

Activity Hazard Analysis (AHA)

Activity/Work Task: Fueling 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	<div style="background-color: red; color: white; padding: 2px;">E = Extremely High Risk</div> <div style="background-color: orange; color: black; padding: 2px;">H = High Risk</div> <div style="background-color: yellow; color: black; padding: 2px;">M = Moderate Risk</div> <div style="background-color: green; color: black; padding: 2px;">L = Low Risk</div>
	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	Controls	EM 385-1-1	RAC
Fueling operations.	Exposures to fuels.	Personnel shall periodically review the Safety Data Sheets (SDS) for the fuels that are being used at the project. The handling and use of fuels shall be performed in well-ventilated areas – preferably outside of buildings. Personnel shall avoid skin and eye contact with fuels. Safety glasses and disposable nitrile gloves shall be worn while handling fuels. If personnel sustain skin contact with fuels, then the affected area shall be immediately washed with soap and water. If fuel contact with clothing is made, then clothing shall be removed and changed immediately.	06.B.01 09.B.07 05.B.01 09.B.05	L
	Fire: extinguisher requirements.	10 pound A:B:C fire extinguisher shall be <u>readily</u> available when fueling equipment at any location on site. Trucks with flammable/combustible fuels must be equipped with 20 pound A:B:C fire extinguisher. Personnel who intend to extinguish small fires shall be trained annually in the use of fire extinguishers. Equipment and property are of secondary concern in a fire situation - personnel shall never try to extinguish a fire if there is any doubt that it can be extinguished safely.	09.E.03 09.B.03	L

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Fueling operations (continued).	Fire: elimination of ignition sources – hot surfaces.	All vehicles and equipment shall be shut down prior to fueling. Small equipment, such as generators, mowers, pressure washers, etc. shall be allowed to cool prior to re-fueling. Heavy equipment with the fuel cap near the engine or near other hot surfaces shall also be allowed to cool prior to re-fueling.	09.B.21	M
	Fire: elimination of ignition sources – arcs/sparks/open flames.	Smoking shall not be allowed within 50 feet of fueling operations. Personnel shall visually survey the immediate area for open flames and other ignition sources prior to commencing fueling operations. Personnel are prohibited from using cell-phones or two-way radios during all fueling operations.	09.B.02	L
	Fire: elimination of ignition sources – static electricity.	Personnel shall never fill portable fuel cans that are in the bed of a pickup truck or in the trunk of an automobile. Filling fuel containers on plastic pickup truck bed-liners can cause static electric discharges, which may ignite the fuel. The fuel can(s) shall be removed from the truck bed or automobile trunk and placed on the ground before adding fuel. Electrical continuity shall be maintained between the portable fuel can and the tank being filled. A bonding cable shall be used to maintain continuity between the metal fuel container and the equipment fuel tank. Allowing free-fall of fuel into the tank is prohibited. Personnel shall not re-enter vehicles while fueling is underway due to the static electric charge generated between clothing and vehicle seats. If you absolutely have to get in your vehicle while the gas is pumping, make sure you get out, close the door touching the metal, before you pull the nozzle out. This way the static from your body will be discharged before you remove the nozzle.	09.B.21	L
	Storage and transportation: five-gallon cans in pick-up trucks.	Gasoline shall be stored and transported in properly marked/labeled five-gallon, or smaller-size safety cans (equipped with self-venting cap and flash arrestor). Gasoline cans shall be secured to prevent movement during transportation. No more than six - five gallon containers of gasoline may be transported in vehicles (back of pick-up trucks or trailers) at the same time unless all the Department of Transportation (DOT) Hazardous Material Regulations are complied with, such as proper packaging, completing shipping papers, placarding (as required), and the appropriate HM 126 Training (as well as having been provided emergency response information and training.) The total quantity of hazardous materials may never exceed 440 pounds total. Hazardous materials must be secured prior to transporting.	09.B.08 09.B.11	L
	Communication of hazards.	Drivers must be notified that they are transporting hazardous materials. Drivers shall review SDS for the fuels transported in their vehicle.	01.B.01	L

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Fueling operations (continued).	Storage of fuels on-site.	Portable safety gasoline cans must be stored within a flammable materials storage area, have appropriate warning signs, be posted as “No Smoking’, and have a fire extinguisher available in the area.	09.B.02 09.B.18	M
	Spills.	All spills shall be immediately cleaned-up. Spill control equipment shall be readily available. All spills shall be reported to the Site supervisor (SS) and Site Safety and Health Officer (SSHO).	09.B.19	M
	Storage and transportation: safety containers and saddle tanks in pick-up trucks.	Gasoline shall not be transported in portable saddle tanks – only diesel fuel shall be transported in saddle tanks. All portable saddle tanks mounted in pick-up trucks shall be manufactured to meet DOT specifications. Portable saddle tanks shall be securely mounted to the pick-up truck, as recommended by the manufacturer. Saddle tanks shall be properly marked (see 49 Code of Federal Regulation 172.101) with the proper shipping name and labeled for “No Smoking.” No more than 110 gallons of diesel fuel may be transported in a saddle tank unless all the DOT Hazardous Material Regulations are complied with, such as proper packaging, completing shipping papers, placarding, and the appropriate HM 126 Training (as well as having been provided emergency response information and training.)	09.B.08	L
	Bulk storage of diesel fuel on-site.	Caps on saddle tanks shall be securely closed. Saddle tanks shall be inspected weekly to check for leaks. Bulk storage tanks shall not be permitted on site without express permission from the Contractor’s Project Manager and Health and Safety Manager. Containment measures shall be implemented.		M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<p>Personal Protective Equipment - Level D: Hard Hat Safety Glasses Safety-Toed Boots Disposable nitrile gloves ANSI Class 2 reflective warning vests</p> <p>Equipment: Fire Extinguishers Saddle tanks Bonding cable Five-gallon safety cans (equipped with self-venting cap and flash arrestor) Basic spill kit (55-gallon open top drum, shovels, plastic sheeting, sorbent pads and granular material)</p>	<p>Training Requirements:</p> <p>Bonding techniques Materials of Trade Hazard communication - Review Material Safety Data Sheet for fuels Portable fire extinguisher use Lifting/back safety</p>	<p>Daily site safety inspection (SSHO/UXOSO) – William Morton</p> <p>Survey area for ignition sources (prior to commencing fueling operations) Verify SDSs for fuels are available in vehicles transporting fuels Saddle tanks (daily) Verify eye wash bottle is readily available Fire extinguisher (before fueling equipment)</p>

Activity Hazard Analysis (AHA)

Activity/Work Task: Site Surveys, Utility Clearance and Markings	Overall Risk Assessment Code (RAC)	L				
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: (activity description) This AHA serves as the hazard assessment. A licensed subcontractor will conduct a utility survey to locate subsurface drilling hazards using multiple geophysical methods, including electromagnetic induction and ground penetrating radar. Utility lines found in the immediate vicinity of the proposed limits of intrusive activity will be marked using color-coded surveyor paint.	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	RAC
Walking the Site Lifting Equipment and Materials	Slips, trips, and falls	<ul style="list-style-type: none"> Inspect work areas for washes, potholes, or other surface irregularities that could cause slips, trips or falls. Always establish good footing. Maintain good housekeeping. Keep walkways clear of debris and tools. 	L
	Muscle strains	<ul style="list-style-type: none"> Observe 50 pound individual lifting limit. Do not lift and twist. Get help for loads greater than 50 pounds. Train workers in safe lifting techniques. 	L
Mobile Equipment	Striking workers or equipment	<ul style="list-style-type: none"> Use spotters when backing. Inspect area for overhead and underground hazards. Know the safest route to and from your work area. Use flags, traffic cones to control traffic. 	L

Job Steps	Hazards	Controls	RAC
Changed or Unanticipated Conditions	Safety or health hazards that may be derived from changed or unanticipated conditions	<ul style="list-style-type: none"> Modify the AHA as often as necessary to address new or unanticipated hazards. Use "Job Safety Analysis" form to facilitate field documentation. 	NA
Equipment to be Used		Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<ul style="list-style-type: none"> Level D personal protection: safety boots, Safety eyewear, long pants protection, abrasion resistant gloves 		<ul style="list-style-type: none"> Tailgate safety meeting Worker must be trained in the safe application of task specific tools and materials William Morton – CP/SSHO/UXOSO 	<ul style="list-style-type: none"> Inspect all equipment at least daily Utility clearance checklist Inspect non-construction equipment and power tools per manufacturer requirements.

Activity Hazard Analysis (AHA)

Activity/Work Task: Vegetation Clearance	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: 06/01/20, Revised 012821		Frequent Likely Occasional Seldom Unlikely
Prepared by (Name/Title): Doug Russell/HSE Manager	Catastrophic	E E H H M
Reviewed by (Name/Title): Brian Rhodes	Critical	E H H M L
	Marginal	H M M 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
Arrival of new personnel at site.	Unfamiliarity with: site, general site hazards, project safety rules, chain of command, and emergency procedures.	All personnel shall attend the site orientation training.	01.B.03 01.E.01 28	L
Vegetation removal.	Poor planning.	Complete Job Safety Analysis for each task, as specified in "Job Safety Analysis (JSA)." Use Hazard Assessment Resolution Program frequently – for each task to be completed.		L
	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
	Struck-by/Against.	Wear reflective warning vests when exposed to vehicular traffic. Personnel working on or near roads and only remain on road long enough to complete work. Personnel walking along roadway shall stay off roadway as far as possible and walk on the side facing traffic.	05.F	M
	Intrusive activities.	Follow procedure for intrusive activities prior to commencing clearing and grubbing activities. Follow MEC avoidance techniques in accordance with EM 385-1-97 during all vegetation removal.	25.A.01	M
	Slips, trips, and falls.	Keep work areas clear and maintain housekeeping. Personnel shall not jump from elevated surfaces. Personnel shall use caution when walking on rocky, slippery, or uneven terrain.	14.C.01-10	M

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Vegetation removal (continued).	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
	Use of heavy equipment.	Only qualified personnel shall be permitted to operate equipment. Heavy equipment shall be inspected daily after the initial U.S. Army Corps of Engineers inspection (and documented). Do not use unsafe equipment. All equipment shall have backing alarms. All equipment shall be operated at safe speeds and in a safe manner. Equipment operators shall wear safety belts. Personnel are only permitted to approach equipment after a signal from the operator. Ground personnel, working near heavy equipment, shall wear high visibility conspicuity vests. Ground personnel shall not enter the swing radius of equipment. Ground personnel shall not position themselves between equipment and stationary objects. Personnel shall verify all mechanical guards are in place and functioning properly. Moving equipment shall be equipped with a back-up alarm. All equipment shall be shut down with energies dissipated prior to performing maintenance activities - lock out/tag out procedures may apply. Only qualified mechanics shall work on or repair heavy equipment. Heavy equipment shall be equipped with Falling Object Protective Structure.	18.A 18.G 18.B 05.F 18.B.12	L
	Injury from chain saws, wood/falling trees, chips, cuts, and noise.	Chain saw operators shall wear a specially designed helmet system (consisting of head, face, and hearing protection). Use gloves and chaps at all times when using saw. Operators shall wear chain saw protective boots with steel toes. Secure loose fitting clothing with duct tape. Keep other personnel at least two tree lengths away from tree being felled. Operators shall have escape routes planned that are at 45 degrees from the projected direction of the falling tree. Keep escape routes clear of all tools, materials, and wood/brush. Always cut away from the body. Shut off chain saws when walking between work areas. Have spotter assist when falling large or tall trees. Only cut trees, logs, or branches from ground height. Shut off engines before freeing pinched chains. Chain saw operators shall always hold the saw with both hands during cutting operations. Inspect chain saw before each use. Do not use saws in which any safety feature is not functioning. Frequently check and adjust tension on chain. Do not use saws with or dull cutters. Do not increase force used as cutters become dull. The idle speed shall be properly adjusted to prevent the chain from moving when the engine is idling. Keep bar groove clean. Use only new chains or professionally sharpened chains. Replace sprockets, which show signs of wear. Remain alert to kickback hazards and keep a firm, proper grip on chain saw at all times. All chain saws shall be equipped with automatic chain brake and other anti-kickback devices. Use wedges to prevent binding of the chain. Do not cut with the tip (nose) of the bar. Do not use dull chains. Do not overreach with chain saw. Personnel shall not operate chain saws above shoulder height. Personnel shall be familiar with cutting techniques.	13.F 13.A 31.C	L

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Vegetation removal (continued).	Tree pruning, falling, and brush removal/chipping.	Machete use is prohibited. Personnel operating weed whackers shall wear hearing protection and eye/face protection. Steel blade use on weed whackers is prohibited. The procedures outlined in <i>Safety and Health Requirements Manual</i> , Sections 31.C, 31.D and 31.E shall be conveyed to all personnel involved in the operations. Remain clear of feed and discharge chutes on chippers.	31.C 31.D 31.E	L
	Fatigue.	Chainsaw and equipment operators shall be given ample rest breaks.		L
	Insect bites/West Nile Virus.	Wear personal protective equipment (PPE) and tape joints to keep insects away from the skin. Use protective insect repellents containing N,N-Diethyl-m-toluamide, such as, 3M Ultrathon or equivalent and clothing insecticide preparations containing permethrins (Repel Permanone or equivalent) to prevent insect bites. Check limbs/body for insects/insect bites before showering. Notify Site Safety and Health Officer (SSHO) of flu-like symptoms.	06.D.01	L
	Contact dermatitis and poison ivy.	Check around work areas to identify if poison ivy is present. Wear long-sleeve shirts/trousers or Tyvek® coveralls to avoid skin contact with plants or other skin irritants. Learn to identify poisonous plants. Avoid unnecessary clearing of plant/vegetation areas. Cover vegetation with plastic (visqueen) where sampling position raises exposure potential. Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions. Identify workers who are known to contract poison ivy.	06.D.03	L
	Severe weather.	The SSHO will monitor weather conditions each day in order to plan and prepare for hazardous conditions and will use lightning and severe weather detection devices to evaluate potential weather threats. Work activities will be suspended prior to weather conditions becoming hazardous so that workers have ample time to seek shelter. When lightning is observed within a 10 mile radius or upon hearing thunder, outdoor activities shall be suspended and personnel shall be evacuated to safe areas (inside vehicles, buildings, or tornado shelters as appropriate). A waiting period of at least 30 minutes from the last nearby lightning strike will be observed before resuming activities. Follow procedures outlined in Section 2.5 of the SSHP.	06.I	L
	Hazardous atmospheres.	Personnel shall immediately notify the SSHO if odors are detected.		L
	Heat stress and cold stress.	Follow procedures outlined in the SSHP.	06.I	L
	Dust.	Dust shall be monitored and controlled. PPE use is required when working in contaminated areas.	28	L

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Vegetation removal (continued).	Fire.	Smoking shall be permitted in designated areas. Vehicles shall not be parked in tall dry grass. Engines shall be shut off before refueling. A 10 pound A:B:C fire extinguisher shall be available on heavy equipment Gasoline shall be stored in safety cans with flash arrestors and spring-loaded vents.	09.E.01 09.A.06 09.B.08	L
	Controlled burns	RSA Fire Department will plan controlled burns and manage their activities in relation to a Wildfire Control Plan.	09.K	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel Name(s)	Inspection Requirements
Personal Protective Equipment - Level D - Modified: Hard Hat Safety Glasses Safety-Toed Boots Work Gloves ANSI Class 2 reflective warning vests Disposable coveralls and protective gloves (when contact with irritating plants possible) Helmet systems for chain saw use Protective chaps for chain saw use Hearing protection Equipment: Geophysics Instruments Excavator or Bush Hog Equipped Skid Steer Fire Extinguishers Emergency Eyewash First Aid Kit Deep-Woods Off or Ultrathon Repel Permanone Drinking water Weather radio or AM/FM radio Chain saws Extra chains Plastic or wood wedges	Competent Person: William Morton Training Requirements: Site safety orientation UXO Technicians must be qualified IAW DDESB TP 18 Applicable AHAs HAZWOPER 40-Hour MEC Awareness Qualified equipment operators Lifting/back safety Fire extinguisher use Biological hazard identification and control Emergency procedures Tornado shelter locations National Lightning Safety Institute Lightning Safety Procedures	Daily site safety inspection (SSHO/UXOSO) – William Morton Check Known Allergies Questionnaire Housekeeping (daily) Fire extinguisher (monthly) Vehicle inspection daily Overhead and underground utilities Mechanized equipment (daily) Equipment and tools inspection daily and before use Survey areas for poisonous plants, insects, and animals Check body for ticks Monitor approaching storms

Activity Hazard Analysis (AHA)

