petroleum gas powered units that are provided with additional safeguards to the exhaust, fuel, and electrical systems. They may be used in some locations where the use of an LP unit may not be considered suitable.

LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

DESIGNATED LOCATIONS

The atmosphere or location shall have been classified as to whether it is hazardous or non-hazardous prior to the consideration of the type lift trucks to be used therein.

The lift trucks as specified below are the minimum types required, but lift trucks having greater safeguards may be used if desired.

For specific areas of use see Attachment 8.1 which tabulate the information contained in this section.

Lift trucks shall not be used in atmospheres containing hazardous concentration of acetylene, butadiene, ethylene oxide, hydrogen (or gases or vapors equivalent in hazard to hydrogen, such as manufactured gas), propylene oxide, acetaldehyde, cyclopropane, diethyl ether, ethylene, isoprene, or unsymmetrical dimethyl hydrazine (UDMH).

Lift trucks shall not be used in atmospheres containing hazardous concentrations of metal dust, including aluminum, magnesium, and their commercial alloys, other metals of similarly hazardous characteristics, or in atmospheres containing carbon black, coal, or coke dust except approved lift trucks designated as EX may be used in such atmospheres.

In atmospheres where dust of magnesium, aluminum or aluminum bronze may be present, fuses, switches, motor controllers, and circuit breakers of lift trucks shall have enclosures specifically approved for such locations.

Only approved lift trucks designated as EX may be used in atmospheres containing acetone, acrylonitrile, alcohol, ammonia, benzene, benzol, butane, ethylene dichloride, gasoline, hexane, lacquer solvent vapors, naphtha, natural gas, propane, propylene, styrene, vinyl acetate, vinyl chloride, or xylenes in quantities sufficient to produce explosive or ignitable mixtures and where such concentrations of these gases or vapors exist continuously, intermittently or periodically under normal operating conditions or may exist frequently because of repair, maintenance operations, leakage, breakdown or faulty operation of equipment.

Lift trucks designated as DY, EE, or EX may be used in locations where volatile flammable liquids or flammable gases are handled, processed or used, but in which the hazardous liquids, vapors or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in the case of abnormal operation of equipment; also in locations in which hazardous concentrations of gases or vapors are normally prevented by positive mechanical ventilation but which might become hazardous through failure or abnormal operation of the ventilating equipment; or in locations which are adjacent to Class I, Division 1 locations, and to which hazardous concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clear air, and effective safeguards against ventilation failure are provided.

In locations used for the storage of hazardous liquids in sealed containers or liquefied or compressed gases in containers, approved lift trucks designated as DS, ES, GS, or LPS may be used. This classification includes locations where volatile flammable liquids or flammable gases or vapors are used, but which, would become hazardous only in case of an incident or of some unusual operating condition. The quantity of hazardous material that might escape in case of incident the adequacy of

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ventilating equipment, the total area involved, and the record of the industry or business with respect to explosions or fires are all factors that should receive consideration in determining whether or not the DS or DY, ES, EE, GS, LPS designated lift truck possesses sufficient safeguards for the location. Piping without valves, checks, meters and similar devices would not ordinarily be deemed to introduce a hazardous condition even though used for hazardous liquids or gases. Locations used for the storage of hazardous liquids or of liquefied or compressed gases in sealed containers would not normally be considered hazardous unless subject to other hazardous conditions also.

Only approved lift trucks designated as EX shall be used in atmospheres in which combustible dust is or may be in suspension continuously, intermittently, or periodically under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures, or where mechanical failure or abnormal operation of machinery or equipment might cause such mixtures to be produced.

The EX classification usually includes the working areas of grain handling and storage plants, room containing grinders or pulverizers, cleaners, graders, scalpers, open conveyors or spouts, open bins or hoppers, mixers, or blenders, automatic or hopper scales, packing machinery, elevator heads and boots, stock distributors, dust and stock collectors (except all-metal collectors vented to the outside), and all similar dust producing machinery and equipment in grain processing plants, starch plants, sugar pulverizing plants, malting plants, hay grinding plants, and other occupancies of similar nature; coal pulverizing plants (except where the pulverizing equipment is essentially dust tight); all working areas where metal dusts and powders are produced, processed, handled, packed, or stored (except in tight containers); and other similar locations where combustible dust may, under normal operating conditions, be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

Only approved lift trucks designated as DY, EE, or EX shall be used in atmospheres in which combustible dust will not normally be in suspension in the air or will not be likely to be thrown into suspension by the normal operation of equipment or apparatus in quantities sufficient to produce explosive or ignitable mixtures but where deposits or accumulations of such dust may be ignited by arcs or sparks originating in the lift truck.

Only approved lift trucks designated as DY, EE, or EX shall be used in locations which are hazardous because of the presence of easily ignitable fibers or flying's but in which such fibers or flying's are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

Only approved lift trucks designated as DS, DY, ES, EE, EX, GS, or LPS shall be used in locations where easily ignitable fibers are stored or handled, including outside storage, but are not being processed or manufactured. Lift trucks designated as E, which have been previously used in these locations may be continued in use.

On piers and wharves handling general cargo, any approved lift truck designated as Type D, E, G, or LP may be used, or lift trucks which conform to the requirements for these types may be used.

If storage warehouses and outside storage locations are hazardous only the approved lift truck specified for such locations shall be used. If not classified as hazardous, any approved lift truck designated as Type D, E, G, or LP may be used, or lift trucks which conform to the requirements for these types may be used.



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LIFT TRUCKS (FORKLIFTS) AND POWERED INDUSTRIAL TRUCKS

If general industrial or commercial properties are hazardous, only approved lift trucks specified for such locations shall be used. If not classified as hazardous, any approved lift truck designated as Type D, E, G, or LP may be used, or lift trucks which conform to the requirements of these types may be used.

Converted lift trucks that have been originally approved for the use of gasoline for fuel, when converted to the use of liquefied petroleum gas fuel may be used in those locations where G, GS or LP, and LPS designated lift trucks have been specified in the preceding paragraphs.

No lift trucks shall be used in atmospheres where the lower flammability limit (LFL) exceeds 1%.

PROCEDURE

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AMS-710-02-PR-01600

Revision:

1

Procedure Owner:

HSE

Issuing Authority:

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10/5/2022



EXCAVATION AND TRENCHING

1	Revised Section 4.1.13 to provide a safe means of access and egress at a lateral distance less than 25 feet away from employees in an excavation to meet ISNet World requirements.	M. Dotson	10/5/2022
0	Initial Issue	M. Dotson	7/22/2022
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
Rev	Changes	Approved	Date

Parent Document:

N/A

EXCAVATION AND TRENCHING

1.0 PURPOSE

This procedure establishes the minimum requirements for Excavation and Trenching activities on APTIM sites.

2.0 SCOPE

This procedure is to be utilized for all excavation and trenching activities on APTIM sites.

2.1 Exceptions

The only exceptions to this procedure are when Federal, State, Local or client requirements become more protective for worker safety.

3.0 RESPONSIBILITIES

The following personnel have responsibilities defined in this procedure:

- APTIM Managers
- APTIM Superintendent
- APTIM Supervisors
- APTIM Employees
- APTIM Contractors
- APTIM Subcontractors
- APTIM Visitors

4.0 PROCEDURE

This procedure establishes the minimum requirements for work, activities, inspections, and training, required for work in and around excavation and trenching operations on APTIM sites. This procedure will also apply to all APTIM subcontractors.

4.1 General

- 4.1.1 A designated Competent Person shall be onsite at all times when excavation activities are conducted.
- 4.1.2 APTIM Supervisors shall ensure employees, contractors, subcontractors, and visitors meet the requirements listed in this procedure when conducting excavation and trenching work.
- 4.1.3 Before any excavation can be started, an Excavation Permit (AMS-710-02-FM-01601) must be completed by the responsible Superintendent or equivalent with input from the Authorized Person for underground testing (utility identification) and the Excavation Competent Person. Appropriate Client approval and use of Client Excavation permit is

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also necessary where required by Client regulations. Client and/or utility company representatives shall be notified 24 hours prior to beginning excavations.

4.1.4 Underground Storage Tank (UST) Removal

4.1.5 AMS-710-02-WI-01601 Underground Storage Tank Removal contains specific instructions for trenches and excavations relating to UST removal.