Activity/Work Task: Intrusive Investigation	Overall Risk Assessment Code (RAC) (Use highest code)	L	
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: 6-2-21		Frequent Likely Occasional Seldom Unlikely	
Prepared by (Name/Title): Winston D Russell/HSE Manager	Catastrophic	E E H H M	
Reviewed by (Name/Title):	Critical	E H H M L	
	Marginal	H M M L L	
	Negligible	M L L L L	
Notes: (Field Notes, Review Comments, etc.)	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	RAC
Arrival of new personnel at site.	Unfamiliarity with: site, general site hazards, project safety rules, chain of command, and emergency procedures.	All personnel shall attend the site orientation training.	L
Intrusive Investigation	Poor planning.	Complete JSA for each task, as specified in AMS 710-05-FM-01708, Sample Job Safety Analysis Worksheet “Job Safety Analysis (JSA).” Use Hazard Assessment Resolution Program frequently – for each task to be completed.	L
	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.	L
	Struck-by/Against.	Wear reflective warning vests when exposed to vehicular traffic. Personnel working on or near roads and only remain on road long enough to complete work. Personnel walking along roadway shall stay off roadway as far as possible and walk on the side facing traffic.	L
	Earth moving machinery	Only qualified personnel operate heavy equipment. Daily equipment inspections for safety equipment i.e., alarms, fire extinguisher, seat belt, ROPS, windows, mirrors, etc. Keep out of swing radius. Only approach equipment after making eye contact with operator, signaled to do so and machine placed in safe position.	L

Job Steps	Hazards	Controls	RAC
Intrusive Investigation (continued).	Munitions and Explosives of Concern (MEC) / Unexploded Ordnance (UXO) contact.	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 and applicable SOPs. Excavate to the side of anomalies. Only use hand tools to expose anomaly. Follow all applicable SOPs and EM 385 1-97.	L
	Blast overpressure fragmentation blast.	The UXO Safety Officer (UXOSO) is responsible for maintaining the minimum safe distance arcs indicated in the Work Plan for the fragmentation data sheet of the Munition with the Greatest Fragmentation Distance (MGFD) for the Munitions Response Site.	L
	Slips, trips, and falls.	Keep work areas clear and maintain housekeeping. Personnel shall not jump from elevated surfaces. Personnel shall use caution when walking on rocky, slippery, wooded or uneven terrain.	L
	Accidental detonation of MEC.	Observe the requirements of Explosives Safety and Health Manual EM 385-1-97. Only UXO technicians will excavate or handle MEC. Personnel in the immediate vicinity of MEC operations will be kept to the minimum necessary for safe operations but no less than two UXO technicians. Do not subject MEC to heat, shock, or friction. Only hand excavation permitted when within one feet of MEC. Use magnetometers frequently to pinpoint the location of MEC.	L
	Non-UXO personnel.	Establish minimum separation distance (MSD) and Public Access Exclusion Distance (PAED) based on the Hazardous Fragmentation Distance of the MGFD and maintain site control. Stop all MEC operations when non-UXO personnel are within the MSD/PAED arc.	L
	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.	L
	Insect bites/West Nile Virus.	Wear personal protective equipment and tape joints to keep insects away from the skin. Use protective insect repellents containing N,N-Diethyl-m-toluamide, such as, 3M Ultrathon or equivalent and clothing insecticide preparations containing permethrins (Repel Permanone or equivalent) to prevent insect bites. Check limbs/body for insects/insect bites before showering. Notify Site Safety and Health Officer (SSHO) of flu-like symptoms.	L
	Contact dermatitis and poison ivy.	Check around work areas to identify if poison ivy is present. Wear long-sleeve shirts/trousers or Tyvek® coveralls when necessary to avoid skin contact with plants or other skin irritants. Learn to identify poisonous plants. Avoid unnecessary clearing of plant/vegetation areas. Cover vegetation with plastic (visqueen) where body position raises exposure potential. Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions. Identify workers who are known to contract poison ivy.	L

Job Steps	Hazards	Controls	RAC
Intrusive Investigation (continued).	Severe weather.	The SSHO will monitor weather conditions each day in order to plan and prepare for hazardous conditions. Work activities will be suspended prior to weather conditions becoming hazardous so that workers have ample time to seek shelter. Upon seeing lightning or hearing thunder, outdoor activities shall be suspended and personnel shall be evacuated to safe areas (inside vehicles, buildings, or tornado shelters as appropriate). Follow procedures outlined in the APP.	L
	Adjacent Test Areas	Coordinate with TA-3 and TA-6 Test Areas for site entry since RSA-312-R-01 is a buffer zone.	L
	Heat stress and cold stress.	Follow procedures outlined in the APP/ Site Safety and Health Plan.	L
	Fire.	Smoking shall be permitted in designated areas. Vehicles shall not be parked in tall dry grass. Engines shall be shut off before refueling. A 10 pound A:B:C fire extinguisher shall be available when refueling.	L
	Contact with chemical agent or other hazardous chemicals	CWM probability is "Unlikely" for the site. In event suspect CWM or hazardous chemicals are encountered, stop, work, move to up wind location and notify SSHO, RSA Garrison Safety, PM, HSEM and USACE. Follow standard 3Rs for MEC.	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: Magnetometers Geophysics Instruments Backhoe or mini excavator Fire Extinguishers Emergency Eyewash First Aid Kit Communication devices Deep-Woods Off or Ultrathon Repel Permanone Drinking water Weather radio or weather APP	Training Requirements: Site safety orientation UXO Technicians must be qualified IAW DDESB TP 18 HAZWOPER 40-Hour MEC Awareness 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 (SSHO/UXOSO) – William Morton Instrument function checks in accordance with SOPs 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 Verify tornado shelter available Monitor approaching storms

Activity Hazard Analysis (AHA)

Activity/Work Task: Excavation & Backfill	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/Project Number: W912DY-17-D-0003	Severity	Probability
Date Prepared: 06/25/20, Revised 9/17/21		Frequent Likely Occasional Seldom Unlikely
Prepared by (Name/Title): Ray Clark, Engineer Scientist	Catastrophic	E E H H M
	Critical	E H H M L
Reviewed by: Doug Russell/HSE Manager	Marginal	H M M L L
	Negligible	M L L L L
Notes: (Field Notes, Review Comments, etc.) This AHA serves as certification of 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
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		M = Moderate Risk
		L = Low Risk

Job Steps	Hazards	Controls	RAC
Verify overhead and underground utilities locations. Set up equipment for operation. Inspect equipment for use. Inspect work area where equipment is to be used. Isolate work area, as appropriate. Move equipment to work area.	Newly hired personnel and visitors. 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 a site safety orientation. After personnel are trained in the contents of the Installation-Wide RSA Accident Prevention Plan (APP) and the Site Safety and Health Plan (SSHP), they shall sign the APP Acknowledgment Form and the SSHP Acknowledgment Form. Review emergency procedures and evacuation plans.	M
	Unqualified operator(s).	Verify operator is qualified and authorized for the equipment being used. Only personnel authorized by employer shall operate equipment.	M
	Failure to properly plan daily activities.	A Job Safety Analysis (JSA) shall be prepared by the crew prior to commencing daily activities. The JSA shall 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 Process and Safety Step Back. Personnel to conduct focused and leading indicator "Target" observations.	M

Job Steps	Hazards	Controls	RAC
Excavation and backfill.	Complacency.	All personnel shall attend the morning safety meetings to re-focus themselves to hazards, emergency procedures and equipment, operational aspects, and change(s) in site/work conditions. Recommended control measures for the hazards shall be part of the discussion.	M
	Fire.	<p>Fire extinguishers shall be available in work areas. A 4-A:60-B:C fire extinguisher shall be available when refueling at the project site. Excavators shall be equipped with a 10-B:C fire extinguisher. Site personnel shall complete annual fire extinguisher training.</p> <p>The SSHO shall establish smoking areas. Smoke only in designated areas. Only discard cigarette butts in proper receptacles – never discard cigarette butts onto the ground. Smoking shall not be permitted within 50 feet of fueling operations.</p> <p>Use caution with vehicle exhaust systems in grassy areas. Do not run vehicles or equipment while parked in dry, grassy areas.</p> <p>Engines shall be shut off and allowed to cool before refueling. Follow AHA for “Fueling Operations.”</p>	M
	Unsafe equipment.	<p>Before excavating equipment is placed in use at the project, it shall be inspected and tested in accordance with the manufacturer’s recommendations and shall be certified in writing by a competent person to meet the manufacturer’s recommendations. Subsequent re-inspections will be conducted at least annually thereafter. These inspections shall be documented on a Checklist for Construction Equipment. All safety deficiencies noted during the inspection shall be corrected prior to the equipment being placed in service at the project.</p> <p>All excavating equipment shall be inspected by the operator prior to use on the project and shall then be inspected on a daily basis. Deficiencies in equipment shall be noted on the inspection form. Do not use equipment that is not in proper operating condition. Attach a “Danger – Do Not Use” tag to inoperable equipment, remove key from equipment, and give key to the supervisor when notifying him/her of the inoperable equipment..</p> <p>Verify all manufacturers' safety guards, features, controls, back-up alarms, horns, and equipment are functioning properly and as intended by the manufacturer.</p> <p>Install and maintain equipment attachments and their operating systems according to manufacturer's specifications.</p> <p>Make frequent visual inspections of quick-disconnect systems (systems for connecting attachments to excavators) especially after changing attachments.</p> <p>Verify controls are properly labels as to equipment function.</p>	M

Job Steps	Hazards	Controls	RAC														
Placing and moving equipment. Excavation and backfill.	Overhead/aboveground hazards and utilities.	<p>Follow AMS-710-02-PR-01610, Utility Contact Prevention.</p> <p>Overhead and aboveground hazards shall be evaluated prior to moving equipment on the project site. Complete a Site Layout Plan prior to mobilizing the equipment. The plan shall identify all overhead and aboveground hazards in the active work area(s) and travel routes - include utilities, pipe racks, structures, restricted areas, pedestrian routes, and equipment/vehicle traffic.</p> <p>Power lines shall be assumed to be energized unless verified to be de-energized and visibly grounded. Operation beneath a power line that has not been verified as de-energized and grounded must maintain clearance distances stated below.</p> <table border="0"> <thead> <tr> <th><u>Nominal System Voltage</u></th> <th><u>Minimum Required Clearance Distance</u></th> </tr> </thead> <tbody> <tr> <td>Up to 50 kV</td> <td>10 feet (3 m)</td> </tr> <tr> <td>Over 50 - 200 kV</td> <td>15 feet (4.6 m)</td> </tr> <tr> <td>Over 200 - 350 kV</td> <td>20 feet (6 m)</td> </tr> <tr> <td>Over 350 - 500 kV</td> <td>25 feet (7.6 m)</td> </tr> <tr> <td>Over 500 – 750 kV</td> <td>35 feet (10.7 m)</td> </tr> <tr> <td>Over 750 – 1,000 kV</td> <td>45 feet (13.7 m)</td> </tr> </tbody> </table> <p>For over 1,000 kV, the minimum required clearance distance will be established by the utility owner/operator or professional engineer who is a qualified person with respect to electrical power transmission and distribution.</p> <p>Identify and provide temporary visual barriers that help prevent encroachment with the lines. In areas where it is not feasible to use barricades, spotters shall be provided; however, the minimum clearance distances from electrical lines must be observed.</p> <p>Each work crew member shall be trained in the electrocution hazards and emergency procedures associated with contacting energized power lines.</p> <p>Post overhead hazard warning signs as necessary.</p>	<u>Nominal System Voltage</u>	<u>Minimum Required Clearance Distance</u>	Up to 50 kV	10 feet (3 m)	Over 50 - 200 kV	15 feet (4.6 m)	Over 200 - 350 kV	20 feet (6 m)	Over 350 - 500 kV	25 feet (7.6 m)	Over 500 – 750 kV	35 feet (10.7 m)	Over 750 – 1,000 kV	45 feet (13.7 m)	M
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Job Steps	Hazards	Controls	RAC
Placing and moving equipment. Excavation and backfill.	Underground utilities and other underground hazards.	<p>Follow AMS-710-02-PR-01610, Utility Contact Prevention. Follow any additional procedures for intrusive activities identified in APP and Work Plan prior to commencing intrusive activities.</p> <p>Utilities shall be located and marked prior to commencing intrusive activities. Contact utility one-call service (811) at least 48 hour but not more than 10 days prior to commencing intrusive activities, excluding weekends or any state or federal holidays. Retain a copy of mark-out ticket for documentation purposes and QC purposes. Documentation of utility mark-out must be completed using the Utility Mark-out Documentation form (EIG-HS-308.03).</p> <p>Evaluate the work areas, ground conditions, and travel paths to identify any sensitive underground structures, unstable areas, dangerous slopes, and existing open excavations.</p> <p>Complete a Site Layout Plan prior to mobilizing the equipment. The plan shall identify all underground utilities and other underground hazards in the active work areas and travel routes.</p> <p>Cease work immediately if unknown utilities or utility markers are uncovered.</p> <p>Use manual excavation within 3 feet of known utilities. 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.</p> <p>Each work crew member shall be trained in electrocution hazards, explosion/fire hazards, and emergency procedures associated with contacting energized power lines and pipelines.</p> <p>Immediately contact Public Works Department in event utilities are encountered that were not previously marked. Notify Public Works in event any damage to utilities occur.</p>	M
	Hand injuries.	<p>Personnel shall wear appropriate leather, heavy cotton or synthetic gloves when handling materials with sharp edges, splinters, burrs, rough surfaces, etc.</p> <p>Items to be handled shall be inspected for sharp edges, splinters, burrs, rough surfaces, etc. prior to being handled.</p> <p>Personnel shall be aware of and avoid pinch point hazards.</p>	M
	Noise.	<p>All personnel shall wear hearing protection when operating noisy equipment.</p> <p>Personnel working in vicinity of noisy equipment shall wear hearing protection.</p> <p>Verify personnel noise exposures are safe by performing noise dosimetry.</p>	L

Job Steps	Hazards	Controls	RAC
Excavation and backfill.	Use of excavators and backhoes.	<p>Only qualified personnel shall be permitted to operate equipment.</p> <p>It is the responsibility of the operator to read and understand the manufacturer's operator manual, the manufacturer's recommendations for each type and model of equipment to be operated, and the requirements of AMS-710-02-PR-05700 prior to operating equipment. Operators must know the capacity and operating characteristics of the equipment to be operated.</p> <p>When mounting or dismounting equipment, clean shoes and hands before climbing. Always use handrails, grab rails, and steps. Maintain a three-point contact/control with steps and handholds. Never jump on or off equipment. Never attempt to mount or dismount a moving machine. Do not use steering wheel or control levers as a handhold. Lower the boom (and loader when equipped) to a safe position with the bucket/attachment on the ground and turn off the excavator before dismounting equipment.</p> <p>The equipment must be attended at all times or attachments must be placed in the "transport lock position" or lowered to the ground.</p> <p>The operator is responsible for keeping the windows clear and keeping cab clean at all times.</p> <p>Equipment operators must wear seat belt at all times and keep body (hands, arms, legs, head, etc.) inside the protected area of the cab. Operations are to be performed only from the operators control station.</p> <p>All equipment shall be operated at safe speeds and in a safe manner.</p> <p>If equipped with such, use the machine stabilizers.</p> <p>Loads must be carried as low as possible to maintain stability of the equipment and operator visibility.</p> <p>Do not operate equipment on grades steeper than those specified by the manufacturer. When operating on a sloped area, always move up or down the slope and not across the slope. Avoid making turns on inclines. If it is necessary, make turns wide and slowly with load carried low. When traveling up or down inclines, do so with loaded buckets facing uphill and empty buckets facing downhill.</p> <p>The operator of equipment shall not use cellular telephone devices or head/earphones for entertainment purposes while operating equipment. The use of cell phones and other communication devices are permitted for job-related communications or emergency situations, when the equipment is not operating.</p>	M