4.1.6 Underground Utilities

4.1.6.1 Utility locating personnel shall locate and mark all known underground utilities within excavation area using utility locating equipment and techniques. The utilities shall be marked with paint or flags. For more guidance, please refer to AMS-710-02-PR-01610 (Identifying Underground Installations).

4.1.6.2 At least 3 feet (0.9144 m) of clearance between any underground utility and the cutting edge or point of powered excavation equipment will be maintained until the precise location of the utility is determined. Initial excavation within this 3-foot area will be conducted manually.

4.1.6.3 All utilities exposed during an excavation will be protected from accidental damage. Machine excavation within 3 feet (0.9 m) of a located utility requires a spotter.

4.1.6.4 The underground utilities information obtained shall be provided to affected personnel via the Job Safety Analysis (JSA) (AMS-710-05-WI-01701) and AMS-710-02-FM-06901, Underground/Overhead Utility Checklist/Diagram. Underground utilities information, in relation to proposed excavation work, means the following information about underground essential services that may be affected by the excavation:

- The utilities that may be affected
- The location, including the depth, of any pipes, cables or other plant associated with the affected essential services
- Any conditions on the proposed excavation work.

4.1.6.5 Any essential services information obtained must be readily available for inspection. The information must be available:

- For at least two (2) years after the incident occurs
- In every other case, until the excavation work is completed.

4.1.6.6 When working on a pressurized liquid system (i.e., site service water, processed cooling water, pumped sanitary system) with piping 1" or more in diameter in an excavation 4 foot or greater in depth where an engulfment hazard exists must:

- De-energize and drain the system
- Lockout/Tagout

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- All persons entering the excavation, whether working on the system or not shall apply safety locks and danger tags to the system in accordance with AMS-710-02-PR-01500, Control of Hazardous Energy.
 - No personnel shall be allowed in the excavation during pressure/leak testing.
- 4.1.7 The work area around an excavation over 4 feet (1.2 m) deep shall be, so far is reasonably practicable, secured from unauthorized access (including inadvertent entry).
- 4.1.8 When mobile equipment is operated adjacent to an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs.
- 4.1.9 Soil classification shall be made by the Competent Person or a registered Professional Engineer trained in soil classification. Based on the results of tests described in Exhibit 7.4, "Soil Classification Worksheet," the competent person will classify each soil/rock deposit as stable rock, Type A, Type B, or Type C. When layers of soil/rock exist, the weakest layer will be classified; however, each layer may be classified individually when a more stable layer lies under a less stable layer. If the properties or conditions of a soil/rock deposit change in any way, re-evaluation will be required. Unclassified soil shall be assumed to be Class "C" and will be sloped 1½:1 or shored when the excavation exceeds 4 feet (1.2 m) in depth.
- 4.1.10 Each employee in an excavation shall be protected from cave-ins. Excavations over 4 feet (1.2 m) deep shall be shored, sloped, or benched as required. Excavations and the work scheduled to be performed in the excavation shall be evaluated by the Competent Person to determine if the shoring, sloping, or benching needs to begin at a depth less than 4 feet (1.2 m).
- 4.1.11 Shoring for excavations over 20 feet deep (6 m) shall be designed by a registered Professional Engineer and shoring installed shall be approved and signed off by a registered Professional Engineer.
- 4.1.12 Spoils must be placed a minimum of 3 feet (0.9 m) from the edge of the excavation. Loose soil or rocks shall be removed from the sides of excavation walls.
- 4.1.13 Excavations 4 feet (1.2 m) in depth or greater, shall have a stairway, ladder, ramp, or other safe means of egress less than 25 feet (7.6 m) from any employee. Excavations that are less than 4 feet (1.2 m) in depth shall have safe access and egress for all employees with a maximum break in elevation of 19 inches (48.3 cm).
- 4.1.14 Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person.
- 4.1.15 Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design and shall be constructed in accordance with the design.

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- 4.1.16 Excavations shall be inspected by a Competent Person and the results recorded on either AMS-710-02-FM-01602 or AMS-710-02-FM-01603:
- 4.1.16.1 Prior to entry
 - 4.1.16.2 After rain or snowfall
 - 4.1.16.3 After freezing and/or thawing temperatures occur
 - 4.1.16.4 After any condition that can change the integrity of the soil
- 4.1.17 During rainy weather, work in excavations shall cease until the Competent Person has evaluated the excavation and the effect of the rain on the excavation. The Competent Person will maintain a regular inspection schedule to ensure the excavation stability and condition during rain events if employees continue to work in the excavation. Depending on the amount of rainfall, the duration of the rainfall and the soil type, the Competent Person may need to maintain continuous observation of the excavation conditions.
- 4.1.18 For excavations that have the potential for oxygen deficiency or to contain hazardous atmosphere, an atmosphere evaluation shall be performed. This test will be performed by the Construction HSE Manager or their designee. Indications of the potential for a hazardous atmosphere include, but are not limited to: gas lines, sewer lines, areas with hydrocarbons, and proximity to emissions sources for H₂S, SO₂, CO, CO₂ and other gases that are heavier than air. Excavations with hazardous atmospheres should be treated as a confined space.
- 4.1.19 Excavations shall be evaluated for hazards in addition to cave-in potential and atmospheric hazards. Electrical sources energized (pressurized) pipes, underground tanks, etc. may also present a hazard to employees who are required to enter an excavation.
- 4.1.20 The Competent Person responsible for the crew working in the excavation shall inspect the excavation throughout the work period, record the observations on AMS-710-02-FM-01602, and stop operations when unsafe conditions exist.
- 4.1.21 Water shall not be allowed to accumulate in excavations at any time. Pumps, drains, or other means shall be used to remove water constantly.
- 4.1.22 Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems shall be provided, such as shoring, bracing, or underpinning to ensure the stability of such structures. Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be done unless:
- A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure;
 - The excavation is in stable rock;

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- A registered professional engineer has determined that the structure is sufficiently removed from the excavation so that it will be unaffected by the excavation activity; or
- A registered professional engineer has determined that such excavation work will not pose a hazard to employees.

- 4.1.23 Sidewalks, pavements and appurtenant structures shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures. The support system shall be capable of withstanding a minimum live load of 125 lb./ft.
- 4.1.24 Emergency rescue plans shall be developed and rescue equipment shall be readily available.
- 4.1.25 Employees will not be permitted to work under loads or near digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded provided the vehicles are equipped with a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.
- 4.1.26 Employees exposed to falls by excavation crossings and walkways will be provided with fall protection in accordance with Procedure AMS-710-02-PR-00900 - Fall Protection.

4.2 Training

4.2.1 Employee Training

- 4.2.1.1 Each employee who works in or around an excavation shall be trained to recognize potential hazards associated with excavations: cave-in potential, fall hazards, safe entry and exit, proximity to excavating equipment, air quality, back-filling and compacting activities, protective systems, etc. This training shall be documented in accordance with AMS-710-05-PR-01900 (HSE Education and Training) and records maintained in the Site HSE files
- 4.2.1.2 Everyone assigned as an Excavation Competent Person shall have documented training (see 4.2.1.1) or shall send documentation of experience and qualifications in excavation activities to the Global HSE Education and Training Director for review.

5.0 TERMINOLOGY

Term	Definition
Accepted Engineering Practices	Those requirements that are compatible with standards of practice required by a registered professional engineer.
Angle of Repose	The greatest angle above the horizontal plane at which a material will lie without sliding.