Job Steps	Hazards	Controls	RAC
Excavation and backfill.	Use of excavators and backhoes (continued).	<p>The operator shall not use attachments for which they were not designed to be used for, e.g., using a bucket to transport telephone poles.</p> <p>Follow the manufacturer's instructions for using positive locks on quick-disconnect equipment.</p> <p>Securely latch attachments such as quick-disconnect buckets before beginning work.</p> <p>Make frequent visual inspections of quick-disconnect systems — especially after changing attachments.</p> <p>The operator is to stay alert and focused at all times when the excavator or backhoe is in operation.</p>	M
	Excavation and trenching.	All excavation and trenching activities will be conducted in accordance with AMS-710-02-PR-01600 <i>Excavation and Trenching</i> and EM-385-1-1 Section 25 Excavation and Trenching as applicable. Excavation from stable ground. Slope side walls if spalling is observed. Keep all personnel, equipment and spoils at least 3 feet from excavation. No one is permitted to enter excavation except those in cabs of heavy equipment.	M
	Struck by and against	<p>Wear PPE with high visibility vests when walking or working near moving equipment or vehicles.</p> <p>Prevent unauthorized workers or bystanders from entering work areas with equipment operations.</p> <p>Verify "DANGER – STAY CLEAR" (or equivalent) warning sign(s) is visibly posted on the equipment.</p> <p>Personnel shall maintain a safe distance from operations. Keep alert for movement of equipment, loads, excavations, piles, and ejected matter.</p> <p>Personnel shall not be permitted in the swing radius of the equipment. Precautions must be implemented to keep personnel out of excavations and at least 10 ft. (3 m) away from the equipment and its maximum boom and/or counterweight swing radius when operating. Accessible areas within the swing radius of the equipment are to be barricaded to prevent personnel from being struck or crushed, as appropriate.</p>	M

Job Steps	Hazards	Controls	RAC
Excavation and backfill.		<p>Do not approach an excavator or backhoe without first establishing communication with the operator or spotter (eye contact and then a signal to proceed after the equipment has been shut down:</p> <ul style="list-style-type: none"> • Excavator bucket planted, powered down, and controls locked. • Backhoe bucket planted, engine shut off. <p>Don't allow anyone to stand under a suspended load or the boom, arm, or bucket.</p> <p>Operator to stop operations if personnel are observed within the swing radius.</p>	RAC
	Spotter operations.	<p>Use designated spotters as necessary and as determined by the operator or supervisor.</p> <p>Establish communication before starting work – hand signals, whistles, radios, air horn, audible alarm, or other means of effective jobsite communication.</p> <p>When a designated spotter is used, the equipment shall not be moved unless the designated spotter giving signals is in full view of the operator. The spotter must maintain line of site or communication with the equipment operator.</p> <p>For movement of mobile equipment in congested areas, a designated spotter shall be in full view of the operator and shall direct the movement. In some cases, multiple spotters may be required.</p>	M
	Sampling from bucket.	<p>Position the sampling support and collection area on the cab side of the excavator to minimize operator blind spots created by the excavator boom assembly.</p> <p>Verify the operator is aware of your intention to collect samples from the bucket.</p> <p>Prior to sampling, the equipment operator shall fully lower the bucket to the ground, set the safety lockout lever to isolate joystick controls, decelerate the engine to idle level and signal the sample technician it is safe to approach the bucket. For backhoes, the bucket shall be planted on the ground and the engine shut down prior to approaching the bucket to obtain a sample.</p> <p>Keep out from between the excavator bucket and fixed objects, vehicles, or equipment when sampling.</p> <p>The operator should swing the machine to where the boom is at least at a 45-degree angle away from the excavation.</p>	M
	Excavation hazards.	Follow the project Excavation/Trenching Plan contained in the CMIP.	M

Job Steps	Hazards	Controls	RAC
Excavation and backfill.	Dust or potential airborne chemical hazards	Control dust by maintaining equipment operation rates. Control dust by applying water when action level 2.5 mg/m ³ is exceeded. Personnel shall stay out of dust and work from upwind when possible. Perform dust monitoring as specified in the SSHP. Real-time air monitoring will be executed in accordance with SSHP requirements to mitigate potential worker exposure.	M
Use heavy haul units.	Dump truck operations.	Dump trucks shall be inspected and found to be in safe condition prior to being placed in service at the site. Overhead hazards shall be re-evaluated prior to allowing dump trucks onto the project site. Areas with overhead hazards shall be barricaded with caution tape to prevent dump bed from contacting. In areas where it is not feasible to used barricades, then spotters shall be provided; however, the minimum distances from electrical lines must be observed. Operators shall wear seat belts while trucks are in motion at the project site. Spotters shall assist trucks when backing as necessary. Trucks shall be equipped with audible backup alarms. Cab shall be equipped with elevated bed indicator. Material shall not be loaded over cab of trucks. Personnel shall stay away from trucks when being loaded. Tires shall be inspected for accumulation of debris and cleaned as needed to avoid tracking on roadways.	L
General site activities.	Slips, trips, and falls.	Understand the hazards of slips, trips, and falls – consider the consequences. Do not jump from equipment or elevated surfaces. Clean-up work areas throughout the day and at the end of each workday. Use three-point contact rule for entering/exiting vehicles, trucks, and equipment. Use hand rails and other stationary objects (door frames, door knobs, steering wheels, walls, etc.) to increase stability. Use extra caution when walking on wet, muddy, frosty, icy, or snow-covered surfaces. Consider postponing work as necessary and feasible. Increase your awareness, keep alert, stay focused, and know your environment. Stay away from slopes, hills, and grades. Be cautious when using stairs. Remove snow and ice when possible (shoveling, chipping, and salt application). Apply traction aids, such as sand, gravels, and straw. Lower your center of gravity when necessary. Slow down - take smaller steps.	M

Job Steps	Hazards	Controls	RAC
General site activities.	Insect bites and stings.	<p>Review injury and illness potential with workers.</p> <p>Inspect work areas for bee nests and activity prior to commencing work in that area.</p> <p>Wear PPE, such as disposable coveralls, to keep insects away from the skin.</p> <p>Expect to encounter insects when working in warm weather – especially at locations with vegetation present.</p> <p>Use protective insect repellents containing DEET (Deep Woods Off or equivalent) to prevent insect bites, unless individual allergies and sensitivities prevent its use.</p> <p>Consider applying Permethrin (Repel® Permanone® or equivalent) preparations to clothing to repel ticks, chiggers, mosquitoes, and/or spiders.</p> <p>Check limbs/body for insects/ insect bites upon removing PPE and again during showering.</p> <p>Immediately notify supervisor or SSHO of insect bites, stings, irritations, rashes, or flu-like symptoms.</p>	L
	Contact dermatitis from poisonous and irritating plants (poison ivy, poison oak, and poison sumac).	<p>Learn to identify poisonous and irritating plants. Check around work areas to identify if poisonous and irritating plants are present.</p> <p>Identify workers who are known especially sensitive to poisonous and irritating plants and plan work accordingly.</p> <p>Wear Tyvek® coveralls to avoid skin contact with irritating plants.</p> <p>Immediately notify the SSHO if you suspect you contacted an irritating plant.</p> <p>Avoid unnecessary clearing of plant/vegetation areas.</p> <p>Remove clothing or Tyvek® coveralls by inside-out method to avoid contact with potentially contaminated outer surfaces.</p> <p>Follow additional procedures outlined in the APP.</p>	L
	Severe weather.	<p>The SSHO to monitor weather conditions each day in order to plan and prepare for hazardous conditions.</p> <p>The SSHO to identify the nearest suitable storm shelter at each work location.</p> <p>Upon seeing lightning or hearing thunder, outdoor activities shall be suspended and personnel shall be evacuated to safe areas (inside vehicles, buildings, or tornado shelters as appropriate).</p>	M

Job Steps	Hazards	Controls	RAC
General site activities.	Heat and Cold stress.	Follow procedures outlined in the SSHP. Use ACGIH guidelines for WBGT TLV values.	M
	Struck by material	Personnel shall never place themselves under suspended/overhead loads. Material shall be loaded over the dump bed and not allowed to pass over operator cab. Haul units shall be equipped with adequate Falling Object Protective Structure. All loads are to be covered when traveling on the road weather on base or off base. NO driver operator shall climb into truck or over 6 feet above ground level with out proper fall protection	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel Name(s)	Inspection Requirements
<u>Personal Protective Equipment</u> Hard hat Safety glasses with side shields Safety-toed boots Work gloves Class 2 high visibility vests Hearing protection, as necessary <u>Other Equipment:</u> Fire Extinguishers Caution tape Excavation perimeter protection First Aid Kit Drinking water Weather radio Insect repellent with DEET (Deep Woods Off™ or equivalent) Repel Permanone™ Communication devices Air monitors per SSHP (aerosol, LEL, CO, O ₂) Water truck Excavator Dump truck Front end loader Forklift	Competent Person (CP) / Qualified Person (QP): CP/SSHO/UXOSO William Morton _____ Alternate CP/SSHO _____ QP/First Aid and _____ QP/First Aid and CPR William Morton _____ Training Requirements (as determined by the SSHO): Site safety orientation Emergency procedures Hearing conservation Applicable AHAs and SDS Lifting/back safety Fire extinguisher use Biological hazard identification and control Storm shelter location Lightning safety procedures Heat stress prevention and heat stroke treatment Cold stress prevention Excavation and trenching Subcontractor Personnel Proof of Training and Competency and Certifications of Employee Medical Surveillance Program Participation to be provided to the COR and SO prior to the commencement of field operations for review and approval.	Daily site safety inspection (SSHO/UXOSO) William Morton Daily site safety inspection (QCO) _____ Initial and daily equipment inspections. Overhead utilities and hazards (prior to operating equipment in area) Locate underground utilities (prior to intrusive activities) Excavation (at least daily) Housekeeping (daily) Fire extinguisher (monthly) 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 storm shelter that is available

Activity Hazard Analysis (AHA)

Activity/Work Task: Groundwater Sampling		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
Reviewed by (Name/Title):		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		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	
Sampling ground water	Failure to properly plan daily activities.	Complete a Job Safety Analysis (JSA) for each task, as specified in AMS-710-05-PR-01700 "Work Area Hazard Assessment Process". Use Hazard Assessment Resolution Program frequently – for each task to be completed.			01.A.09	M	
	Hand injuries.	Items to be handled shall be inspected for sharp edges prior to being handled. Personnel shall wear leather gloves or appropriate ANSI Level 3 or higher cut resistant gloves when handling sharp materials. Personnel shall be aware of and avoid pinch point hazards.			05.A.08	L	
	Noise.	Equipment operators and ground personnel working near heavy equipment or noise areas shall wear hearing protection to reduce exposures to below the Occupational Safety and Health Administration limits.			05.C	L	
	Chemical contamination.	Follow procedures in Site-specific Safety and Health Plan (SSHP). Wear Nitrile disposable gloves, at a minimum. Boot covers and disposable coverall may be necessary. Air monitoring required per SSHP. SDS shall be reviewed by affected personnel.			05.A	L	
	Struck by equipment.	Ground personnel, working near heavy equipment or traffic, shall wear American National Standards Institute Class 2 high-visibility conspicuity vests. Ground personnel shall not enter the working radius of equipment and stay clear of other equipment. Personnel shall make eye contact with operators and acknowledge they are entering the area.			05.F	M	

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Sampling ground water (continued).	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. Do not over-load coolers.	14.A.01	M
	Insect or Arachnid bites/West Nile virus.	Wear PPE and tape joints to keep insects and arachnids away from the skin. Use protective insect repellents containing N,N-diethyl-m-toluamide, such as, 3M Ultrathon or equivalent and clothing insecticide preparations containing permethrins (Repel Permanone or equivalent) to prevent insect/arachnid bites. Check limbs/body for insects/arachnids, or /insect/arachnid bites before showering. Notify Site Safety and Health Officer (SSHO) of rash or flu-like symptoms.	06.D.01	L
	Contact dermatitis and poison ivy.	Check around work areas to identify if poison ivy is present. Wear long-sleeve shirts/trousers or Tyvek® coveralls to avoid skin contact with plants or other skin irritants. Learn to identify poisonous plants. Reference illustrations in APP. Cover vegetation with plastic (visqueen) where sampling position raises exposure potential. Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions. Identify workers who are known to contract poison ivy.	06.D.03	L
	Slips, trips, and falls.	Keep work areas clear and maintain housekeeping. Personnel shall not jump from elevated surfaces. Personnel shall use caution when walking on rocky, slippery, or uneven terrain.	14.C.01-10	M
	Fire.	Fire extinguishers shall be available in work areas and site vehicles. Smoking shall only be allowed in designated areas.	09.E.01	L
	Use of sampling tools.	All sampling tools shall be inspected in accordance with manufacturer's recommendations. Be careful of broken sample containers or glass vials.	13.A.02	L
	Heat stress and cold stress.	Follow procedures outlined in the APP/SSHP.	06.I	M
	Severe weather.	The SSHO will monitor weather conditions each day in order to plan and prepare for hazardous conditions. The SSHO will identify a suitable tornado shelter at each work location. Work activities will be suspended prior to weather conditions becoming hazardous so that workers have ample time to seek shelter. Upon seeing lightning or hearing thunder, outdoor activities shall be suspended and personnel shall be evacuated to safe areas (inside vehicles, buildings, or tornado shelters as appropriate). Follow procedures outlined in the Accident Prevention Plan. Monitor Redstone Arsenal site specific requirements.	06.I	L

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Sampling ground water (continued).	Generator or 12 VDC sampling pump use	<p>A copy of the sampling pump manual shall be available at the job site.</p> <p>Use of heavy duty or extra heavy duty extension cords required. Always connect the negative battery terminal to ground away from the battery. Make next connection to auxiliary positive connection away from battery.</p> <p>Level D PPE minimum required. Note: Hard hats shall be required when an overhead hazard is present (per AMS-710-02-PR-03100 Engine on vehicles shall be off during connections to battery.</p> <p>Route pump controller conductors away from vehicle moving parts and pinch points that could compromise wiring insulation.</p> <p>Portable generators shall be equipped with an UL acceptable GFCI down stream of standard breakers.</p> <p>Inspect all cord or plug devices for compromised insulation or missing conductor circuit parts.</p> <p>Keep generator and cords away from immediate sampling location to avoid noise and trip hazards</p> <p>Generator must be shut down and the engine allowed to cool for at least 15 minutes before re-fueling.</p> <p>Fuel must be stored in approved Type 1 or 2 metal safety containers with self-closing spring actuated caps, flame arrestor and UL approved spout or funnel.</p>		M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<p>Personal Protective Equipment - Level D</p> <p>Hard hat*</p> <p>Safety glasses</p> <p>Safety-toed boots</p> <p>Work gloves</p> <p>Nitrile gloves</p> <p>ANSI Class 2 reflective warning vests</p> <p>Disposable gloves (nitrile)</p> <p>Disposable boot covers</p> <p>Equipment:</p> <p>Fire extinguishers</p> <p>Support trucks and generators</p> <p>First aid kit</p> <p>Deep-Woods Off or Ultrathon</p> <p>Repel Permanone</p> <p>Permethrin</p> <p>Drinking water</p> <p>Weather radio</p> <p>Vehicles and support trailers</p> <p>Air monitoring equipment</p> <p>Communication devices</p> <p><i>*Hard hats are mandatory whenever an overhead hazard is present i.e., wooded areas or when working near heavy equipment. Routine surface water sampling in open areas does not require the use of hard hats, unless the sampling takes place within a designated and posted "Hard Hat" area</i></p>	<p>Competent Person (CP) / Qualified Person (QP):</p> <p>William Morton – CP/SSHO/UXOSO</p> <p>William Morton – QP/First Aid and CPR</p> <p>Training Requirements:</p> <p>Site safety orientation</p> <p>HAZWOPER 40-Hour</p> <p>MEC Awareness</p> <p>Lifting/back safety</p> <p>Fire extinguisher use</p> <p>Emergency procedures</p> <p>Biological hazard identification and control</p> <p>Tornado shelter locations</p> <p>National Lightning Safety Institute Lightning Safety procedures</p>	<p>Daily site safety inspection CP (SSHO/UXOSO) – William Morton</p> <p>Housekeeping (daily)</p> <p>Fire extinguisher (monthly)</p> <p>Vehicle and equipment inspection daily</p> <p>Equipment and tools inspection daily and before use</p> <p>Survey areas for poisonous plants, insects, and animals</p> <p>Check body for ticks</p> <p>Monitor approaching storms</p> <p>Check communication devices at each site location before work</p>

Activity Hazard Analysis (AHA)

Activity/Work Task: MEC/MPPEH Handling and Certification	Overall Risk Assessment Code (RAC) (Use highest code)	L	
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: 6-4-21		Frequent Likely Occasional Seldom Unlikely	
Prepared by (Name/Title): Winston D Russell/HSE Manager	Catastrophic	E E H H M	
Reviewed by (Name/Title):	Critical	E H H M L	
	Marginal	H M M L L	
	Negligible	M L L L L	
Notes: (Field Notes, Review Comments, etc.)	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 H = 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.	M = Moderate Risk L = Low Risk	
Job Steps	Hazards	Controls	RAC
Arrival of new personnel at site.	Unfamiliarity with: site, general site hazards, project safety rules, chain of command, and emergency procedures.	All personnel shall attend the site orientation training.	L
MEC/MPPEH Handling and Certification	Poor planning.	Complete JSA for each task, as specified in AMS 710-05-FM-01708, Sample Job Safety Analysis Worksheet "Job Safety Analysis (JSA)." Use Hazard Assessment Resolution Program frequently – for each task to be completed.	L
	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.	L
	Struck-by/Against.	Wear reflective warning vests when exposed to vehicular traffic. Personnel working on or near roads and only remain on road long enough to complete work. Personnel walking along roadway shall stay off roadway as far as possible and walk on the side facing traffic.	L

Job Steps	Hazards	Controls	RAC
MEC/MPPEH Handling and Certification (continued).	Munitions and Explosives of Concern (MEC) / Unexploded Ordnance (UXO) contact.	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 and applicable SOPs. Excavate to the side of anomalies. Only use hand tools to expose anomaly. Follow all applicable SOPs and EM 385 1-97.	L
	Blast overpressure fragmentation blast.	The UXO Safety Officer (UXOSO) is responsible for maintaining the minimum safe distance arcs indicated in the Work Plan for the fragmentation data sheet of the Munition with the Greatest Fragmentation Distance (MGFD) for the Munitions Response Site.	L
	Slips, trips, and falls.	Keep work areas clear and maintain housekeeping. Personnel shall not jump from elevated surfaces. Personnel shall use caution when walking on rocky, slippery, wooded or uneven terrain.	L
	Accidental detonation of MEC.	Observe the requirements of Explosives Safety and Health Manual EM 385-1-97. Only UXO technicians will excavate or handle MEC. Personnel in the immediate vicinity of MEC operations will be kept to the minimum necessary for safe operations but no less than two UXO technicians. Do not subject MEC to heat, shock, or friction. Only hand excavation permitted when within one feet of MEC. Use magnetometers frequently to pinpoint the location of MEC.	L
	Non-UXO personnel.	Establish minimum separation distance (MSD) and Public Access Exclusion Distance (PAED) based on the Hazardous Fragmentation Distance of the MGFD and maintain site control. Stop all MEC operations when non-UXO personnel are within the MSD/PAED arc.	L
	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.	L
	Insect bites/West Nile Virus.	Wear personal protective equipment and tape joints to keep insects away from the skin. Use protective insect repellents containing N,N-Diethyl-m-toluamide, such as, 3M Ultrathon or equivalent and clothing insecticide preparations containing permethrins (Repel Permanone or equivalent) to prevent insect bites. Check limbs/body for insects/insect bites before showering. Notify Site Safety and Health Officer (SSHO) of flu-like symptoms.	L
	Contact dermatitis and poison ivy.	Check around work areas to identify if poison ivy is present. Wear long-sleeve shirts/trousers or Tyvek® coveralls when necessary to avoid skin contact with plants or other skin irritants. Learn to identify poisonous plants. Avoid unnecessary clearing of plant/vegetation areas. Cover vegetation with plastic (visqueen) where body position raises exposure potential. Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions. Identify workers who are known to contract poison ivy.	L

Job Steps	Hazards	Controls	RAC
MEC/MPPEH Handling and Certification (continued).	Severe weather.	The SSHO will monitor weather conditions each day in order to plan and prepare for hazardous conditions. Work activities will be suspended prior to weather conditions becoming hazardous so that workers have ample time to seek shelter. Upon seeing lightning or hearing thunder, outdoor activities shall be suspended and personnel shall be evacuated to safe areas (inside vehicles, buildings, or tornado shelters as appropriate). Follow procedures outlined in the APP.	L
	Adjacent Test Areas	Coordinate with TA-3 and TA-6 Test Areas for site entry since RSA-313-R-01 is a buffer zone.	L
	Heat stress and cold stress.	Follow procedures outlined in the APP/ Site Safety and Health Plan.	L
	Fire.	Smoking shall be permitted in designated areas. Vehicles shall not be parked in tall dry grass. Engines shall be shut off before refueling. A 10 pound A:B:C fire extinguisher shall be available when refueling.	L
	MEC/MPPEH explosive hazard	A SUXOS and UXOSO shall inspect all MEC/MPPEH for potential explosive hazard. Fuze, cavities and components if present shall be thoroughly inspected and certified MDAS. Prior to disposal a third verification shall be performed by UXOQC.	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: Roll-off box (lockable) Backhoe or mini excavator Fire Extinguishers Emergency Eyewash First Aid Kit Communication devices Deep-Woods Off or Ultrathon Repel Permanone Drinking water Weather radio or weather APP	Training Requirements: Site safety orientation UXO Technicians must be qualified IAW DDESB TP 18 HAZWOPER 40-Hour MEC Awareness 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 (SSHO/UXOSO) – William Morton Daily site safety inspection (SUXOS) – Instrument function checks in accordance with SOPs 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 Verify tornado shelter available Monitor approaching storms

Activity Hazard Analysis (AHA)

Activity/Work Task: Equipment Decontamination	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	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
Clean equipment.	Failure to properly plan daily activities.	Complete Job Safety Analysis for each task, as specified in, “Job Safety Analysis (JSA).” Use Hazard Assessment Resolution Program frequently – for each task to be completed.		M
	Exposure to contaminants.	Maintain work zones and decontamination areas. Level D - Modified personal protective equipment shall be worn as required in the Accident Prevention Plan or Site Safety and Health Plan. Personnel shall perform proper decontamination procedures each time when exiting the Exclusion Zone.	28 05.A.01	L
	Poor lighting.	Additional lighting shall be put in place as necessary. Temporary lighting shall be protected with ground fault circuit interrupters (GFCI).	07.A.01 11.D.05	L
	Slips, trips, and falls.	Work areas shall be kept organized during work activities. Housekeeping shall be maintained. Personnel shall use caution when walking/working on wet surfaces.	14.C.01-10	M
	Electrical.	GFCIs 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.	11.D.05 11.A.03	M
	Heavy lifting.	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
	Noise.	Personnel shall wear hearing protection when operating pressure washer.	05.C	L

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Clean equipment (continued).	Liquid splash, eye, face injury	Full body PVC raingear or polyethylene coated coveralls shall be worn by pressure washer operators. Orifice operators shall use a full-face shield. Other crew members shall use a of ANSI Z87.1 compliant safety glasses with side shields, goggles or face shield.		M
	Skin contact with contaminated wash-water	Remove PVC raingear polyethylene coated coveralls by inside-out method to avoid contact with potentially contaminated outer surfaces. Dispose of polyethylene coated coveralls while turned inside-out. Manually decontaminate reusable PVC raingear using trisodium phosphate (TSP) or other approved decontamination solution.		L
	Fire.	Fire extinguishers shall be placed in work areas. Smoking shall only be allowed in designated areas. Site personnel shall complete annual fire extinguisher training.	09.E.01 09.A.06	L
	Heat and Cold stress.	Follow procedures outlined in the SSHP.	06.I 02.C	M
	Use of pressure or steam washer.	The pressure/steam washer shall be inspected before each use. The manufacturer's instruction manual shall be used to guide the inspection process. Personnel shall be trained in the use of the washing equipment. All personnel working in the equipment decontamination area shall be trained in the emergency shut-off procedures for the equipment being used. The minimum amount of steam/pressure that will complete the job should be used. Pressure washers exceeding 3000 psi shall not be used. The spray from such equipment shall only be directed at surfaces to be cleaned and never at body parts or other personnel. Personnel in the immediate area shall use face shields and metatarsal/shin guards. Personnel shall keep firm grip on wand and not point it at anything that is not being washed. Pressure washer operators must maintain good footing. The trigger on the wand shall never be wired/fixed open. Operators are to take adequate breaks to avoid fatigue. Hot surfaces shall be avoided. Units shall be shut off and allowed to cool prior to re-fueling (if gas-powered). Carbon monoxide shall be monitored if gas-powered pressure washers are used in areas with limited ventilation. Carbon monoxide concentrations shall not be allowed to exceed 25 parts per million within any work areas.	13.A.02 13.A.02 09.B.21 13.A.12	L

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Clean equipment (continued).	Spills of decontamination water.	All waste handling activity shall be performed on visqueen (polyethylene sheeting) lined work surfaces. Waste liquids shall be stored with secondary containment. Lids and bungs shall be secured when drums are in storage or are being moved. Spill cleanup equipment shall be readily available when handling wastes. Drums containing waste shall be inspected on a daily basis. Spills shall be immediately reported to the Site Safety and Health Officer.	09.B.18	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Personal Protective Equipment - Level D - Modified: Hard hat Safety glasses Safety-toed boots Face shield Metatarsal and leg protection Work gloves PVC rain-gear or Poly coated Tyvek Protective over-boots Hearing protection Equipment: GFCI Fire extinguishers Emergency eyewash First aid kit Drinking water Weather radio or AM/FM radio Spill control equipment	Competent Person (CP) / Qualified Person (QP): William Morton – QP/SSHO/UXOSO William Morton – QP/First Aid and CPR Training Requirements: Site safety orientation HAZWOPER 40-Hour Lifting/back safety Fire extinguisher use Emergency procedures National Lightning Safety Institute Lightning Safety procedures	Daily site safety inspection (SSHO/UXOSO) – William Morton Housekeeping (daily) Fire extinguisher (weekly) Equipment and tools inspection daily and before use Monitor approaching storms

Activity Hazard Analysis (AHA)

Activity/Work Task: Waste Management	Overall Risk Assessment Code (RAC)	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				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	RAC
Drums Handling	Handling heavy objects	Observe proper lifting techniques. Obey sensible lifting limits (50 lbs. maximum per person manual lifting). Use mechanical lifting equipment (handcarts, trucks, and forklift) to move large loads, awkward loads. Check and secure drum lids before moving.	M
	Caught in/between moving parts/pinch points	Identify and understand parts of equipment, which may cause crushing, pinching, rotating, or similar motions. Remove all jewelry, especially rings, bracelets, watches Watch hand placement and foot placement Assure guards are in place to protect from these parts of equipment during operations. Abrasion resistant work gloves when the possibility of pinching, or other injury may be caused by moving / handling large or heavy objects. Maintain all equipment in a safe condition. Keep all guards in place during use. De-energize and lock-out machinery before maintenance or service.	M

Job Steps	Hazards	Controls	RAC
Drums Handling (continued)	Slips, trips, falls	Clear walkways, platforms, access steps and work areas of equipment, tools, and debris. Mark, identify, or barricade other obstructions. Work areas, platforms, and walkways should be kept free of materials, debris, and obstructions such as ice, grease, or oil that could cause a surface to become slick or otherwise hazardous. Maintain three-point contact when mounting / dismounting heavy equipment. Maintain good housekeeping.	M
	Sharp objects	Wear abrasion resistant work gloves. Inspect hand tools before use. Keep guards in place during use.	M
	Vehicle traffic	Use spotter when backing. Survey route to work locations. Inform crew of hazards. Wear reflective vest when exposed to heavy equipment or traffic.	M
	Struck by/against heavy equipment, protruding objects	Isolate equipment swing area. Require backup alarms on all heavy equipment. Make eye contact with operators before approaching equipment. Understand and review hand signals.	L
	Inhalation and contact with hazardous substances	Review hazardous properties of site contaminants with workers before work begin. Monitor breathing zone pursuant to SSHP. Avoid skin contact with contaminated waste. Avoid inhalation of dust or vapors.	M

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<ul style="list-style-type: none"> Level D: hard hat, safety glasses, safety boots, ear protection, abrasion resistant gloves Hand tools Drum dolly Forklift 	<ul style="list-style-type: none"> Tailgate Safety Meeting Site-specific orientation HAZWOPER 40-hr. HAZWOPER 8-hour refresher 8-hr Supervisor training Forklift operator training William Morton – CP/SSHO/UXOSO 	<ul style="list-style-type: none"> Use this AHA as a checklist Inspect all equipment and tools prior to use per manufacturer requirements.

Activity Hazard Analysis (AHA)

Activity/Work Task: Disposal of Investigative Derived Waste	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 certification of 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	RAC
Investigative waste disposal	Personnel injury, property damage, and/or equipment damage	Use qualified and trained forklift operators. The operator shall not exceed the load capacity rating for the forklift. The load capacity shall be clearly visible on the forklift. Forklift operators shall inform their supervisor of any prescribed medication that they are taking that would impair their judgment.	M
	Cross-contamination and contact with potentially contaminated materials	Loads to be transported shall be inspected for container integrity and secured prior to movement. Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination. Only essential personnel will be in the work area. All personnel will follow good hygiene practices. Proper decontamination procedures will be followed. All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations.	L
	Heavy lifting	Use proper lifting techniques. Lifts greater than 50 pounds require assistance or mechanical equipment; size up the lift. Avoid sudden or awkward motion. Lift with legs.	L
	Slip, trip and falls	Housekeeping shall be a routine task throughout daily activities.	M

Job Steps	Hazards	Controls	RAC
Investigative waste disposal	Drum handling	Stay upwind when filling a drum (with either soil or water), be careful not to make contact with the contained waste. Conduct air monitoring as specified in the SSHP. Wear appropriate gloves and or splash protection. Make sure lid or bung of drum is secure. If moving a drum unassisted, be sure to leverage properly, use proper lifting techniques, and wear safety glasses and steel-toed boots. When using a drum dolly, make sure straps and lid catch are securely attached. Leverage properly when tilting drum. Be sure toes stay away from drum.	M
	Tripping Hazards	Site Safety and Health Officer (SSHO) will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform Site Supervisor (SS) or SSHO of any observed potential slip, trip, or fall hazards.	L
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).	M
	Improper labeling or shipping papers	All generated waste shall be labeled in accordance with Department of Transportation regulations based on waste stream profile and be accompanied by required documentation based on waste characterization criteria per Resource Conservation and Recovery Act and 40 Code of Federal Regulations (CFR). Only personnel with the required training shall characterize and profile waste.	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel Name(s)	Inspection Requirements
Personal Protective Equipment Level D with Nitrile gloves Equipment: Air monitoring equipment Fire Extinguishers First Aid Kit Trucks Drums Packing materials Drum dolly	Competent Person (CP) / Qualified Person (QP): William Morton HAZWOPER 40-Hour Site safety orientation Emergency procedures Hazard communication Hazardous materials shipping Applicable AHAs Fire extinguisher use	Daily site safety inspection (SSHO/UXOSO) – William Morton Housekeeping (daily) Fire extinguisher (weekly) Vehicle inspection daily Inspect shipping containers and labeling

Activity Hazard Analysis (AHA)

Activity/Work Task: Site Restoration	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: 06/21/21		Frequent Likely Occasional Seldom Unlikely
Prepared by (Name/Title): Ray Clark, Engineer	Catastrophic	E E H H M
Reviewed by: Doug Russell/HSE Manager	Critical	E H H M L
	Marginal	H M M 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
Arrival of new personnel at site.	Unfamiliarity with: site, general site hazards, project safety rules, chain of command, and emergency procedures.	All personnel shall attend the site orientation training.	01.B.03 01.E.01 28	M
Restore site.	Poor planning.	Complete Job Safety Analysis for each task. Use Hazard Assessment Resolution Program frequently – for each task to be completed.		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
	Intrusive activities and underground utilities.	Follow procedure for Utility Contact Prevention in Accident Prevention Plan (APP) prior to commencing excavation activities. Utilities shall be located and marked prior to commencing intrusive activities. The Alabama One Call Law must be followed. Contact Digger's Hotline of Alabama at least 10 days but not less than prior 48 hour to commencing intrusive activities off base, excluding weekends or any state or federal holidays. Retain a copy of mark-out ticket for documentation purposes and QC purposes. On base utilities shall be cleared by the RSA Public Works Department.	25.A.01	M

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Restore site (continued).		<p>Follow requirements of AMS-710-02-PR-01600, <i>Excavation and Trenching</i>, and AMS-710-02-PR-01610, <i>Utility Contact Prevention</i>.</p> <p>Evaluate the work areas, ground conditions, and travel paths to identify any sensitive underground structures, unstable areas, dangerous slopes, and existing open excavations.</p> <p>Use manual excavation within 3 feet of known utilities. 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.</p> <p>Each work crew member shall be trained in electrocution hazards, explosion/fire hazards, and emergency procedures associated with contacting energized power lines and pipelines.</p> <p>Immediately contact utility one-call service (811) if an underground utility is damaged, dislocated, or disturbed.</p>		
	Overhead hazards/utilities.	<p>Before equipment is moved, the travel route shall be surveyed for overhead and terrain hazards. The minimum distances from electrical lines must be observed in accordance with EM-385-1-1 Table 11-1.</p> <p>Power lines shall be assumed to be energized unless verified to be de-energized and visibly grounded. Operation beneath a power line that has not been verified as de-energized and grounded must maintain clearance distances stated above. A high-visibility elevated warning line or barricade shall be erected at the minimum approach distance.</p> <p>Each work crew member shall be trained in the electrocution hazards and emergency procedures associated with energized power lines.</p> <p>RSA public works personnel who may be required to deenergize overhead electric lines shall follow NFPA 70E requirements and be familiar with arc flash protection requirements.</p>	11.F.04	M
	Slips, trips, and falls.	Keep work areas clear and maintain housekeeping. Personnel shall not jump from elevated surfaces. Personnel shall use caution when walking on rocky, slippery, or uneven terrain.	14.C.01-10	M
	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