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Authorized Person for Underground Testing	The person(s) designated by the Construction Manager to identify underground utilities using a combination of blueprints and underground testing equipment. This individual shall coordinate excavation activities with the Client (as applicable) and outside utility companies. Several individuals (such as the Piping Superintendent, Electrical Superintendent, Equipment Superintendent, and Field Engineer) may serve as Authorized Persons as necessary.
Benching (Benching system)	A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
Cave-In	The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.
Competent Person	One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
Excavation	Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
Excavation Competent Person	A person capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. The Construction Manager and Construction HSE Manager shall designate the Competent Person in writing and their qualifications shall be documented.
Hazardous Atmosphere	An atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.
Protective System	A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face, into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.
Ramp	An inclined walking or working surface that is used to gain access to one point from another and is constructed from earth or from structural materials such as steel or wood.
Registered Professional Engineer	A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this

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	standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.
Sheeting	Members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.
Shield	A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Shields may be premanufactured or job-built in accordance with 29 CFR 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."
Shoring (Shoring System)	A structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.
Site	Any location, facility or project where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities and/or project sites.
Sloping (Sloping System)	A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.
Stable Rock	Natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.
Structural Ramp	A ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock is not considered structural ramps.
Support System	A structure such as underpinning, bracing, or shoring that provides support to an adjacent structure, underground installation, or the sides of an excavation.
Tabulated Data	Tables and charts approved by a registered professional engineer and used to design and construct a protective system.
Trench (Trench Excavation)	A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

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Type A Soil	Cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144kPa) or greater. Examples of cohesive soils are clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, soil is not Type A if: • Soil is fissured • Soil is subject to vibration from heavy traffic, pile driving, or similar effects • Soil has been previously disturbed • Soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater • Material is subjected to other factors that would require it to be classified as a less stable material
Type B Soil	This classification refers to: • Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa) • Granular cohesionless soils including angular gravel (similar to crushed rock), silt, silt loam, sandy loam, and, in some cases, silty clay loam and sandy clay loam • Previously disturbed soils except those which would otherwise be classified Type C soil • Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subjected to vibration • Dry rock that is not stable Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B
Type C Soil	This classification refers to: • Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less • Granular soils including gravel, sand, and loamy sand • Submerged soil or soil from which water is freely seeping • Submerged rock that is not stable • Material in a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper

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6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-02-FM-01601	Excavation Permit
AMS-710-02-FM-01602	Daily Excavation Inspection Form (Short)
AMS-710-02-FM-01603	Daily Excavation Inspection Form (long)
AMS-710-02-FM-01604	Soil Classification Worksheet
AMS-710-02-FM-06901	Underground/Overhead Utility Checklist/Diagram

6.2 Other Internal References

AMS-710-02-PR-00900	Fall Protection
AMS-710-02-WI-01601	Underground Storage Tank Removal
AMS-710-02-PR-01500	Control of Hazardous Energy
AMS-710-02-PR-01610	Utility Contact Prevention
AMS-710-05-PR-01900	HSE Education and Training
AMS-710-05-WI-01701	Job Safety Analysis (JSA)

6.3 Other External References

None

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
Excavation Permit (AMS-710-02-FM-01601)	2 years	Project Records

8.0 ATTACHMENTS

Attachment	Attachment Title
None	

PROCEDURE

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1

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UTILITY CONTACT PREVENTION

1	Revised sections 4.1.1.1, 4.3.5, added Recordkeeping section.	M. Dotson	8/29/2022
0	Initial Issue	M. Karr	9/3/2019
INT	Issued for Interim Use	M. Hadacek & S. Lachney	7/30/2017
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N/A

UTILITY CONTACT PREVENTION

1.0 PURPOSE

The purpose of this document is to provide the minimum requirements to ensure that all utilities are properly identified, to prevent personal injury, property damage and/or causing negative impact to the surrounding community and environment.

The following deliverables are defined within this procedure:

Deliverable	Producer	Customer
Authorization to Drill Permit Form (AMS-710-02-FM-01611)	Competent Person – Utility Contact Prevention	Project Manager HSE Employees External Client
Utility Mark-Out Documentation Form (AMS-710-02-FM-01612)	Competent Person – Utility Contact Prevention	Project Manager HSE Employees External Client
Intrusive Activities Checklist (AMS-710-02-CK-01613)	Competent Person – Utility Contact Prevention	Project Manager HSE Employees External Client

2.0 SCOPE

This procedure applies to all APTIM sites planning above ground or intrusive activities, where the utility locations and clearances are not positively identified.

Work conducted around overhead power lines with mobile equipment is addressed in AMS-710-02-PR-06600, Equipment Operation Around Overhead Power Lines.

This procedure authorizes implementation of local, or client required procedures, when those procedures are more protective. Applicable local and/or client specific procedures shall be documented in the project-specific Health and Safety Plan (HASP), Work Plan, or Accident Prevention Plan.

2.1 Exceptions

Exceptions must be approved per the requirements of AMS-710-05-PR-01300, HSE Request for Variances.

3.0 RESPONSIBILITIES

The following APTIM personnel have responsibilities defined in this procedure:

- Managers
- Project Managers

UTILITY CONTACT PREVENTION

- Utility Contact Prevention – Competent Person
- Supervisors
- Employees
- Contractors
- Subcontractors

3.1 APTIM Managers

APTIM Managers are to ensure their Project Managers are adhering to these expectations.

3.2 APTIM Project Managers

Project Managers must designate their Competent Persons and ensure they're implementing these expectations.

3.3 APTIM Utility Contact Prevention – Competent Person

See detailed responsibilities in section 4.1.1.

3.4 APTIM Supervisors, Employees, Contractors and Subcontractors

Supervisors, employees, contractors and subcontractors are required to not proceed or act outside of the expectation.

4.0 PROCEDURE

4.1 Underground Utility Contact Avoidance during Intrusive Activities

4.1.1 Preliminary Requirements

4.1.1.1 The Project Manager - Designates a Competent Person – Utility Contact Prevention (UCP), to manage the aspects of work associated with the intrusive activities, supervise the employees who have the potential to contact any utilities, and fulfill the requirements of this procedure.

- Ensuring Aptim or subcontractors who know the job scope have a competent person present onsite to meet with and witness utility locate operations,

4.1.1.2 The Competent Person - UCP is responsible for the following:

- Determining location-specific regulations and client requirements for the notification, identification, locating, marking, contact prevention, and protection of utilities.
- Ensuring boundaries of intrusive activities have been clearly marked, prior to contacting utility locating services.

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- Ensuring National One-call center and/or other utility locating services have been contacted, and formal notification of the pending intrusive activities has been completed.
 - Ensuring that utility owners are contacted to mark the location of their facilities in the area of the intrusive activities. They shall obtain and document the utility mark-out confirmation number or ticket number provided by the One Call Center. Generally, this notification for a mark-out request must be made from at least two (2) business days (48 hours) to three (3) business days (72 hours) before beginning intrusive activities.
 - Ensuring private utility locating services have been contacted and have completed mark-outs, in areas not covered by a One-call center.
 - Ascertaining the requirements for maintaining the open ticket with the One Call Center (or local equivalent), client, and/or property owner after the initial formal notification and taking action required to maintain the open ticket, until intrusive activities are completed.
 - Ensure time requirements for allowing utility owners to mark locations are met, and authorizing intrusive activities, after satisfaction that all utilities have been located and marked.
 - Ensuring all above ground utilities are marked, flagged, or otherwise protected, in areas where equipment could come into contact with them.
 - Photograph all utility markings.
 - Ensure markings are protected and preserved as feasible.
- 4.1.1.3 Due to the sensitivity and costs associated with damage to fiber optic cables, the Competent Person - UCP must ensure and document verbal contact and an agreement with the fiber optic cable owner, for all work within 50 feet of fiber optic cables. Additional protective measures for intrusive activities near fiber optic cables shall be specified in site specific HASP, Site Safety Plan, etc.
- 4.1.1.4 The Competent Person - UCP must verify that the necessary emergency procedures to be taken if underground utilities become damaged are provided in the HASP, work plan, Job Safety Analysis, or Activity Hazard Analysis. These emergency procedures must be conveyed to employees as specified in Section 4.2.3, Field Crew Training (below).
- 4.1.2 General Requirements**
- 4.1.2.1 A designated Competent Person - UCP shall be onsite at all times when intrusive activities are conducted.
- 4.1.2.2 Overhead utility locations must be marked where heavy equipment or other equipment has the potential for contacting overhead or adjacent utilities. Where required by law, advanced notification to the utility company may be required for any work where potential exists for incidental contact with utility lines. Daily site inspections are

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required to determine where activities will take place and to ensure all adjacent above ground utilities are identified, marked, and/or protected, to prevent contact. Provide updated information to employees in daily tailgate meetings.

- 4.1.2.3 Maintain a minimum of 10 feet from overhead power lines, up to 50 kV. Adjust distances based on voltages over 50 kV by adding 0.4 inches per kV to the minimum 10-foot clearance. 20 feet of separation from lines, is required if voltage is unknown. Spotters are required to ensure safe clearance is maintained.
- 4.1.2.4 Prior to conducting any intrusive activities, the Competent Person - UCP must verify the Intrusive Activities Checklist (AMS-710-02-CK-01613) and the Utility Mark-out Documentation form (AMS-710-02-FM-01612) have been completed. No intrusive activities work is to be performed until all utility mark-outs are verified and until the facility owner-members have all provided the appropriate positive response.
- 4.1.2.5 Location specific procedures may not always be conveyed to contractors. The property owner, client, and/or facility operator must be consulted on the issue of underground utilities. All knowledge of past and present utilities must be evaluated prior to conducting work.
- 4.1.2.6 Only hand digging is permitted within 3 feet of underground high voltage lines, product lines, gas lines, or fiber optic cables. Once the line or cable is exposed, heavy equipment can be used but must remain at least 3 feet from the exposed line or cable.
- 4.1.2.7 If possible, shoveling/digging should be conducted parallel to the expected utility run.