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Restore site (continued).	Use of heavy equipment.	Only qualified personnel shall be permitted to operate equipment. Heavy equipment shall be inspected daily after the initial U.S. Army Corps of Engineers inspection (and documented). Do not use unsafe equipment. All equipment shall have backing alarms. All equipment shall be operated at safe speeds and in a safe manner. Equipment operators shall wear safety belts. Personnel are only permitted to approach equipment after a signal from the operator. Ground personnel, working near heavy equipment, shall wear high visibility conspicuity vests. Ground personnel shall not enter the swing radius of equipment. Ground personnel shall not position themselves between equipment and stationary objects. Personnel shall verify all mechanical guards are in place and functioning properly. Moving equipment shall be equipped with a back-up alarm. All equipment shall be shut down with energies dissipated prior to performing maintenance activities - lock out/tag out procedures may apply. Only qualified mechanics shall work on or repair heavy equipment.	18.A 18.G 18.B 05.F	M
	Insect bites/West Nile Virus.	Wear PPE and tape joints to keep insects away from the skin. Use protective insect repellents containing N,N-Diethyl-m-toluamide, such as, 3M Ultrathon™ or equivalent and clothing insecticide preparations containing permethrins (Repel® Permanone® or equivalent) to prevent insect bites. Check limbs/body for insects/insect bites before showering. Notify Site Safety and Health Officer (SSHO) of flu-like symptoms.	06.D.01	L
	Contact dermatitis and poison ivy.	Check around work areas to identify if poison ivy is present. Wear long-sleeve shirts/trousers or Tyvek® coveralls to avoid skin contact with plants or other skin irritants. Learn to identify poisonous plants. Remove clothing or Tyvek® coveralls by inside-out method to avoid contact with potentially contaminated outer surfaces. Avoid unnecessary clearing of plant/vegetation areas. Cover vegetation with plastic (visqueen) where sampling position raises exposure potential. Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions. Identify workers who are known to contract poison ivy.	06.D.03	L
	Severe weather.	Follow procedures outlined in the SSHP.	06.I	L
	Hazardous atmospheres.	Personnel shall immediately notify the SSHO if odors are detected.		L
	Heat stress and cold stress.	Follow procedures outlined in the SSHP. Use ACGIH guidelines for WBGT monitoring and TLVs.	06.I	M
	Dust.	Dust shall be monitored and controlled. Respiratory protection may be required if dust cannot be adequately controlled.		L

Job Steps	Hazards	Controls	EM 385-1-1	RAC
Restore site (continued).	Fire.	Smoking shall be permitted in designated areas. Vehicles shall not be parked in tall dry grass. Engines shall be shut off before refueling. A 40-B:C fire extinguisher shall be available when refueling. Site personnel shall complete annual fire extinguisher training. Smoking shall not be permitted near fueling areas. Gasoline shall be stored in safety cans with flash arrestors and spring-loaded vents.	09.E.01 09.A.06 09.B.08	L
	Dump truck operations.	Dump trucks shall be inspected and found to be in safe condition prior to being placed in service at site. Overhead hazards shall be re-evaluated prior to allowing dump trucks onto the project site. Areas with overhead hazards shall be barricaded with caution tape to prevent dump bed from contacting. In areas where it is not feasible to use barricades, then spotters shall be provided: however, the minimum distances from electrical lines must be observed (see SSHP). Operators shall wear seat belts while trucks are in motion at the project site. Spotters shall assist trucks when backing is necessary.	18.A.03 18.G.26 11.F	M
	Use of fertilizers.	The material safety data sheet for fertilizers shall be read and understood. Personnel shall avoid contact with fertilizer.	06.B.01	L
	Electrocution.	Only qualified electricians shall perform electrical disconnection activities.	11.A	M

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® Drinking water Weather radio or AM/FM radio	Competent Person (CP) / Qualified Person (QP): William Morton – CP/SSHO/UXOSO William Morton – CP/First Aid and CPR Training Requirements: Site safety orientation Applicable AHAs HAZWOPER 40-Hour 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 (SSHO/UXOSO) – William Morton Check Known Allergies Questionnaire, training, and medical certifications against personnel roster Mechanized equipment (U.S. Army Corps of Engineers form prior to use) Mechanized equipment (daily) Overhead and underground utilities Housekeeping (daily) Fire extinguisher (weekly) Vehicle inspection daily Equipment and tools inspection daily and before use Survey areas for poisonous plants, insects, and animals Check body for ticks Verify tornado shelter available

Activity Hazard Analysis (AHA)

Activity/Work Task: COVID-19 Job Site Practices	Overall Risk Assessment Code (RAC) (Use highest code)	L
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
Reviewed by (Name/Title):	Critical	E H H M L
	Marginal	H M M L L
Notes: (Field Notes, Review Comments, etc.) This AHA serves as the hazard assessment	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
	"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 H = High Risk M = Moderate Risk L = Low 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.		

Job Steps	Hazards	Controls	RAC
Mobilization to site	Inadequate preparation and training that can lead to possible infection	<ul style="list-style-type: none"> • Site Safety & Health Officer (SSHO) to identify potential infection sources due to the task, location, and surrounding areas. Include discussion of same in site specific training. • SSHO to discuss Coronavirus hazards and controls in the readiness review and initial tailgate safety meeting and include at least the topics listed below. The meeting should be held outdoors or in a space large enough to allow space between participants. SSHO to verify that the necessary equipment and supplies are available and in good condition: gloves, safety glasses, sanitizer. <ol style="list-style-type: none"> 1. The virus is highly contagious and is probably 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. 2. The most frequent symptoms are fever, coughing, shortness of breath. 3. Maintain 6-foot separation unless the job task requires working closely. If working closer than 6 feet wear a mask. • All personnel shall follow guidance in AMS-710-01-PR-04001, <i>COVID-19 Control Plan</i> and AMS-710-01-FM-04002, <i>Aptim Covid-19 Play Book</i>. • Check of the APTNet Corona Virus webpage for the latest CDC guidance and update recommendations, as applicable. • Site workers are required to report travel to high-risk areas, potential exposure to infected people, and symptoms of illness. • Do not share tools, pens, or anything else without disinfecting between uses. Use your own pen. 	L

Job Steps	Hazards	Controls	RAC
		<ul style="list-style-type: none"> • When practical, a single person should be in a vehicle. If 2 or more people are in a vehicle, all should wear masks. Adjust vehicle's air handling system to maximize outside air. • Discuss and follow any state and local restrictions on gatherings (# of people that can congregate) and closings. Be aware that stores, restaurants and coffee locations that you may have frequented may be closed. Bring your own food and drinks. • In addition to what is provided in this AHA, subcontractors and Government personnel are directed to follow their Corporate HR policies. • CDC document How It Spreads: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html • Avoid air travel if possible. If air travel is necessary, wear a face mask during the flight and maintain as much distance from other passengers as allowed by seating airplane seating arrangements. • If renting a vehicle, request a rental vehicle that has been idle. Three days is best because all or nearly all virus particles on surfaces are inactivated by 72 hours of exposure to air. At least 75% of virus particles are inactivated by 24 hours of exposure to air. • Wipe the steering wheel and other high-contact surfaces of rental vehicles with disinfectant. Any cloth or tissue saturated with disinfectant such as >60% isopropyl alcohol, >120 proof clear liquor (keep sealed or in trunk when in transit), or commercial disinfectant. Concentrated alcohol is flammable so use in well ventilated area away from ignition sources. Any disinfectant product from a reputable supplier (Kimberly-Clark, S. C. Johnson, Lysol, Clorox) should inactivate the virus. See this EPA report on disinfectants for additional information: https://www.epa.gov/coronavirus/about-list-n-disinfectants-coronavirus-covid-19-0. • Designate a representative to monitor for signs of illness in the workplace, and if someone is showing symptoms, SSHO shall ask them to leave. • Designate a representative to take employees' temperatures with a digital forehead thermometer that is disinfected appropriately between applications. This should be done PRIOR TO any individual entering the job site. Individuals' temperatures should also be taken when leaving or at the end of their shift. Personnel will be sent home if their temperature exceeds 100.4° F (38.0° C). SSHO shall keep records of temperatures taken and appeared normal. Note that some people with COVID-19 may not have a fever, so this should not be the only means of detection. • Sick employees shall be separated immediately from others. CDC recommends that employees who appear to have acute respiratory illness symptoms (i.e., cough, shortness of breath) upon arrival to work or become sick during the day should be separated from other employees and be sent home immediately. Individuals that have been asked to leave should NOT be allowed to enter any occupied area at any time prior to leaving. • Provide tissues and encourage employees to cover their noses and mouths with a tissue (or elbow or shoulder if a tissue is not available) when coughing or sneezing and disposable hand towels and no-touch trash receptacles. • Limit the exchange/sharing of paper documents by encouraging use of electronic communication whenever possible and do not allow sharing of tools or any multi-user devices and accessories such as iPads, laptops, hand-held radios, computer stations, etc. 	

Job Steps	Hazards	Controls	RAC
		<ul style="list-style-type: none"> • Provide soap and water and hand sanitizer with alcohol content between 65% and 90% in the workplace. Ensure that adequate supplies are maintained. Place hand sanitizers in multiple locations on the job site, in the office, in or around portable toilets, or in conference rooms to encourage hand hygiene. • Provide disposable gloves where appropriate; instruct workers to wash hands after removing gloves. • Communicate key CDC recommendations (and post signage where appropriate) to your staff and tradespeople. 	
Hotel Stays	Infection	<ul style="list-style-type: none"> • Request a room that has been idle. Three days is best because all or nearly all virus particles on surfaces are inactivated by 72 hours of exposure to air. AT least 75% of virus particles are inactivated by 24 hours of exposure to air. • Request no maid service for short stays. • Minimize time spent in common areas like the hotel lobby, exercise facility, or restaurant. Practice social distancing with hotel staff and other guests. • Wipe high-contact areas like doorknobs and countertops with disinfectant. Any cloth or tissue saturated with disinfectant such as >60% isopropyl alcohol, >120 proof clear liquor, or commercial disinfectant spray. Concentrated alcohol is flammable so use in well ventilated area away from ignition sources. Note that any disinfectant from a reputable supplier (Kimberly-Clark, S.C. Johnson, Lysol, Clorox) is likely to be effective on Coronavirus. See this EPA report on disinfectants for additional information: https://www.epa.gov/coronavirus/about-list-n-disinfectants-coronavirus-covid-19-0. 	L
Transportation or shipment of disinfectants	<p>Violation of Department of Transportation hazardous materials shipping regulations</p> <p>Spills, leaks, fires</p>	<ul style="list-style-type: none"> • Transport disinfectants in vehicles in compliance with DOT Materials of Trade exception: <ul style="list-style-type: none"> ○ Materials in labeled leak-tight containers. ○ Containers secured so that they do not move while in transit, driver aware of hazardous materials in vehicle. ○ No more than 5 gallons of flammable liquid in any single container. ○ If disinfectants must be shipped (for example by FedEx) use ground shipment. 	L
Site tasks	Infection or spread of infection to other site personnel	<ul style="list-style-type: none"> • Stay at least 6 feet from other personnel unless closer spacing is necessary for the work (and maintain this spacing during breaks and lunch). If unable to maintain 6 feet distance, personnel should wear a surgical mask or face covering. If there are lifts that are greater than 50 lbs, use a mechanical lifting device in order to avoid close proximity to another worker during the lift assist. If unavoidable, both should wear masks. • Also, when the buddy system is employed maintain spacing of at least 6 feet. • Hold tailgate safety meetings outdoors or in a space large enough to allow separation. • To the extent practical, limit time within trailers and office spaces. Each trailer is equipped with its individual HVAC unit that includes a filter. • All Site Worker's temperatures will be monitored at the beginning of each workday by designated personnel. • Personnel will be sent home if their temperature exceeds 100.4° F (38.0° C). • Do not share pens, tools or personal protective equipment (PPE). • Avoid touching high contact surfaces like portable toilet handles, doorknobs, etc. with your bare skin and if you cannot avoid that, wash or disinfect your hands afterward. 	L

Job Steps	Hazards	Controls	RAC
		<ul style="list-style-type: none"> • Avoid handshakes and hugs. • Provide handwashing station or hand sanitizer and use often. Soap is preferable to hand sanitizers when it is available. Sanitizers can break down the skin making an individual more prone to chemical and biological exposures. • Clean high-contact surfaces daily with disinfectant. 	
<p>Site-specific tasks: Multiple operators in equipment, multiple drivers of work vehicles, sharing ice cooler, sharing hand tools, sharing analog instruments, sharing portable toilet</p>	Possible infection or spread of infection	<ul style="list-style-type: none"> • Limit operators and decontaminate equipment and vehicles twice daily. • Pack water in personal backpacks and small coolers. • Each team member will have a personal shovel and instrument to use for job duration. • Portable toilet commonly touched surfaces will be cleaned after each use. 	L
	Non vaccinated personnel	<ul style="list-style-type: none"> • Effective 10/7/21 Aptim is enforcing vaccination mandate in accordance with President Biden's Executive Order September 24, 2021. 	L
Confirmed infection	<p>Infection of others</p> <p>Logistical issues related to managing infected personnel far from home</p>	<ul style="list-style-type: none"> • Personnel who develop symptoms like fever, cough, or shortness of breath that might indicate infection are to self-quarantine and notify the SSHO. SSHO is to notify PM and Corporate lead entity. SSHO may not release the name of quarantined personnel to others without authorization from Corporate lead entity. • Subcontractor and Government personnel who develop symptoms like fever, cough, or shortness of breath that might indicate infection should notify the SSHO and follow guidance within their Corporate HR policies. • APTIM's PM, in concert with senior management, will provide coordination and support to facilitate quarantine. If infected person is local the person will be asked to self-quarantine at home or go to a hospital if seriously ill. If infected person is not local, the person may have to quarantine in a hotel, unless seriously ill. If/when this occurs it will be reported up the chain and situation-specific responses will be determined. • If suspected infected personnel must be within 6 feet of other personnel (in a car, for instance) the suspected infected individual and any personnel within a 6 foot radius should wear an N95 if available, face covering or surgical mask. • If an employee tests positive for COVID-19, they should follow employer requirements for sick leave, benefits, and return to work. Subcontractors and Government personnel are directed to follow guidance within their Corporate HR policies regarding employee leave. In addition, before returning to the project site the site worker must provide the SSHO with documentation of a negative test, a note from a doctor, or a state or local testing facility. • Contact Tracing: All of the people that the positive testing employee had sustained contact with for more than 10 minutes (within a 6 foot distance) will be made aware of their potential for exposure and will be told to do daily self-checks and monitor their symptoms and temperature. 	L
Restricting Job Site Visitors	Possible Exposure by Unvetted Visitor	<ul style="list-style-type: none"> • Restrict the number of visitors to the job site, including the trailer or office. 	L

Job Steps	Hazards	Controls	RAC
		<ul style="list-style-type: none"> • All visitors should be screened in advance. If the visitor can answer "yes" to any of the following questions (without identifying which question applies), the visitor will not be permitted to access the facility. The questions are: <ul style="list-style-type: none"> ○ Have you been asked to self-quarantine since last site visit ○ Have you been in close contact with any person(s) who has been asked to self-quarantine since last site visit? ○ Have you experienced a recent onset of any illness-related symptoms, such as fever, cough, or shortness of breath? ○ Have you traveled outside of North America in the past 14 days? ○ Have you been in close contact with any person(s) who have traveled outside of North America in the last 14 days? ○ Have you been in close contact with any person(s) who has been diagnosed with COVID-19? 	
Site clean-up and demobilization	Possible infection or spread of infection Employee stopped or prevented from traveling home due to state restrictions due to stay at home orders	<ul style="list-style-type: none"> • Decontaminate equipment before shipping to home office. • Decontaminate GPS units before returning. • Clean boots, work clothes, and gear used at work prior to travel home to prevent further exposure and spread. • Plan ahead for specific state restrictions personnel will travel through during demobilization and provide a letter stating employee is essential personnel. 	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/chemical resistant gloves Equipment: Hand wash disinfectant Face covering As needed for task	Competent Person (CP) / Qualified Person (QP): William Morton - CP/SSHO/UXOSO William Morton - CP/First Aid and CPR Training Requirements (as determined by SSHO): Tailgate meetings Emergency procedures Hazard communication	Daily site safety inspection (SSHO/UXOSO) – William Morton Housekeeping (daily) Hand washing station or hand sanitizer solution available and used. Distancing being practiced. Face coverings. Do any personnel show signs of infection? SSHO to notify Project Manager, Health and Safety Manager and HR of any reports of signs of infection immediately. SSHO is not to provide names of involved personnel to others without authorization from HR.