4.1.3 Operating Requirements Specific to Excavation Activities

- 4.1.3.1 Refer to Section 5.0, Terminology to determine the applicable activities considered to be included as excavation.
- 4.1.3.2 The requirements of AMS-710-02-PR-01600, Excavation and Trenching must be followed.
- 4.1.3.3 After all mark outs have been completed, and the excavation locations have been accepted by the Competent Person - UCP prior to mechanical excavation, each utility identified inside the excavation location must be hand dug or vacuum excavated to a verify the utility location. The utility locations must be exposed in enough locations to verify its path of travel. If possible, the excavation location should be moved away from any utilities.
- 4.1.3.4 All utilities exposed during an excavation will be protected from accidental damage.
- 4.1.3.5 Utilities which are found to change elevation (shallower or deeper) or direction of run (curve) require UCP approval prior to soil removal/excavation operations.
- 4.1.3.6 When excavating close to a utility, outside the required 3-foot radius, the excavator should have a spotter to assist and guide the excavation equipment operator.

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- 4.1.3.7 While the excavation is open, underground installations shall be protected, supported, or removed as necessary to safeguard employees.
- 4.1.3.8 The utility owner should be contacted for guidance on protecting the utility from damage when backfilling excavations. When excavation is complete, as practical, 6 inches of soil may be placed over the utility to shield/protect during backfilling operations
- 4.1.3.9 Areas of refusal (tree roots, large rocks, concrete structures) which prevent either digging to depth or exposing utilities require UCP approval prior to beginning soil removal operations.

4.1.4 Operating Requirements Specific to Drilling Activities

- 4.1.4.1 Refer to Section 5.0, Terminology to determine the applicable activities considered to be drilling activities.
- 4.1.4.2 Follow all requirements in Section 4.1.1. & 4.1.2
- 4.1.4.3 After all mark outs have been completed, prior to drilling, each individual location must be hand dug or vacuum excavated to a minimum of 5 feet below ground surface (bgs).
- 4.1.4.4 Should the local geology be prone to refusal or should there be any other reason the drilling location cannot be cleared to a minimum of 5 feet bgs by hand digging or vacuum extraction, then the appropriate geophysical techniques should be utilized to verify the drilling location is clear of utilities to 5 feet bgs.
- 4.1.4.5 At any drilling location that cannot be cleared by hand digging or vacuum extraction, then an Authorization to Drill Permit (AMS-710-02-FM-01611) must be approved by the Director of Operations (or designee, which may be delegated to the business line manager for each area) in addition to the project/program manager/director. The SBU HSE lead may be consulted, but signature is not required.

4.1.5 Operating Requirements for Boring & Trenching Activities at Retail Fuel Dispensing Stations

- 4.1.5.1 Work in and around known retail fuel systems (lines and tanks) may be best performed by a licensed, APTIM approved tank subcontractor.
- 4.1.5.2 Gauge tank pit observation wells prior to beginning drilling activities.
- 4.1.5.3 Locate emergency shut off system prior to drilling activities.
- 4.1.5.4 Look for any visual indications that product lines or utilities have been installed in boring location (cracked concrete, sagging concrete, patched concrete, trench cuts, etc.)
- 4.1.5.5 Establish "No Drill Zones" if possible. No Drill Zones are areas around UST's, gas dispensers, lines or the canopy of retail fuel dispensing stations.

UTILITY CONTACT PREVENTION

- 4.1.5.6 Boring and trenching activities at retail fuel dispensing systems should be moved to a pea gravel free area of the site when possible.
- 4.1.5.7 If relocation is not possible, an air knife or vacuum extraction approach will be used for pre-clearance of underground utilities.
- 4.1.5.8 If pea gravel is encountered, stop work and either move the bore hole location or install with vacuum extraction techniques to a depth of 5 feet, if possible.
- 4.1.5.9 Standard pre-clearance tools (i.e., hand augurs, post hole diggers, spud bars, etc.) are prohibited when working in and around pea-gravel due to the possibility of damage to fiberglass tanks and lines from tool strikes.

4.1.6 Operating Requirements Specific to Sheet Piling Activities

- 4.1.6.1 Follow Section 4.1.4, Operating Requirements Specific to Drilling Activities.
- 4.1.6.2 After all mark outs have been completed, prior to installation of piling, each utility identified inside the sheet piling location must be hand dug or vacuum excavated to a verify the utility location. Additional planning may be necessary to change the location of the sheet piling location or the location of the utilities.

4.2 Training Requirements

4.2.1 Competent Person – Utility Contact Prevention

The Competent Person UCP must have successfully completed APTIM's internal Underground and Overhead Utility Contact Prevention training. It is the Project Manager's responsibility to verify that the Competent Person –UCP has completed training prior to overseeing activities.

4.2.2 Competent Person - Excavation Training

The Competent Person - Excavation shall have documented training or documented experience in excavation activities.

4.2.3 Field Crew Training

- 4.2.3.1 Prior to assignment of work, the Competent Person - UCP will provide the above and underground utilities information obtained to affected field crew personnel via the job safety analysis (JSA). Information will include:
 - The utilities identified in work areas that may be affected by operations.
 - The location and depth of the utilities associated with the affected essential services
 - Any conditions on the proposed intrusive activities work and clearance requirements.

UTILITY CONTACT PREVENTION

4.2.3.2 Prior to assignment of work, the Competent Person - UCP will also provide the following information to affected field crew personnel:

- The requirements of this procedure.
- The required work practices and controls to prevent contacting utilities.
- The emergency procedures necessary if utilities are damaged.
- The roles and responsibilities of each worker within the work crew.

4.3 Incident Reporting Requirements

- 4.3.1 Employees are required to immediately report to their direct supervisor any utility contact incident or near miss incident.
- 4.3.2 All incidents involving utility contact shall be reported by the Competent Person – UCP and site supervisor as required by AMS-710-05-PR-02200, Incident Reporting.
- 4.3.3 Any damage caused or discovered to natural gas, liquid petroleum, or any hazardous liquid utilities, underground utilities must be immediately reported by the Competent Person – UCP, to emergency services, to the facility owner, and utility owner.
- 4.3.4 All other utilities contact, and damages are to be reported to the facility operator and the One Call Center (or local equivalent) by the Competent Person - UCP.
- 4.3.5 The Competent Person - UCP shall verify that all other local reporting requirements are met, e.g., reporting underground pipeline damages involving excavation in Texas to the Railroad Commission of Texas. General contact information toll free 877-228-5740, 512-463-7158. 24-hour emergency numbers toll free 844-77-0305, 512-463-6788.

5.0 TERMINOLOGY

Term	Definition
As-Built Drawings	As-built drawings are blueprints that are usually obtained from the facility owner or client. They show original buried utilities and any modifications that have been made.
Company	APTIM
Competent Person – Utility Contact Prevention	Assigned by the Project Manager: An APTIM employee who is capable of identifying existing and predictable hazards presented by utilities located at an APTIM site that may be, hazardous, or dangerous to employees, could result in property damage, or negatively impact the community or environment. The Competent Person Utility Contact Prevention has successfully completed APTIM's in-house 'Underground/Overhead Utility Contact Prevention' training

UTILITY CONTACT PREVENTION

	course, possesses an appropriate educational background, field experience, and has the authority to correct deficiencies or take prompt corrective measures to eliminate them. The required identification and documentation procedure for competent persons is specified in AMS-710-02-PR-04200, Competent/Qualified Person Procedure.
Drilling Activities	Any mechanical or manual penetration of the earth's surface using drilling, boring, auguring, or similar type of equipment. For the purposes of this procedure, drilling activities include the use of direct-push equipment and driving equipment such as hammers, impact hammers, vibratory drivers, or similar types of equipment.
Driving Activities	Any mechanical or manual penetration of the earth's surface using driving equipment. Driving activities include the installation of piles, sheet piles, poles, stakes, and fence posts.
Excavation	Any operation in which earth, rock, or other material in or on the ground is moved, removed, or otherwise displaced by means of any tools, power equipment or explosives, and includes, without limitation, grading, trenching, digging, ditching, drilling, auguring, boring, tunneling, scraping, cable or pipe plowing, piling, and driving. Any manmade cut, cavity, trench, or depression in an earth surface formed by earth removal.
Excavation Activities	Any mechanical or manual penetration of the earth's surface using heavy equipment such as excavators, backhoes, dozers, etc. Excavation activities also include manual use of hand shovels, pick-axes, etc. The use of 3-foot or larger diameter augers is also considered excavation activity.
Fiber Optic Cables	Optical communication cables that are buried underground.
Intrusive Activities	Any mechanical or manual penetration of the earth's surface, including drilling activities, driving activities, and/or excavation activities using drilling equipment, driving equipment, or excavating equipment.
No Drill Zones	No Drill Zones are areas located on retail petroleum sites where drilling is not permitted due to the presence of Underground Storage Tank's (UST's), gas dispensers, lines or the canopy of retail fuel dispensing stations.
One Call Center	811-One Call, Dig Safe, Miss Dig, etc. dial-in telephone number for requesting the location and mark-out of buried utilities, such as gas lines, electrical lines, telephone/cable lines, sewer lines, and water lines
Private Utility Locating Service	A private utility locating service is a firm established to locate underground utilities using specialized locating equipment, such as ground penetrating radar location devices or radio transmitter type utility locating equipment.
Site	Any location, facility or project where APTIM is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities, and/or project sites.

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Site Survey	Inspection of the site to look for signs of buried utilities that may not be indicated through as-built drawings or through utility locating services. The survey typically involves inspection of overhead electrical services, basements, utility rooms, garages, etc., for signs of old electrical conduits or fuel/water/septic lines.
Utility	Any active or inactive above ground or subsurface structure that is or was designed to service a public or private facility. These may include, but are not limited, to the following: • Electric power lines • Propane lines • Natural gas lines • Telephone lines • Telephone cables • Fiber optic lines • Fiber optic cables • Water lines • Steam and pneumatic lines • Sewer/sewage lines • Drain lines • Underground storage tanks • Septic tanks • Process or product lines • Reclaimed water lines
Vacuum Excavator	Equipment that excavates underground utilities with a combination of alternating water-and-air or air-and air pulsations (e.g., air knife, water knife, etc.)

6.0 REFERENCES

6.1 Required Forms/Checklists

AMS-710-02-FM-01611	Authorization to Drill Permit Form
AMS-710-02-FM-01612	Utility Mark-Out Documentation Form
AMS-710-02-CK-01613	Intrusive Activities Checklist

6.2 Other Internal References

AMS-710-02-PR-04200	Competent/Qualified Person Procedure
AMS-710-02-PR-06600	Working Around Overhead Power Lines with Mobile Equipment
AMS-710-02-PR-01600	Excavation and Trenching
AMS-710-05-PR-01300	HSE Request for Variances

**UTILITY CONTACT PREVENTION**

AMS-710-05-PR-02200

Incident Reporting

6.3 Other External References

None

7.0 RECORDKEEPING

APTIM records identified within this procedure are maintained in accordance with the following:

Title (AMS number, if applicable)	Retention Schedule (years)	Retention Location
HSE Education and Training (AMS-710-05-PR-01900)	HSE training documents seven years	Project site and APTIM LMS System
Authorization to Drill Permit Form (AMS-710-02-FM-01611)	Project Duration	Project files
Utility Mark-Out Documentation Form (AMS-710-02-FM-01612)	Project Duration	Project files
Intrusive Activities Checklist (AMS-710-02-CK-01613)	Project Duration	Project files

8.0 ATTACHMENTS

Attachment	Attachment Title
None	

Attachment E3

Project Activity Hazard Analysis Forms

ATTACHMENT E3
PROJECT ACTIVITY HAZARD ANALYSIS FORMS

1. Mobilization/Demobilization
2. General Site Work
3. Vehicle Operations
4. Vehicle Fueling
5. Utility Clearance Marking and Surveys
6. Vegetation Clearance
7. Intrusive Investigation
8. Excavation and Backfilling
9. Groundwater Sampling
10. MEC/MPPEH Handling and Disposal
11. Equipment Decontamination
12. Waste Management
13. Disposal of IDW
14. Site Restoration
15. COVID-19 Job Site Practices

Activity Hazard Analysis (AHA)

Activity/Work Task: Mobilization (and Demobilization)		Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location: RSA-313-R-01 Redstone Arsenal Huntsville AL		Risk Assessment Code (RAC) Matrix					
Contract Number: W912DY-17-D-0003		Severity	Probability				
Date Prepared: 1/25/23			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Doug Russell HSE Manager			E	E	H	H	M
Reviewed by:			E	H	H	M	L
			H	M	M	L	L
		M	L	L	L	L	
Notes: (Field Notes, Review Comments, etc.) This AHA serves as the hazard assessment		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.				RAC Chart	
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E = Extremely High Risk	
		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.				H = High Risk	
						M = Moderate Risk	
						L = Low Risk	
Job Steps	Hazards	Controls			EM 385-1-1	RAC	
Travel at project site.	Vehicle Operation.	See Vehicle Operation AHA			18.A	M	
Arrival of new personnel at site.	Untrained personnel.	All personnel working on hazardous, toxic, and radioactive waste (HTRW) shall submit HAZWOPER training certificates (40-hour, 8-hour (if applicable), and supervisor (if applicable) to a Site Safety and Health Officer (SSHO). All personnel shall attend a site safety orientation. Other training certifications shall also be made available on site.			18.A	M	
	Medical qualifications.	All personnel working on HTRW shall submit current physician's certificate stating that employee is participating in an appropriate medical surveillance program meeting 29 Code of Federal Regulation (CFR) 1910.120			01.B.03 01.E.01 28	L	
	Allergies.	All personnel should complete the Known Allergies Questionnaire (voluntary only).			01.C.01	L	

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Arrival of new personnel at site (continued).	Unfamiliarity with: site, general (chemical, physical, environmental) site hazards, project safety rules and hazard control procedures, chain of command, and emergency procedures.	All personnel shall attend the site orientation training. The site orientation shall include a review of the phone locations, evacuation routes, and any special requests from the manager of the facility. After personnel are trained in the contents of the Accident Prevention Plan (APP), APP Addenda, and they shall sign the APP Acknowledgment Form. Personnel who may participate in intrusive activities shall attend Munitions and Explosives of Concern Awareness Training. All pertinent AHAs shall be reviewed with personnel (as applicable). Post all hazard warning signs, emergency maps, and emergency phone numbers.	01.B.03 01.E.01 28 03.A.01.b	M
	Munitions and Explosives of Concern (MEC)/Unexploded Ordnance (UXO).	Personnel shall attend site-specific MEC Awareness (and recognition) Training prior to commencement of any site activities.	01.B.01 33.A.01	M
Unload equipment/prepare site.	Failure to properly plan daily activities.	A Job Safety Analysis (JSA), as required by Aptim shall be prepared by the crew prior to commencing daily activities. The JSA may be used as a component of the morning Tailgate Safety Meeting. The JSA shall be revised at any time throughout the workday when new tasks are initiated, unforeseen circumstances arise, or if working conditions change. Personnel shall implement Hazard Assessment Resolution Program.		M
	Heavy lifting, strains, and sprains.	No individual employee is permitted to lift any object that weighs over 50 pounds. Proper lifting techniques shall be used. Multiple employees or the use of mechanical lifting devices are required for lifting objects over the 50-pound limit.	14.A.01	M
	Use of mechanical equipment.	Only qualified personnel shall be permitted to operate equipment. Mechanical equipment shall be inspected daily. Deficiencies in equipment shall be noted on the inspection form. Equipment found to be unsafe shall not be used. All equipment shall be operated at safe speeds and in a safe manner. Equipment operators shall wear safety belts and hearing protection. Ground personnel shall not position themselves between equipment and stationary objects. Personnel are only permitted to approach equipment after a signal from the operator	18.G	M
Prepare site.	Hand injuries.	Items to be handled shall be inspected for sharp edges prior to being handled. Personnel shall wear leather gloves when handling sharp materials. Personnel shall be aware of and avoid pinch point hazards.	05.A.08	L
	Electrical.	Ground-fault circuit interrupters shall be used on all power tools and extension cords. Extension cords, power tools, and lighting equipment shall be inspected before each use, protected from damage, and kept out of wet areas. Keep extension cords off of	11.A	M