Attachment E4
Health and Safety Field Forms

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.



Year _____
U.S. Department of Labor
 Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name _____

City _____ State _____

Identify the person			Describe the case		Classify the case				Enter the number of days the injured or ill worker was:								
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Check the "injury" column or choose one type of illness:							
						Death	Days away from work	Remained at work		Away From Work (days)	On job transfer or restriction (days)	(M)					
						(G)	(H)	Job transfer or restriction	Other recordable cases			(K)	(L)	Injury	Skin Disorder	Respiratory Condition	Poisoning
						(G)	(H)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)	(6)
Page totals						0	0	0	0	0	0	0	0	0	0	0	0

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Injury (1)
 Skin Disorder (2)
 Respiratory Condition (3)
 Poisoning (4)
 Hearing Loss (5)
 All other illnesses (6)

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of... (M)			
(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave. NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ Zip _____

Industry description (e.g., Manufacture of motor truck trailers)

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)
____ _

OR North American Industrial Classification (NAICS), if known (e.g., 336212)
____ _

Employment information

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Company executive

Title

Phone

Date

USACE PRIME CONTRACTOR Monthly Record of Work-Related Injuries/Illnesses & Exposure

US Army Corps of Engineers



Month _____
Year _____

In accordance with the provisions of EM 385-1-1, Section 01 Program Management, Paragraph 01.D Mishap Reporting and Investigation, sub-paragraphs 01.D.05, you (APTIM) shall provide a monthly record of all exposure and accident experience incidental to the work (this includes exposure and accident experience of APTIM and its sub-contractor(s)). As a minimum, these records shall include exposure work hours and a record of occupational injuries and illnesses that include the data elements listed below. Definitional criteria for each data element is found in 29 CFR Part 1904. If the maintenance of OSHA 300 Logs are required by OSHA, most of this information can be obtained from those logs. If data on log provided below is revised after it is submitted to USACE, APTIM shall provide a revised report to the GDA. You must complete the USACE ENG Form 3394, Report of Accident Investigation Report for all recordable accidents. If you're not sure whether a case is recordable, call your local Safety and Occupational Health Office for help.

USACE Command	_____
Contractor Name	_____
Contract Number	_____
Project Title	_____
City	_____ State _____
USACE Office Overseeing Work _____	

Identify the person						Describe The Case	Classify the case														
(A)	(B1)	(B2)	(B3)	(C)	(D)	(E)	(F)	Using these categories, check ONLY the most serious result for each case:				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:							
Company Name	Prime or Sub (P or S)	Age	Gender	Date Employee Began Work on Job Covered by Contract	Job Title (e.g., Welder)	Date of injury or onset of illness (mo./day)	Where the event occurred (e.g. Loading dock north end)	Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	Death	Days away from work	Remained at work		On job transfer or restriction (days)	Away from work (days)	Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses	
									(G)	(H)	Job transfer or restriction	Other recordable cases	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)

0	0	0	0	0	0	0	0	0	0	0	0
Exposure Hours						Certification of Record					
Month	_____	_____	_____	_____	_____	Name of Person	_____				
Year to Date	_____	_____	_____	_____	_____	Submit. Record	_____				
						Signature	_____				
						Date	_____				

For Government Use Only			
TYPE OF WORK ACTIVITY (Choose One):		Type of Contract (Choose One):	
Construction	<input type="checkbox"/>	Environmental Remed.	<input type="checkbox"/>
Opn & Main.	<input type="checkbox"/>	Superfund	<input type="checkbox"/>
Eng. Services	<input type="checkbox"/>	FUDS	<input type="checkbox"/>
Dredging	<input type="checkbox"/>	IRP	<input type="checkbox"/>
Rsch. & Dev.	<input type="checkbox"/>	FUSRAP	<input type="checkbox"/>
Emerg. Opns.	<input type="checkbox"/>	Ordinance/Expl. Cleanup	<input type="checkbox"/>
Other	<input type="checkbox"/>	Environmental Other	<input type="checkbox"/>
		Civil Works	<input type="checkbox"/>
		Military Programs	<input type="checkbox"/>
		Other	<input type="checkbox"/>

USACE Summary of Contractor Work-Related Injuries and Illnesses



Month Submitted _____
 US Army Corps of Engineers

Year _____

Review the Record and verify that the entries are complete & accurate before completing this summary.

Using the Record, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the record. If you had no cases write "0". This summary is a cumulative record of the injury/illness experience for the year

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total days of job transfer or restriction	Total days away from work
0	0
(K)	(L)

Injury and Illness Types

Total number of...	(1) Injury	(2) Skin Disorder	(3) Respiratory Condition	(4) Poisoning	(5) Hearing Loss	(6) All other illnesses
(M)	0	0	0	0	0	0

Establishment information

Establishment name _____

Street _____

City _____

State _____

Zip _____

Industry description (e.g., Manufacture of motor truck trailers)

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

or

North American Industrial Classification (NAICS) if known (e.g. 336212)

Employment information

Annual average number of employees _____

Total hours worked by all employees last year _____



APTIM INCIDENT REPORT

General Information – Applicable to All Incidents		*Required Fields
*Type of Incident:		
<input type="checkbox"/> Information Only	<input type="checkbox"/> Illness	<input type="checkbox"/> NOV/Agency Visit
<input type="checkbox"/> First Aid	<input type="checkbox"/> Complaint	<input type="checkbox"/> Property Damage
<input type="checkbox"/> Injury	<input type="checkbox"/> Spill	<input type="checkbox"/> Fire
<input type="checkbox"/> Vehicle Incident	<input type="checkbox"/> Non-Work	
*Incident Category: Level I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/>	*Severity Consequence Matrix: Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/>	*Incident Date:
*Project Number:	*Project Name	*Incident Time:
*Did incident occur on employer premises? Yes <input type="checkbox"/> No <input type="checkbox"/>	If not on premises, where at?	*Date Incident Reported
*High Potential Incident? Yes <input type="checkbox"/> No <input type="checkbox"/>	Work Shift: Day <input type="checkbox"/> Night <input type="checkbox"/>	Part of Shift: Before <input type="checkbox"/> During <input type="checkbox"/> After <input type="checkbox"/>
*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 <input type="checkbox"/> No <input type="checkbox"/> 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 <input type="checkbox"/> No <input type="checkbox"/>	Was injured hospitalized overnight as an inpatient? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Was employee sent off site for treatment? Yes <input type="checkbox"/> No <input type="checkbox"/>	*Was medical treatment provided on site? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Was employee seen by a licensed health care provider? (i.e., clinic, ER, doctor, nurse, physician's assistant) Yes <input type="checkbox"/> No <input type="checkbox"/>		
Treatment provided:	Provided By: (Name)	
Hospital/Treatment Facility:	Physician/Health Care Professional: (Name)	
Hospital/Treatment Facility Address (Street, City, State, Zip):		



APTIM INCIDENT REPORT

Does employee have lost days? Yes <input type="checkbox"/> No <input type="checkbox"/>		How many days? Est <input type="checkbox"/> Actual <input type="checkbox"/>	Time period:			
Does employee have restrictions? Yes <input type="checkbox"/> No <input type="checkbox"/>		Describe:	When are they to be lifted?			
*Classification:	<input type="checkbox"/> First Aid	<input type="checkbox"/> Medical Treatment – Recordable	<input type="checkbox"/> Restricted Work Duty - Recordable			
	<input type="checkbox"/> Lost Time – Recordable	<input type="checkbox"/> Occupational Illness – Recordable	<input type="checkbox"/> Non Work Related <input type="checkbox"/>			
Fatality <input type="checkbox"/>						
*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:				
<table style="width:100%; border:none;"> <tr> <td style="width:33%; vertical-align: top;"> <p>*Accident Type:</p> <input type="checkbox"/> Absorption Ingestion Or Inhalation Noc <input type="checkbox"/> Burn,Contact W/Welding Objects <input type="checkbox"/> Burn,Inhale,Contact W Chemicals <input type="checkbox"/> Burn,Scald,Cont. W/Dust,Gases,Fumes,Vapor <input type="checkbox"/> Burn,Scald,Contact Abnormal Air Pressure <input type="checkbox"/> Burn,Scald,Contact Electric Current <input type="checkbox"/> Burn,Scald,Contact Fire/Flame <input type="checkbox"/> Burn,Scald,Contact Steam/Cold Objects <input type="checkbox"/> Burn,Scald,Contact Steam/Hot Fluid <input type="checkbox"/> Burn,Scald,Contact W Hot Object <input type="checkbox"/> Burn,Scald,Contact W Temp. Extremes <input type="checkbox"/> Burn,Scald,Contact With Radiation <input type="checkbox"/> Burn,Scald-Miscellaneous <input type="checkbox"/> Caught In Or Between-Collapsing Material <input type="checkbox"/> Caught In Or Between-Machine <input type="checkbox"/> Caught In Or Between-Miscellaneous <input type="checkbox"/> Caught In Or Between-Object Handled <input type="checkbox"/> Crash Of Rail Vehicle <input type="checkbox"/> Crash Of Water Vehicle <input type="checkbox"/> Cut By Hand Tool,Utensil Not Powered <input type="checkbox"/> Cut By Powered Hand Tool,Appliance <input type="checkbox"/> Cut/Puncture By Broken Glass <input type="checkbox"/> Cut/Puncture By Object Being Lifted <input type="checkbox"/> Cut/Puncture/Scrape By Misc. <input type="checkbox"/> Exposure to mechanical vibration <input type="checkbox"/> Exposure to mental stress factors </td> <td style="width:33%; vertical-align: top;"> <input type="checkbox"/> Exposure to particles or contaminants <input type="checkbox"/> Exposure to radiation <input type="checkbox"/> Exposure to sharp, sudden sound <input type="checkbox"/> Exposure to variations in pressure - other than sound <input type="checkbox"/> Fall Or Slip-From Different Level <input type="checkbox"/> Fall Or Slip-From Ladder Or Scaffolding <input type="checkbox"/> Fall Or Slip-From Liquid Or Grease Spill (Same Level) <input type="checkbox"/> Fall Or Slip-Into Openings <input type="checkbox"/> Fall Or Slip-Miscellaneous <input type="checkbox"/> Fall Or Slip-On Ice Or Snow (Same Level) <input type="checkbox"/> Fall Or Slip-On Same Level <input type="checkbox"/> Fall Or Slip-On Stairs <input type="checkbox"/> Fall Or Slip-Slipped,Did Not Fall <input type="checkbox"/> Foreign Body In Eye <input type="checkbox"/> Long term contact with chemical or substance <input type="checkbox"/> Long term exposure to sounds <input type="checkbox"/> Misc Cases-Animal Or Insect <input type="checkbox"/> Misc Cases-Explosion Or Flareback <input type="checkbox"/> Misc Cases-Robbery/Criminal Assault <input type="checkbox"/> Mold <input type="checkbox"/> Motor Vehicle - Collision With Fixed Object <input type="checkbox"/> Motor Vehicle Collision W/Another Vehicle <input type="checkbox"/> Motor Vehicle-Crash Of Airplane <input type="checkbox"/> Motor Vehicle-Miscellaneous <input type="checkbox"/> Natural Disasters <input type="checkbox"/> Repetitive Motion <input type="checkbox"/> Rubbed Or Abraded By Repetitive Motion </td> <td style="width:33%; vertical-align: top;"> <input type="checkbox"/> Single contact with chemical or substance - excludes insect and spider bites and stings <input type="checkbox"/> Slide or Cave-In <input type="checkbox"/> Strain By Holding Or Carrying <input type="checkbox"/> Strain By Pushing Or Pulling <input type="checkbox"/> Strain Or Inj By Continual Noise <input type="checkbox"/> Strain Or Inj By Jumping <input type="checkbox"/> Strain Or Inj By Lifting <input type="checkbox"/> Strain Or Inj By Reaching <input type="checkbox"/> Strain Or Inj By Twisting <input type="checkbox"/> Strain Or Inj By Using Tool Or Machine <input type="checkbox"/> Strain Or Inj By Welding Or Throwing <input type="checkbox"/> Striking Against Moving Parts Of Machine <input type="checkbox"/> Striking Against Object Being Lifted/Han <input type="checkbox"/> Striking Against Sand/Scrap/Oper. <input type="checkbox"/> Striking Against Stationary Object <input type="checkbox"/> Striking/Stepping On Miscellaneous <input type="checkbox"/> Striking/Stepping On Sharp Objects <input type="checkbox"/> Struck Or Inj By Falling Or Flying Object <input type="checkbox"/> Struck Or Inj By Fellow Worker,Patien <input type="checkbox"/> Struck Or Inj By Hand Tool/Machine <input type="checkbox"/> Struck Or Inj By Motor Vehicle <input type="checkbox"/> Struck Or Inj By Object Handled By Other <input type="checkbox"/> Struck Or Inj By Object Lifted/Handled <input type="checkbox"/> Struck Or Injured By-Moving Parts <input type="checkbox"/> Terrorism <input type="checkbox"/> Other: </td> </tr> </table>				<p>*Accident Type:</p> <input type="checkbox"/> Absorption Ingestion Or Inhalation Noc <input type="checkbox"/> Burn,Contact W/Welding Objects <input type="checkbox"/> Burn,Inhale,Contact W Chemicals <input type="checkbox"/> Burn,Scald,Cont. 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*Agency/Source of Injury:						
<input type="checkbox"/> Awkward Position of Wrist, Neck, Back, Arms	<input type="checkbox"/> Forklift-powered industrial truck	<input type="checkbox"/> Materials on Floor				
<input type="checkbox"/> Blade	<input type="checkbox"/> Hand Tools	<input type="checkbox"/> Non-Adjustable Workstation				
<input type="checkbox"/> Box	<input type="checkbox"/> Hand Truck	<input type="checkbox"/> Non-Living Animals				
<input type="checkbox"/> Chemicals-Dust	<input type="checkbox"/> Hot Oil	<input type="checkbox"/> Poor Condition of Safety Equipment				
	<input type="checkbox"/> Housekeeping	<input type="checkbox"/> Poor Lighting				



APTIM INCIDENT REPORT

- | | | |
|--|--|---|
| <input type="checkbox"/> Chemicals-liquid or gas | <input type="checkbox"/> Human Source | <input type="checkbox"/> Poor Ventilation |
| <input type="checkbox"/> Defective Motor Vehicle Equipment | <input type="checkbox"/> Ice or Snow on Walking Surface | <input type="checkbox"/> Power Hand Tool |
| <input type="checkbox"/> Drum | <input type="checkbox"/> Improper Design or Poor Design | <input type="checkbox"/> Repetitive Motion or Forceful Motion |
| <input type="checkbox"/> Electrical | <input type="checkbox"/> Improper method | <input type="checkbox"/> Roll |
| <input type="checkbox"/> Electrical Cord | <input type="checkbox"/> Improper Piling or Storing | <input type="checkbox"/> Slippery Floors |
| <input type="checkbox"/> Electrical Outlet | <input type="checkbox"/> Improper Tool | <input type="checkbox"/> Steam |
| <input type="checkbox"/> Energy –Electrical | <input type="checkbox"/> Keyboard | <input type="checkbox"/> Unguarded Equipment |
| <input type="checkbox"/> Energy – Hydraulic | <input type="checkbox"/> Lack of Safety Awareness | <input type="checkbox"/> Unsafe Act |
| <input type="checkbox"/> Energy – Pneumatic | <input type="checkbox"/> Ladder | <input type="checkbox"/> Unsafe Condition Caused by Contractor or Customer |
| <input type="checkbox"/> Ergonomics-repetitive motion | <input type="checkbox"/> Lifting | <input type="checkbox"/> Unsafe Equip or Material of Contractor or Customer |
| <input type="checkbox"/> Excessive Pinch Grip | <input type="checkbox"/> Live Animals | <input type="checkbox"/> Vehicles |
| <input type="checkbox"/> Excessive Use of The Power Grip | <input type="checkbox"/> Machine Guarding | <input type="checkbox"/> Other: |
| <input type="checkbox"/> Faulty Layout of Plant Facilities | <input type="checkbox"/> Manual Materials Handling-lifting | |