Job Steps	Hazards	Controls	EM 385-1-1	RAC
		roads. Only qualified and authorized electricians will perform electrical installations or maintenance.		
Prepare site (continued).	Fire.	Fire extinguishers shall be placed in work areas. The SSHO shall establish smoking areas in compliance with the facility policy. Fire extinguishers will be available in all Aptim work trucks and office facilities. Site personnel shall complete annual fire extinguisher training. Use caution with vehicle exhaust systems in grassy areas. Flammable or combustible liquids will be stored in approved Type 1 or Type 2 safety cans.	09.E.01 09.A.06	L
	Chemical hazards.	The Exclusion Zones and Contamination Reduction Zones shall be set-up and appropriately marked with signage. The Emergency Eyewash station shall be inspected, cleaned, filled, and then placed in service. Notify all personnel of the emergency eyewash station location. Employees shall be instructed to the chemical hazards they may be exposed by instruction from the manufacturers SDS. Any hazardous chemicals procured during the work shall be accompanied by SDS. Contact HSM before procuring hazardous chemicals.	28 06.B.02.b 06.B.01.b	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel Name(s)	Inspection Requirements
Personal Protective Equipment - Level D: Hard Hat Safety Glasses Safety-Toed Boots Work Gloves ANSI Class 2 reflective warning vests Equipment: Fire Extinguishers Emergency Eyewash First Aid Kit Deep-Woods Off or Ultrathon Repel® Permanone I® Drinking water Weather radio or AM/FM radio	Training Requirements: Site safety orientation Applicable AHAs HAZWOPER 40-Hour MEC Awareness Qualified equipment operators Lifting/back safety Fire extinguisher use Emergency procedures Biological hazard identification and control Tornado shelter locations National Lightning Safety Institute Lightning Safety Procedures	Daily site safety inspection CP (SSHO/UXOSO) – William Morton Check Known Allergies Questionnaire, training, and medical certifications against personnel roster Mechanized equipment (daily) Overhead and underground utilities Housekeeping (daily) Fire extinguisher (monthly) Vehicle inspection daily Equipment and tools inspection daily and before use Survey areas for poisonous plants, insects, and animals Check body for ticks

GENERAL SITE WORK

ACTIVITY HAZARD ANALYSIS						
Date Prepared: August 2020 Project Name: Corrective Measures Implementation at Multiple (9) Sites Activity/Work Task: General Site Work Activity Location(s): Madison County, AL Prepared By: Katherine Kaye Task Start Date: Task Duration: Reviewed By: Edie Scala-Hampson, CIH, CHMM	Overall Risk Assessment Code (RAC) (Use highest code)				L	
	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.				RAC Chart E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk	
"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.						
Job Steps	Hazards	Actions to Eliminate or Minimize Hazards			RAC	
Review-Health and Safety (H&S) Needs	Inadequate preparation that can lead to personal injuries, property damage and project delays Unfamiliarity-Addition of new personnel to work team Emergency response unfamiliarity	Confirm that all field personnel understand their responsibilities and the hazards covered in the project Site Safety and Health Plan (SSHP) and are trained in the procedures corresponding to work assignments. Conduct pre-entry H&S briefing and Tailgate Safety Meetings (TSMs) to accommodate unforeseen circumstances, or if working conditions change. Confirm that site hazards are recognized. Confirm that necessary equipment, to evaluate and control site hazards, is available and in good working condition. Confirm that applicable engineering, administrative and personal protective equipment (PPE) controls and equipment are available and ready to be used as needed. Confirm emergency, safety and first aid supplies are available. Review emergency procedures, contact numbers and evacuation plans. Confirm that all personnel know what to do in the event of an accident (personal or property damage). Complete preliminary and initial quality meeting with the U.S. Army Corps of Engineers (USACE), if required.			L	

Job Steps	Hazards	Actions to Eliminate or Minimize Hazards	RAC
Review–Health and Safety (H&S) Needs (continued)	Munitions and Explosives of Concern (MEC) / Unexploded Ordnance (UXO).	Non-UXO personnel shall attend site-specific MEC Awareness (and recognition) Training prior to the commencement of any site activities. Use only UXO personnel qualified in accordance with Department of Defense Explosives Safety Board Technical Paper 18, Minimum Qualifications for UXO Technicians and Personnel. UXO Technicians shall be present during any activity occurring in a Munitions Response Areas. Perform all work in accordance with approved Work Plan.	L
Transportation–Vehicle Maneuvering	Vehicle accidents	No cell phone use by driver while vehicle is in motion. Practice defensive driving and always wear safety belt. Adjust vehicle per your personal specifications and confirm that it is in good working order and all cargo is secured and distractions are minimized. Familiarize yourself with the route and directions. Keep vehicle speed appropriate to road conditions. Be aware of the set in of driving fatigue and take breaks as needed.	L
	Road conditions: ruts, snow, ice, puddles, poor traction	Be cognizant of road conditions and vehicle size limitations at all times. Match driving speed to the conditions.	L
	Maneuvering in tight areas/potential vehicle or personnel damage	Use a spotter to help maneuver in tight areas. Avoid backing if possible. Check all blind spots before you attempt to move vehicle. Sound horn before backing and move slowly. Remember that loaded haul trucks have the right of way.	L
General Site Work	Security/Site access control–unwanted entry	Establish positive site access control prior to on-site operations using barricades, signs, or other methods.	L
	Strains, sprains, awkward bending/lifting/positions and ergonomic hazards	Maintain good personal fitness. Know your own limitations. Discuss and caution personnel about knowing their personal limitations when conducting strenuous activities. Follow safe work practices and daily task specific procedures. Do not rush. Size up the load before the lift. Lift with straight back and bent knees, do not twist. Do not lift greater than 50 pounds by yourself. Confirm walking pathway is clear. Use mechanical assistance or two-person lift for loads greater than 50 pounds and large awkward loads. Limit repetitive awkward motions and unbalanced lifting as much as possible. Develop appropriate work-rest cycles.	L
	Crush, Roll-over and Impalement Hazards	Operators need to check the clearances of doorways, canopies, and overheads and operate controls smoothly. Never use attachments unless specifically authorized by the manufacturer of the forklift. Do not allow riders for any reason on forklift. Never allow anyone to stand or pass under the raised pallet forks, mast, carriage, boom or attachments. Carry the load low – at minimum clearance. If you cannot see where you are going, get someone to direct you. Follow all equipment warnings. Know the capacity and operating characteristics of the forklift equipment being used. Operators will ensure that once a vehicle is loaded, that the cargo is completely secured prior to departing the work site.	L

Job Steps	Hazards	Actions to Eliminate or Minimize Hazards	RAC
General Site work (continued)	Overhead hazards and struck by falling object	Wear hard hat when there is a potential for head injury and overhead hazards. Prohibit personnel from working under suspended loads.	L
	Traffic–struck-by hazards, crushing hazards	Select work location away from traffic, if possible. Place barricades or stationary vehicles for work site protection, if necessary. Wear high visibility vest. Stay clear of traffic and equipment. Discuss active work areas in daily briefings. Respect active work zones. Make eye contact with operators of equipment to make sure they know your intentions. STAY CLEAR of earth moving equipment. Prohibit machinery or equipment that requires an operator from running unattended.	L
	Unhygienic conditions	Confirm that restroom facilities, if installed on site, are adequately provided and maintained. Maintain hand disinfectant, wipes, and wash stations.	L
	Fire	Maintain at least one dry chemical fire extinguisher having a minimum Underwriters Laboratory (UL) rating of 1A5BC on site. Put fire extinguishers in work areas. Require hot work permit or equivalent review for open flames and high-temperature operations. Store flammable and combustible liquids in approved containers and cabinets. Limit smoking to designated areas. The UXOSO shall establish smoking areas. Smoke only in designated areas. Shut off engines before refueling. A 2-A:20-B:C fire extinguisher shall be available when refueling at the project site.	L
	Driving over soft ground and uneven and rough terrain	Choose location with level and firm soils. Contact subcontractor and note that gravel or wood chips may be needed to prevent entrapment in mud or water. Maintain vehicle speed corresponding to road conditions.	L
	Personal safety	Use the buddy system and maintain visual contact. Avoid traveling alone and bring a topographic and/or site map and compass or GPS.	L
	Electric shock	For new installations and repairs: Confirm written certification of installation and grounding of all electrical power hook up installations and disconnections by a certified electrician. General Electrical safety: Make certain all electrical is de-energized if work is to be performed near live power; implement lockout/tagout procedures. Connect electrical tools through ground fault circuit interrupter for outdoor use or use in wet conditions. Do not operate portable electric tools unless they are grounded and double insulated.	L

Job Steps	Hazards	Actions to Eliminate or Minimize Hazards	RAC
General Site Work (continued)	Slip, trip, and fall hazards	Wear slip-resistant footwear. Use sand or salt to control ice slip hazards, as needed. Keep work area picked up and as clean as feasible and free of tripping and fall hazards. Exercise caution to prevent entrapment in mud or wet soils and avoid walking on loose soils that can give way. Keep egress routes as clear and unobstructed as possible. Use extra caution when working on uneven ground. Do not jump from vehicles or elevations. Use 3 points of contact when climbing or descending from elevation.	L
	Stuck by flying debris—eye, head, etc.	Due to the constant threat of flying debris, safety glasses should be worn at all times.	L
	Biologicals—contact with poisonous plants, allergens, insects and animal kingdom hazards (for example: spiders, hornets, reptiles, snakes, ticks, mosquitoes, bird and rodent droppings, biting and stinging insects, thorny plants, etc.)	Note: All personnel have the option to complete the Voluntary Allergy/Sensitivity/Medical Questionnaire. Conduct visual inspection before work begins and note (mark) areas of poisonous vegetation, insect (hornet wasp) and snake habitats, for example. Use mosquito repellent with DEET, as required. Treat clothing with permethrin-based products if ticks are prevalent. Know the local fauna and review emergency preparedness measures. Review potential animal dangers specific to the site and precautions (actions to take if run-in with wild animal occurs) and treatments. Inspect your body and clothing for ticks during outdoor activity and at the end of the day. Wear light colored clothing so ticks can be more easily seen. Remove ticks right away to prevent infections. Wear long-sleeved shirts and tuck them in. When in areas with tick potential, tuck pants into socks and duct tape the seam. Review information for poison ivy recognition and treatment.	L
		Use barrier cream, if poisonous plants are present (Ivy Block). Use existing footpaths when possible. Avoid walking in un-cleared areas with potential for poison ivy or biological hazard. Use products such as Zanafel, Ivy Block, Tecnu, IvyX if poison ivy or poison oak is prevalent. - Always wash hands using Ivy cleanser before eating, using restroom, or operating motor vehicle, or after leaving field - Do not touch face with body parts or clothing while in the field - If operating cutting equipment (chainsaws, weed-eaters, etc.) consider face shields in addition to safety glasses - Use hands to move brush/limbs that may contact face when walking through woods - Remove contaminated work clothing with gloves. Store, bag and wash separately Use poison ivy cleansers (not soap) to clean affected skin. Shower immediately upon leaving work. Wear snake chaps if poisonous snakes are prevalent.	L

Job Steps	Hazards	Actions to Eliminate or Minimize Hazards	RAC
General Site Work (continued)	UV exposure–sunburn	Wear UVA/UVB SPF sunscreen (minimum 30 SPF) and reapply frequently. Wear hats and clothing that shield skin from direct sun.	L
	Noise–hearing loss	Wear hearing protection if noise levels from neighboring equipment exceeds 85 dBA (if you cannot be heard speaking in a normal voice at arm's distance). Look for ways to limit exposure to high level noise sources. All personnel shall wear hearing protection when exposed to high noise levels. All personnel shall wear hearing protection when operating powered hand tools or noisy equipment. Wear hearing protection when working near noisy tools or equipment. Perform noise dosimetry to verify hearing protection is adequate.	L
	Spills and leaks	Maintain a portable spill response kit (if spills are possible) containing absorbent materials, non-sparking shovel, PPE, and disposable supplies in a readily accessible location. Inventory materials every 6 months and train staff on use of spill kit.	L
	Hand tools/power tools-laceration hazards, jamming, pinch points, struck-by, caught between	Confirm that hand tools are in good repair and used correctly. Use the right tool for the right job. Inspect tools daily prior to use and remove defective tools from service immediately. Wear PPE with eye protection and leather gloves per the SSHP to prevent eye injuries and for all tasks with potential for cuts or lacerations. Use electric power tools and extension cords protected by a ground fault circuit interrupter.	L
	Hand Injuries	Inspect glassware before handling. Sweep glass using scoop and broom. Do not pick up by hand. Inspect items to be handled for sharp edges, splinters, burrs, rough surfaces, etc. before handling. Personnel shall wear leather gloves when handling materials with sharp edges, splinters, burrs, rough surfaces, etc. Personnel shall be aware of and avoid pinch point hazards.	L
	Temperature stress: Heat or cold stress	Review H&S program section regarding monitoring and controls necessary for heat or cold stress prevention. Take preventive and recovery measures as necessary. See SSHP. Develop a work/rest regimen. Have bottled water available. Take breaks as needed for rehydration and recovery. Dress appropriately.	L
	Severe weather-related hazards (lightning, high winds, snow, rain, sleet)	Be tuned in to the local weather reports. STOP work as necessary when adverse weather conditions (high wind, lightning, or heavy rain) appear to be approaching the work area. Suspend work if storm is 5 miles away. Stop work if lightning is within a 30-second count (before thunder is heard) of the work area. Proceed to safe refuge. Return to work 30 minutes after last strike. (Follow	L

Job Steps	Hazards	Actions to Eliminate or Minimize Hazards	RAC
General Site Work (continued)	Severe weather-related hazards (lightning, high winds, snow, rain, sleet)	the 30/30 rule.) Do not remain under trees in severe winds. Identify likely tornado refuge during site safety meeting. Confirm that trailers, if used, are installed with appropriate anchorage capable of withstanding anticipated wind forces and comply with state and local standards for the installation of mobile homes. Only authorized vendors will remove all strapping anchors and chocks in preparation for trailer removal from the work site.	
	Inhalation of dust, irritants, allergens	Remain upwind of dust-generating activities as much as practical. Dust filtering face-pieces can be used if desired (optional). Use water as a dust suppressant, if necessary.	L
General maintenance and housekeeping	Exposure to chemicals: Use of cleaning compounds, paints, sealants, environmental preservatives	Read and follow Safety Data Sheet (SDS) for each chemical used. Do not use any chemical that you have not been trained to safely use. Properly label all containers. Provide ventilation and proper storage/disposal as necessary. Wear required PPE for the exposure. Use green, nonhazardous products where possible.	L
Repetition of work tasks for periods longer than 8 hours	Fatigue associated with extended work shifts including general drowsiness and associated driving fatigue	Know your physical and psychological limitations. Stop work/driving when necessary to take breaks and hydrate. Stop work all together if fatigue endangers your safety or the safety of others. If appropriate find a replacement for your job tasks. Schedule more demanding tasks for when endurance and alertness is best. Postpone more demanding and hazardous jobs if you are fatigued. Follow guidelines of SSHP for work-rest regimens under adverse conditions of heat or cold stress. Limit moderate to heavy workloads by knowing your physical limitations to minimize the risk of musculoskeletal injuries.	L
Completion of work shift and clean-up	Take home toxics-Contact with potentially contaminated materials, insects and/or irritant plants.	Note a source of decontamination water on site. Do not bring contaminated PPE or boots into truck. Wear Tyvek as necessary and washable or disposable over-boots to keep personal clothing clean and free of contaminated soils. Store and dispose of contaminated materials in accordance with regulations. Use liners to prevent contamination of truck. Shower immediately at end of workday. Check body for ticks, bites and signs of irritation or cuts.	L
Completion of work shift and clean-up	Chemical exposure or burns during equipment decontamination (pressure washing) and use of any chemicals or contact with hazardous wastes	Read SDSs for all chemicals used such as methanol or hexane and follow procedures. Label all containers as to contents and associated hazards. Wear appropriate PPE (rain suit or equivalent) to prevent burns from hot water. Do not eat in contaminated areas. Prohibit pressure washing of PPE while it is being worn.	L