***Nature of Injury:**

- | | | |
|---|---|--|
| <input type="checkbox"/> Amputation | <input type="checkbox"/> Dislocation | <input type="checkbox"/> Lung Problem, Toxic Agent Related |
| <input type="checkbox"/> Angina Pectoris (Chest Pain/Decr Blood) | <input type="checkbox"/> Electric Shock | <input type="checkbox"/> Myocardial Infarction- (Heart Attack) |
| <input type="checkbox"/> Asbestos- (Asbestos Fibers) | <input type="checkbox"/> Enucleation- (Removal Of An Organ) | <input type="checkbox"/> No Physical Injury |
| <input type="checkbox"/> Asphyxiation-(Suffocation) | <input type="checkbox"/> Exhaustion | <input type="checkbox"/> Poisoning and toxic effects |
| <input type="checkbox"/> Bite, Sting | <input type="checkbox"/> Foreign Body, Sliver, Chip, Dust | <input type="checkbox"/> Radiation |
| <input type="checkbox"/> Black Lung- (Coal Dust) | <input type="checkbox"/> Fracture, Chip | <input type="checkbox"/> Respiratory Disorders- (Gases, Fumes, Chem) |
| <input type="checkbox"/> Burn - Hot, Cold, Chemical, Radiation, Frostbite | <input type="checkbox"/> Hearing Loss | <input type="checkbox"/> Rupture |
| <input type="checkbox"/> Byssinosis- (Cotton Dust) | <input type="checkbox"/> Heat Prostration- (Overcome By Heat) | <input type="checkbox"/> Silicosis- (Silicon Fibers) |
| <input type="checkbox"/> Carpal Tunnel Syndrome | <input type="checkbox"/> Hepatitis C | <input type="checkbox"/> Sprain, Strain, Torn |
| <input type="checkbox"/> Concussion | <input type="checkbox"/> Infection | <input type="checkbox"/> Suffocation |
| <input type="checkbox"/> Contusion | <input type="checkbox"/> Infectious and Parasitic Diseases | <input type="checkbox"/> Syncope |
| <input type="checkbox"/> Crushing | <input type="checkbox"/> Inflammation | <input type="checkbox"/> Vascular- (Blood Vessels) |
| <input type="checkbox"/> Cut, Laceration, Puncture | <input type="checkbox"/> Internal Injury, Hernia | <input type="checkbox"/> VDT Disease |
| <input type="checkbox"/> Dermatitis | <input type="checkbox"/> Loss of Consciousness | <input type="checkbox"/> Vision Loss |
| | <input type="checkbox"/> Lung Problem, Dust Related | <input type="checkbox"/> Other: |

Vehicle Incident – If Applicable

*Vehicle Make:	*Vehicle Model:	Vehicle Year:	Vehicle ID:
Vehicle Type: Car <input type="checkbox"/> Truck <input type="checkbox"/> Other <input type="checkbox"/>	VIN:	License Plate #:	
Road Type:	Driving Conditions:	Traffic Area:	
Action of Company Vehicle: Being Passed <input type="checkbox"/> Moving Forward <input type="checkbox"/> Passing Others <input type="checkbox"/> Reversing <input type="checkbox"/> Stationary <input type="checkbox"/> Turning <input type="checkbox"/>			
Company Vehicle Collision With: Animal <input type="checkbox"/> Non-Collision <input type="checkbox"/> Object <input type="checkbox"/> Other Vehicle <input type="checkbox"/> Pedestrian <input type="checkbox"/> Struck by Other Vehicle <input type="checkbox"/>			
Damage to Company Vehicle:			
<input type="checkbox"/> Front	<input type="checkbox"/> Side-Driver	<input type="checkbox"/> Side-Passenger	
<input type="checkbox"/> Roof	<input type="checkbox"/> Rear	<input type="checkbox"/> Undercarriage <input type="checkbox"/> Trailer	
Citation issued to company driver? Yes <input type="checkbox"/> No <input type="checkbox"/>		Third party involved? Yes <input type="checkbox"/> No <input type="checkbox"/>	

Spill – If Applicable

*Material Spilled:	*Amount:	*Units:
Processes:	Equipment:	Outcome Result:
Business interruption? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, how long?		*Spill go off site? Yes <input type="checkbox"/> No <input type="checkbox"/>
*Reportable? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Affected Media: <input type="checkbox"/> Soil <input type="checkbox"/> Water <input type="checkbox"/> Air <input type="checkbox"/> Fauna <input type="checkbox"/> Flora <input type="checkbox"/> Public <input type="checkbox"/> Employee		
Causation:		<input type="checkbox"/> Natural Phenomenon
<input type="checkbox"/> Cleanup	<input type="checkbox"/> Maintenance	<input type="checkbox"/> Weather
<input type="checkbox"/> Refueling	<input type="checkbox"/> Handling	<input type="checkbox"/> Other
<input type="checkbox"/> Excavation	<input type="checkbox"/> Human Activities	<input type="checkbox"/> Transportation
Site Activity:	<input type="checkbox"/> Office	<input type="checkbox"/> Remediation
<input type="checkbox"/> Construction	<input type="checkbox"/> Maintenance	<input type="checkbox"/> Fabrication
<input type="checkbox"/> Operation	<input type="checkbox"/> Land Clearing	<input type="checkbox"/> Wetland
<input type="checkbox"/> Air Monitoring	<input type="checkbox"/> Restoration	<input type="checkbox"/> Other
Number of Employees Affected:	Soil sample collected? Yes <input type="checkbox"/> No <input type="checkbox"/>	Water sample collected? Yes <input type="checkbox"/> No <input type="checkbox"/>



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Fire – If Applicable			
*Ignition Source:		*Item/Equipment:	
*Method Used to Extinguish:			
<input type="checkbox"/> AFFF	<input type="checkbox"/> Extinguisher	<input type="checkbox"/> Fire Blanket	<input type="checkbox"/> Fire Department
<input type="checkbox"/> Hydrant	<input type="checkbox"/> Mobile Equip	<input type="checkbox"/> Sprinkler System	<input type="checkbox"/> Fire Hose Reel
		<input type="checkbox"/> Suppression Sys	<input type="checkbox"/> Fire Tender
		<input type="checkbox"/> Water truck	<input type="checkbox"/> Other
Business interruption? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, how long?		*Facility Evacuated? Yes <input type="checkbox"/> No <input type="checkbox"/>	*Reportable? Yes <input type="checkbox"/> No <input type="checkbox"/>
NOV/Agency Visit – If Applicable			
*Type: Scheduled <input type="checkbox"/> Unscheduled <input type="checkbox"/> Response to Complaint <input type="checkbox"/>		*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 <input type="checkbox"/> Appearance <input type="checkbox"/> Environmental <input type="checkbox"/> Other <input type="checkbox"/>			
*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)			
<input type="checkbox"/> Action of Fellow Associate	<input type="checkbox"/> Ergonomically Poor Methods	<input type="checkbox"/> Inadequate Housekeeping	<input type="checkbox"/> Inexperience
<input type="checkbox"/> Chemical or Physical Hazards	<input type="checkbox"/> Improper Body Positioning	<input type="checkbox"/> Inadequate Isolation (LOTO)	<input type="checkbox"/> Noise
<input type="checkbox"/> Congested Work Area	<input type="checkbox"/> Improper Housekeeping	<input type="checkbox"/> Inadequate Lighting	<input type="checkbox"/> Physical Condition
<input type="checkbox"/> Defective/Inadequate Tools	<input type="checkbox"/> Improper Tool/Equipment	<input type="checkbox"/> Inadequate PPE Provided	<input type="checkbox"/> Slippery Floors/Walkways
<input type="checkbox"/> Dress/Hair Violation	<input type="checkbox"/> Inadequate Clearance	<input type="checkbox"/> Inadequate Ventilation	<input type="checkbox"/> Temperature Extremes
<input type="checkbox"/> Equip Provided But Not Used	<input type="checkbox"/> Inadequate Guarding	<input type="checkbox"/> Inadequate Warning Systems	<input type="checkbox"/> Other
Unsafe Act (Check All That Apply)			
<input type="checkbox"/> Disconnecting or Impeding Safety Device Operation	<input type="checkbox"/> Horseplay	<input type="checkbox"/> Inattention/Lack of Awareness	<input type="checkbox"/> Poor Job Planning
<input type="checkbox"/> Failure to Follow Procedures or Standards	<input type="checkbox"/> Ignoring Safety Rules	<input type="checkbox"/> JSA Not Followed	<input type="checkbox"/> Servicing of Adjusting Equipment While in Operation



APTIM INCIDENT REPORT

<input type="checkbox"/> Failure to Identify Hazard or Risk	<input type="checkbox"/> Improper Body Mechanics or Position for Task	<input type="checkbox"/> Not Wearing/Improperly Wearing PPE	<input type="checkbox"/> Using Wrong or Defective Tools/Equipment
<input type="checkbox"/> Haste or Shortcuts	<input type="checkbox"/> Improper Method of Performing Job	<input type="checkbox"/> Operating Equipment Improperly	<input type="checkbox"/> Other

What was the underlying cause(s) of the incident? (Describe all personal factors / job factors in detail):

Job Factors (Check All That Apply)

<input type="checkbox"/> Communication - Horizontal	<input type="checkbox"/> Failure to Correct Reported Hazard	<input type="checkbox"/> Inadequate Workstation / Equipment Maintenance	<input type="checkbox"/> Poor Previous Incident Reporting/Investigations
<input type="checkbox"/> Communication – Job Turnover	<input type="checkbox"/> Inadequate Engineering or Workstation Design	<input type="checkbox"/> Infrequently Performing the Activity	<input type="checkbox"/> Work Planning / Preventative Maintenance
<input type="checkbox"/> Communications - Vertical	<input type="checkbox"/> Inadequate Initial or Refresher Training/Instruction	<input type="checkbox"/> Lack of or Incomplete Work Methods	<input type="checkbox"/> Other
<input type="checkbox"/> Contractor Pre-Qualification Process	<input type="checkbox"/> Inadequate Policies, Standards or Procedures	<input type="checkbox"/> Materials / Equipment Purchasing/Vendor Issues	
<input type="checkbox"/> Duration of Activity Too Long	<input type="checkbox"/> Inadequate Supervision for the Activity	<input type="checkbox"/> Non-Approved Contractor	

Personal Factors (Check All That Apply)

<input type="checkbox"/> External Motivation	<input type="checkbox"/> Inexperience	<input type="checkbox"/> Physical Capability Issue	<input type="checkbox"/> Time/Cost Restraints
<input type="checkbox"/> Fears or Phobias	<input type="checkbox"/> Internal Motivation	<input type="checkbox"/> Physical Stress/Fatigue	<input type="checkbox"/> Under Influence of Alcohol
<input type="checkbox"/> Frustration	<input type="checkbox"/> Lack of Knowledge/Skill	<input type="checkbox"/> Poor Judgment	<input type="checkbox"/> Under Influence of Drugs
<input type="checkbox"/> Inattention	<input type="checkbox"/> Mental Stress	<input type="checkbox"/> Poor Reaction Time	<input type="checkbox"/> Other

What failure in the safety management system resulted in the immediate and underlying causes of the incident?

<input type="checkbox"/> Cutting Corners	<input type="checkbox"/> Poor Quality Safety Equipment	<input type="checkbox"/> Violation of Company Policy
<input type="checkbox"/> Inadequate Supervision of Employees	<input type="checkbox"/> Poor Workplace Training	<input type="checkbox"/> Other

Form Originator

Name	Title	Date

Attachment E5

**Safety Personnel Proof of Training and Competency and Certifications of
Employee Medical Surveillance Program Participation**



Certificate of Completion

This certifies successful completion of
HAZWOPER 8 Hour Refresher
29 CFR 1910.120

Name of Training Course

Sean McCutcheon

Name

A handwritten signature in blue ink, appearing to read "S. McCutcheon", written over a horizontal line.

Instructor

08/18/2024

Date



Certificate of Completion

This certifies that

Sean S. McCutcheon

has successfully completed

8 Hour HAZWOPER Supervisor Training

This certificate does not in itself indicate initial 24 or 40 Hour HAZWOPER Training

In Accordance With Federal OSHA Regulation 29 CFR 1910.120(e)(4)

And all State OSHA/EPA Regulations as well including 29 CFR 1926.65 for Construction.

This course is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) (Accreditation # 044)

Jules Griggs

Instructor

1904044278058

Certificate Number

4/4/2019

Issue Date

Julius P. Griggs

Julius P. Griggs
Program Administrator



Craig Hamilton

Training Director

ONLINE TRAINING
GTS
SYSTEMS

Scan this code or visit www.otsystems.net/v to verify certificate.

Annual Refresher Training NOT Required

This course is distributed by HAZWOPERTraining.com (<http://www.hazwopertraining.com/>)

HAZWOPERTraining.com
1100 Burloak Drive, Suite 300 Burlington, ON L7L
<http://www.hazwopertraining.com/>

OEC-7057823

CERTIFICATE OF COMPLETION



SEAN MCCUTCHEON

Has diligently and with merit completed a
30-Hour OSHA Hazard Recognition Training for the Construction Industry Course
on 2/15/2019

from the OSHA Education Center and the American Safety Council Inc.

A handwritten signature in black ink, appearing to read "Jeffrey Pairan".

Director: Jeffrey Pairan

OEC1030-7057823



This card certifies that:
SEAN MCCUTCHEON

has completed a 30-Hour OSHA Hazard Recognition Training
for the Construction Industry.

A handwritten signature in black ink, appearing to read "Jeffrey Pairan".

Director: **Jeffrey Pairan**

A handwritten signature in black ink, appearing to read "Taylor Sikes".

Trainer: **Taylor Sikes**

02/15/2019

Grad. Date:



American Red Cross
Training Services

Certificate of Completion

Sean McCutcheon

has successfully completed requirements for

Adult and Pediatric First Aid/CPR/AED

Date Completed: 10/31/2023

Validity Period: 2 Years

Conducted by: GoRescue Brands, Inc.



To verify certificate, scan code or visit redcross.org/digitalcertificate and enter ID.

Learn and be inspired at LifesavingAwards.org



01CCV8L



3980 Quebec St., 2nd Floor, Denver CO 80207-1633 800-711-2706

Student Affiliation:
CB&I Federal Services
4433

Certificate of Completion

This is to certify that

Sean McCutcheon

has been tested and successfully meets the training requirements for

***40-Hour HAZWOPER
as per 29 CFR 1910.120(e)***

Presented

Monday, June 15, 2015

Compliance Solutions Occupational Trainers, Inc.

Neval Gupta
Vice President

Jeffrey E. Kline
President/CEO

Certificate Number: 754902796

Certificate of Completion

This certifies that

William Seppala

has successfully completed

8 Hour HAZWOPER Refresher Training

Refresher certification does NOT necessarily indicate initial 24 or 40 Hour HAZWOPER certification

In Accordance w/Federal OSHA Regulation 29 CFR 1910.120(e) & (p)

And all State OSHA/EPA Regulations as well including 29 CFR 1926.65 for Construction.

This course (Version 3) is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) (Accreditation # 044).

Safety Unlimited, Inc., Provider #5660170-2, is accredited by the International Association for Continuing Education and Training (IACET) and is accredited to issue the IACET CEU. As an IACET Accredited Provider, Safety Unlimited, Inc. offers CEUs for its programs that qualify under the ANSI/IACET Standard. Safety Unlimited, Inc. is authorized by IACET to offer 0.8 CEUs for this program.

Julius P. Griggs

Julius P. Griggs
Instructor #892

2505145414602

Certificate Number

5/14/2025

Issue Date



Scan this code or visit [safetyunlimited.com/v](https://www.safetyunlimited.com/v) to verify certificate.



UNLIMITED, Inc.
OSHA Compliant Safety Training Since 1993

2139 Tapo St., Suite 228 Simi Valley, CA 93063
(855) 784-2677 or 805 306-8027
<https://www.safetyunlimited.com>



Proof of initial certification and subsequent refresher training is NOT required to take refresher training



certifies that

WILLIAM SEPPALA

has successfully completed

OSHA 30 Hour Construction

and has earned 3 IACET CEUs and 30.3 Contact Hours.

This course was developed and presented by ClickSafety.com, Inc.



I confirm that I personally took the course listed above.