Equipment	Training	Inspection
PPE Level D: - Hard hat (if there are overhead hazards) - Safety glasses - Safety-toed boots - Work gloves - ANSI Class 2 reflective warning vests Other Equipment: - Generator - Fire extinguishers - Emergency eyewash - First aid kit - Insect repellent–DEET - Hand tools - Spill containment supplies, if needed - First aid supplies - Containers as needed - Tarps - GFCI - Heavy duty extension cords - Drinking water Smart phone apps (temperature stress, noise, weather)	Competent Person (CP) / Qualified Person (QP): CP/UXOSO William Morton QP/First Aid and CPR William Morton Training Requirements (as determined by the UXOSO): - HAZWOPER 40-hour - Site safety orientation - Tailgate meetings - Emergency procedures - Hazard communication - Hearing conservation - MEC awareness - Applicable AHAs - Fire extinguisher use - Biological hazard identification and control - Tornado shelter location - Lightning safety procedures - Heat stress prevention and heat stroke treatment - Cold stress prevention	Daily inspection (SSHO/UXOSO) William Morton Housekeeping (daily) Fire extinguisher (monthly) Vehicle inspection (daily) Eye wash (weekly) Equipment and tools inspection (daily and before use) Survey areas for poisonous plants, insects, and animals (each work area) Check body for ticks (each evening during tick season) Identify closest usable severe weather shelter (ex. tornado shelter) that is available (each work area)

Activity Hazard Analysis (AHA)

Activity/Work Task: Vehicle Operations	Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location: RSA-313-R-01 Redstone Arsenal Huntsville AL	Risk Assessment Code (RAC) Matrix					
Contract Number: W912DY-17-D-0003	Severity	Probability				
Date Prepared: 1/25/23		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Doug Russell, HSE Manager	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
Reviewed by:	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.) This AHA serves as the hazard assessment		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.				RAC Chart
		"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.				E = Extremely High Risk
						H = High Risk
						M = Moderate Risk
				L = Low Risk		
Job Steps	Hazards	Controls			EM 385-1-1	RAC
Project vehicle use.	Operation of motor vehicles and trucks-General.	All company owned, leased, or rented vehicle operations shall comply with the requirements of AMS-710-02-PR-02700, <i>Non-Commercial Motor Vehicle Safety</i> , and AMS-710-02-PR-05700 <i>Mechanized and Marine Equipment</i> . All company owned, leased, or rented commercial vehicle operations shall comply with the requirements of AMS-710-02-PR-03900, <i>Commercial Motor Vehicle Safety</i> . Subcontractors operating motor vehicles shall comply with all federal, state, and local traffic regulations. Subcontractors shall only use vehicles that are in good condition and safe to operate. All personnel shall drive defensively and wear seat belts while vehicles are in motion.			18.A.01 18.A.02 18.A.03 18.C.02 18.C.03	M
	Operation of motor vehicles and trucks-Accidents	In the event of an accident: Stop; call for medical assistance; notify police; complete Vehicle Accident Report and submit to your supervisor. If an APTIM employee is injured, the medical forms per Section 8.0 of the Installation-Wide APP (CEHNC, 2019). Attachment 3, must completed at the health clinic or Emergency Room. Refer to "Aptim Federal Services, LLC Incident Notification, Reporting, and Management Procedure" summary in Attachment 3 of the Site Safety and Health Plan (SSHP).			01.D.01	M

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Project vehicle use (continued).	Operation of motor vehicles and trucks-Backing	Back into parking spaces upon arrival, whenever possible. When preparing to move or back vehicles at the project site, walk around the vehicle before backing to identify any new conditions or obstructions. Use a spotter when backing whenever possible, and sound horn prior to backing. Determine and agree upon hand signals (between spotter and driver) before attempting to back vehicle. Check the rear-view and side mirrors prior to backing (Note: All vehicles, other than automobiles, must have small convex mirrors attached to the side mirrors.) Back slowly in areas of obstructed vision. Anticipate others who may be backing out into your pathway and adjust accordingly.	18.C.14 08.B.04 08.B.06	L
	Operation of motor vehicles and trucks - Unfamiliar with the vehicle	Familiarize yourself with the vehicle before moving. Review the dashboard controls, steering radius, overhead, and side clearances. Locate windshield wipers and lights. Properly adjust mirrors and seat.		M
	Operation of motor vehicles and trucks-Speed	Obey all posted speed limits. Radar detectors are prohibited in all company owned, leased, or rented vehicles. Reduce travel speed during hazardous conditions (i.e., rain, fog, snow).	08.B.06 18.C.04 18.C.05	M
	Operation of motor vehicles and trucks-Spacing/Distance	Identify if your vehicle has Anti-Lock Brakes. Follow the 3-second rule. Increase the 3-second rule as necessary during hazardous travel conditions. Always "leave yourself an out" during travel – this applies to stoplights as well. When stopping, make sure that you leave enough distance between you and the car in front of you (you should be able to see the rear tires of the vehicle in front, when stopped). When at a red light, and it turns green, use the "delayed start" technique, by counting to three before you take your foot off the brake. DO NOT TAILGATE! Allow extra spacing and braking time for trucks and vehicles towing trailers. Trailers shall be equipped with brakes		M
	Operation of motor vehicles and trucks-Skids	If the vehicle has begun to skid out of control, turn the steering wheel in the direction of the skid and re-adjust the wheel, as necessary. Slow travel speeds during hazardous travel conditions. Use 4-wheel drive, if available, when driving vehicles off road, on steep inclines, muddy conditions, etc. Do not take vehicles "off road" if they cannot be operated safely.	18.C.05	M

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Project vehicle use (continued).	Operation of motor vehicles and trucks-Blind Spots	Become familiar with any blind spots associated with your vehicle. Adjust mirrors properly. Make sure you use your directional signals. Always look over your shoulder to assure the lane is clear when changing lanes.		M
	Operation of motor vehicles and trucks-Cellular phones	Exercise caution when approaching other driver's blind spots. Do not use handheld cellular phones while driving. Pull over to the side of the road when making a call.	18.C.01	M
	Operation of motor vehicles and trucks-Equipment Failure	Perform daily inspections of your vehicle. Any vehicle with mechanical problems that may endanger the safety of the driver, passengers, or the public shall not be used.	18.A.03 18.A.04	M
	Operation of motor vehicles and trucks-Safety Equipment	Ensure safety equipment is in the vehicle. Safety equipment should include a spare tire, jack, first-aid kit, fire extinguisher, and flashlight. Flares and/or reflective triangles shall be available in larger trucks. Verify that the proper documentation is in the vehicle - documentation includes an operations manual for the vehicle, insurance card, vehicle registration, and APTIM Incident forms.	18.A.03	M
	Operation of motor vehicles and trucks- Influenced by drug and alcohol	Never drive under the influence of drugs or alcohol. Disciplinary action, including termination, will be taken against anyone who is convicted of or who pleads no-contest to the charges of driving under the influence in accordance with AMS. Project-assigned hourly employees are not permitted to operate company owned, leased, or rented vehicles after 10:00 p.m. without written authorization from their supervisor.	01.C.02	M
	Operation of motor vehicles and trucks-Driver Attitude/Fatigue	Do not operate any vehicle when abnormally tired, temporarily disabled, or under the influence of drugs or alcohol. Keep an even temper when driving. Do not let the actions of others affect your attitude. Avoid "highway-hypnosis" and "falling asleep at the wheel." Take plenty of breaks when driving long distances. Rotate driving responsibility with your partner. No employee is authorized to operate a company vehicle (including rentals) after having been on-duty for a period of 12-hours. No employee may drive for more than 10-hours in a single on-duty period.	01.C.04	M
	Operation of motor vehicles and trucks-Vehicle Loading	DO NOT OVERLOAD the vehicle. Secure all equipment within the body of the vehicle. Do not block side view mirrors with load. Do not transport Department of Transportation manifested hazardous materials without a commercial driver's license. Dispatch all equipment and personnel with proper forms and identification.	18.C.13 18.C.16	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel Name(s)	Inspection Requirements
Personal Protective Equipment – N/A: Equipment: Seatbelt Spare tire and jack First aid kit Fire extinguisher Flashlight Operations manual for the vehicle Insurance card Vehicle registration Accident report forms	Training Requirements: Site safety orientation Licensed vehicle operators Defensive driving (all APTIM personnel)	Daily site safety inspection (SSHO/UXOSO) –William Morton Vehicle inspections (daily) Vehicle inspections (prior to trips greater than 50 miles for APTIM provided vehicles)