William Seppala
STUDENT SIGNATURE

15515225
SERIAL NUMBER

12/2/2015
COMPLETION DATE

30.25 HOURS
COURSE DURATION

As an Authorized OSHA Outreach Training Provider, ClickSafety verifies that this OSHA Outreach Training course was conducted in accordance with OSHA Outreach Training Program requirements. ClickSafety will document this class to the OSHA Authorizing Training Organization. Upon successful review of the documentation, ClickSafety will provide each student their DOL OSHA card within 90 days of the completion date of the OSHA course.

15515225

THE NATIONAL ENVIRONMENTAL TRAINERS

certify that

Bill Seppala

has satisfactorily passed an exam and completed a 40 hour training course entitled
Hazardous Waste Operations and Emergency Response
meeting the requirements identified in Title 29 CFR 1910.120.

This course is eligible for 3.33 Continuance of Certification (COC) points from the Board of Certified
Safety Professionals.



February 02, 2006

Signature of Instructor

Clay A. Bednarz, MS, RPHH

Certificate of Completion

This certifies that

WILLIAM J. SEPPALA

has successfully completed

8 Hour HAZWOPER Supervisor Refresher Training

This certification alone does NOT indicate INITIAL 8 Hour OSHA Supervisor Training

In Accordance With Federal OSHA Regulation 29 CFR 1910.120(e)(8)

And all State OSHA/EPA Regulations as well including 29 CFR 1926.65 for Construction.

This course (Version 3) is approved for 8 Contact Hours (0.8 CEUs) of continuing education per the California Department of Public Health for Registered Environmental Health Specialist (REHS) (Accreditation # 044)

Safety Unlimited, Inc., Provider #5660170-2, is accredited by the International Association for Continuing Education and Training (IACET) and is accredited to issue the IACET CEU. As an IACET Accredited Provider, Safety Unlimited, Inc. offers CEUs for its programs that qualify under the ANSI/IACET Standard. Safety Unlimited, Inc. is authorized by IACET to offer 0.8 CEUs for this program.

Julius P. Griggs

Julius P. Griggs
Instructor #892

2502025291847

Certificate Number

2/2/2025

Issue Date



Scan this code or visit [safetyunlimited.com/v](https://www.safetyunlimited.com/v) to verify certificate.



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(855) 784-2677 or 805 306-8027
<https://www.safetyunlimited.com>



Proof of initial certification and subsequent refresher training is NOT required to take refresher training

Physician's Written Opinion

HAZWOPER & RESPIRATOR CLEARANCE

Periodic Field Labor FFD



Name: William Seppala	Date: 4.17.25	Social Security Number: XXX-XX-7786
-----------------------	---------------	-------------------------------------

On this date, CORE Health Networks has reviewed the above employee's recent medical examination and associated medical tests in accordance to OSHA 1910.120 pertaining to workers exposed to hazardous wastes and make the following statements:

1. Are there any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health while working in the above job position?
 Yes No
2. Are there any recommended limitations upon the employee's assigned work?
 Yes No
3. Has the employee been informed of the examination results?
 Yes No

MEDICAL RECOMMENDATIONS FOR RESPIRATOR USE

On this date, CORE Health Networks has examined the above employee according to OSHA 1910.134 Federal Regulation pertaining to respiratory protection and make the following statements:

- No limitations have been placed on use of a respirator
- Medically not able to wear a respirator
- May wear a respirator for escape only
- These limitations have been placed on the use of a respirator

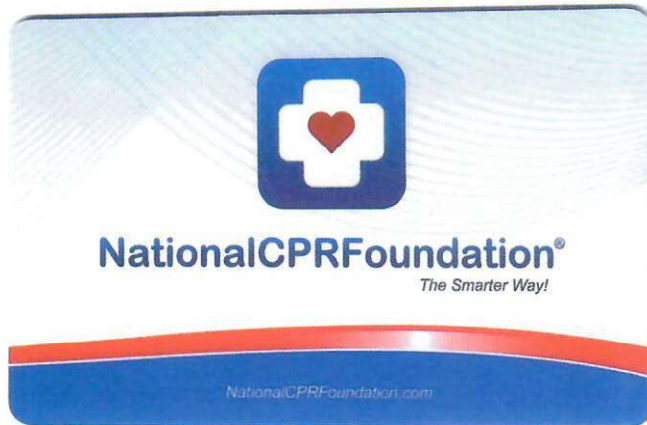
- A copy of this document has been provided to the employee
- A follow-up evaluation is to be scheduled on _____

William J. Nassetta, MD, MPH

4.22.2025
Date

Employee Signature

Supervisor Signature



NationalCPRFoundation®
Provider Card

Student: William Seppala

The student has successfully met the requirements for certification by completing the cognitive training and skills evaluation in the specified course in terms of NCPRF® and in accordance with the corresponding ILCOR, OSHA, and AHA®/ECC guidelines.

ID#: 15DDC1	Date: 12/26/2024
Certificate: CPR / AED / First-Aid	Renew: 12/26/2026

National CPR Foundation® is known for providing life-saving skills training for longer, more lasting lives.



Compliance Solutions

"Today's Training... Tomorrow's Solution"

3980 Quebec St, 2nd Floor Denver, CO 80207-1633 800-711-2706

*Student Affiliation:
CB&I Federal Services
4433*

Certificate of Completion

This is to certify that

William Seppala

has been tested and successfully meets the training requirements for

OSHA Site Supervisor

as per 29 CFR 1910.120

Presented

Friday, June 20, 2014

Compliance Solutions Occupational Trainers, Inc.

Certificate Number: 754884238

Neval Gupta
Vice President

Jeffrey Kline
President/CEO



CERTIFICATE OF COMPLETION

This certifies that

William Seppala

has successfully completed the course
40-hour EM 385-1-1 USACE Safety & Health



Course Duration
40.0



Completion Date
02/14/2024

Samantha Montalbano, Chief Operating Officer

6504 Bridge Point Parkway, Suite 100 | Austin, TX 78730 | www.360training.com

➤ (CUT HERE)

➤ (CUT HERE)

FOLD



This certifies that the person named below
has successfully completed the

William Seppala

40-hour EM 385-1-1 USACE Safety & Health

Samantha Montalbano, Chief Operating Officer

02/14/2024
Completion date

6504 Bridge Point Parkway, Suite 100 | Austin, TX 78730 | www.360training.com

This is your pocket card which may be used as proof of training completion. This training program is intended to provide supplementary job safety training and is not required or approved by any regulatory authority. Please check Federal, State, and local regulations for additional training requirements related to your specific job.

Questions? support@360training.com
visit: www.360training.com/osha-campus



CERTIFICATE OF COMPLETION

This certifies that

William Seppala

has successfully completed the course
ISO 9001:2015 Internal Auditor Training



Course Duration
6.0



Completion Date
02/18/2024

Samantha Montalbano
Samantha Montalbano, Chief Operating Officer

6504 Bridge Point Parkway, Suite 100 | Austin, TX 78730 | www.360training.com

✂ (CUT HERE)

✂ (CUT HERE)

FOLD



This certifies that the person named below
has successfully completed the

William Seppala

ISO 9001:2015 Internal Auditor Training

Samantha Montalbano
Samantha Montalbano, Chief Operating Officer

02/18/2024
Completion date

6504 Bridge Point Parkway, Suite 100 | Austin, TX 78730 | www.360training.com

This is your pocket card which may be used as proof of training completion. This training program is intended to provide supplementary job safety training and is not required or approved by any regulatory authority. Please check Federal, State, and local regulations for additional training requirements related to your specific job.

Questions? support@360training.com
visit: www.360training.com/osha-campus

William J. Seppala

William.seppala@aptim.com
46 Courtney Place Palm Coast, FL 32102
Cell Number: 386-986-7084
Army Corp of Engineers # 3078

BASIC EOD SCHOOL	MAY	81
ADVANCED EOD SCHOOL	SEPT	88
OSHA 40 HR	FEB	06
MILITARY MUNITIONS RULE COURSE	MAR	13
OSHA 8 HR REFRESHER	JAN	24
OSHA HAZWOPER MEDICAL EVALUATION	FEB	24
NATIONAL CPR FOUNDATION 1 st Aid/AED/CPR	DEC	22
CONSTRUCTION QUALITY MANAGEMENT	MAR	19
OSHA 8 HR SITE SUPERVISOR	JUN	14
OSHA 30 HR CONSTRUCTION SAFETY	DEC	15
CB&I SIPP TRAINING	JAN	17
NAVSEA MPPEH CERTIFICATION	JUN	22
EM 385-I-1 CERTIFICATION 40HR	FEB	24

*APR 1981 - OCT 1984: EOD Technician, 31st EMS Homestead AFB, FL

*DEC 1984 - SEP 1987: Instructor of Basic Demolitions (Division N6) at NAVSCOLEOD, Indianhead NOS, Md. Instructed military students in procedures for Basic demolition, to include disposal, burning & venting.

*SEP 1987 - OCT 1989: Master Instructor in Nuclear Weapons (Division N14) at NAVSCOLEOD, Indianhead NOS, Md.

* SEPT 2004 -- AUG 2007: UXO Tech II, Northrop Grumman at PineCastle Range Complex, Ocala, FL.

*AUG 2007 – AUG 2010: UXO Tech III (Team Leader), Northrop Grumman at PineCastle Range Complex, Ocala, FL.

*AUG 2010 – DEC 2012: Senior UXO Supervisor, Northrop Grumman at PineCastle Range Complex, Ocala, FL.

*DEC 2012—MAR 2013: UXO Tech III (Team Leader) ORC program, Emerald State Environmental, PineCastle Range, Ocala, FL.

*APR 2013---JUN 2013: UXO Tech III (Asst. Team Leader) ORC operation, CB&I at Camp LeJuene, NC.

*JUL 2013---JUL 2013: UXO Tech III, Construction Support, CB&I at St. Julienne's Creek, Va.

*AUG 2013-NOV 2013: UXO Tech III, DGM investigations & processing, CB&I at Redstone Arsenal, AL.

*NOV 2013—DEC 2013: UXO Tech III (Team Leader) Legacy Munitions Site excavation & Demo Supervisor, CB&I at Ft. Hunter Liggett, Ca.

*JAN 2014—MAY 2014: UXO Tech III (Team Leader) Surface Clearance w/ Schonstedt Assist, CB&I at Redstone Arsenal, AL.

*JUN 2014---OCT 2014: UXO Tech III (Team Leader) Transect Investigation, Demo Supervisor & DGM investigation/processing, CB&I at Camp Hale, Co.

*JAN 2015---MAR 2015: UXO Tech III (Team Leader) MPPEH Processing & Demo Supervisor, CB&I at Yuma, Az

*APR 2015—FEB 2016: UXO Tech III (Team Leader) ORC operation, Demo Supervisor & Interim UXO safety/UXOQC, CB&I at Camp Pendleton, Ca.

*FEB 2016---May2016: UXO Safety Officer/ UXOQCS, ORC operation, CB&I at Camp Pendleton, Ca.

*JUN 2016—JUL 2016: UXO Tech III (Team Leader) RCRA Investigation, CB&I at Redstone Arsenal, AL.

William J. Seppala

- *AUG 2016—FEB 2017: UXO Safety Officer/ UXOQCS, RCRA Investigation, CB&I at Redstone Arsenal, Al.
- *FEB 2017---FEB 2017: UXO Safety Officer/ UXOQCS, RAC #07 Subsurface Investigations & Clearance, CB&I at Dam Neck, Va.
- *MAR 2017-MAR 2017: Interim SUXOS, ORC operation, CB&I at Camp Pendleton, Ca
- *APR 2017-OCT 2017: UXO Safety Officer/SSHO, Non-Time Critical Removal Action, CB&I at Adak, Ak
- *NOV 2017-DEC 2017: Field Foreman/Inspector, FEMA Flood Response Action, APTIM at Beaumont Tx.
- *FEB 2018-MAR 2018: UXO Tech. III, Surface UXO Clearance, DGM & Intrusive Investigations, APTIM at Quantico, Va.
- *APR 2018-OCT 2018: UXO Safety Officer/SSHO, Non-Time Critical Removal Action, APTIM at Adak, Ak
- *NOV 2018-NOV 2018: UXO Tech III, Construction Support/Escort Bronco Pipeline, APTIM at Denver, Co.
- *DEC 2018-DEC 2018: UXO Tech III, Construction Support/Escort, Well Installation, APTIM at St. Julienne's Creek Annex, Va.
- *JAN 2019-JAN 2019: UXO Tech III, Construction Support/Excavation Site in Explosive Disposal Area, APTIM at Crane, In.
- *FEB 2019-MAR 2019: UXO TECH III, Team Leader for Intrusive Anomaly Investigation, APTIM at Quantico, Va.
- *APR 2019- OCT 2019: UXO Safety Officer/SSHO, Non-Time Critical Removal Action, APTIM at Adak, Ak
- *OCT 2019- NOV 2019: UXO Safety Officer/UXOQCS, Munitions Removal Site, APTIM at Cheatham Annex, Va.
- *FEB 2020- APR 2020: Senior UXO Supervisor, MILCON P-815 Mortar Target Remediation, APTIM at Oceana NAS, Va.
- *JUN 2020- JUN 2020: UXO Safety Officer/UXOQCS, MILCON P-777 Site Characterization, APTIM at Point Mugu, Ca.
- *JUN 2020- JUL 2020: UXO Tech III, Construction Support, APTIM at George AFB, Ca.
- *JUL 2020- JUL 2020: UXO Tech III, Construction Support, APTIM at Camp Peary, Va.
- *JUL 2020- AUG 2020: Senior UXO Supervisor, Munitions Removal Site, APTIM at Cheatham Annex, Va.
- *AUG 2020- SEP 2020: UXO Safety Officer/UXOQCS, MILCON P-777 Munitions Removal Site, APTIM at Point Mugu, Ca.
- *FEB 2021-APR 2021: UXO Safety Officer/UXOQC Manager, APTIM at Crane NSA, Indiana
- *APR 2021-OCT 2021: UXO Safety Officer/SSHO, Non-Time Critical Removal Action, APTIM at Adak, Ak.
- *OCT 2021-NOV 2021: UXO Safety Officer/UXOQCS, Munitions Removal & Screening, APTIM at Camp Peary, Va.
- *MAR 2022-OCT 2022: UXO Safety Officer/SSHO, Non-Time Critical Removal Action, APTIM at Adak, Ak
- *NOV 2022-APR 2023: Disaster Response & Recovery, Manager of Staging Yard @ Volusia County, Fl.
- *APR 2023-AUG 2023: Senior UXO Supervisor, Remedial Investigation (Chemical), Dugway Proving Grounds, Ut.
- *SEP 2023-SEP 2023: UXO Tech III, Subsurface Clearance in ICM Grids, Chocolate Mountains, Ca.
- *DEC 2023- DEC 2023: Senior UXO Supervisor, Civil Survey of SMWU 01 & SMWU 25, Tooele Army Depot, Ut.
- *FEB 2024- APR 2024: Senior UXO Supervisor, RSA-312 Sub-surface Clearance action, Redstone Arsenal, Huntsville, Al.
- *JUL 2024- Present: Senior UXO Supervisor, Southern Triangle DPG R.I./F.S. Chemical, Dugway Proving Grounds, Ut.

U. S. Army

Missile & Munitions School

Redstone Arsenal, Alabama



Certificate

William J. Seppala AB

has successfully completed a course of 2 weeks duration

in

EXPLOSIVE ORDNANCE DISPOSAL PHASE I (4E-F3/431-55D10)

at the

U.S. Army Missile And Munitions Center And School

28 October 1980

Harry L. Foradori
HARRY L. FORADORI
Colonel, Ordnance Corps
Commandant

Naval School Explosive Ordnance Disposal



This certifies that

Airman William J. Seppala, 118-58-7786, USAF

**having successfully completed
the prescribed course of study for**

**EXPLOSIVE ORDNANCE DISPOSAL SPECIALIST -
G5ABN46430**

**is awarded this
Certificate**

this 10th **day of** April **A.D.** 1981

J. T. Kennedy, CAPT, USN
COMMANDING OFFICER

Attachment E6

Safety and Occupational Health Deficiency Tracking Log

Attachment E7

Preliminary Accident Notification – Accident Notification Feeder Report

**U.S. Army Corps of Engineers (USACE)
MISHAP NOTIFICATION AND INVESTIGATION**

**Requirement Control Symbol
RCS-CESO-21-0001**

For use of this form, see instructions in the attachments and USACE ER 385-1-99; the proponent agency is CESO.

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority 10 U.S.C. 7013, Secretary of the Army; 5 U.S.C. 7902, Safety Programs; Public Law 91-596, Occupational Safety and Health Act of 1970; DoD Instruction 6055.1, DoD Safety and Occupational Health Program; Army Regulations 385-10, Army Safety Program; DoD Instruction 6055 .07, Mishap Notification, Investigation, Reporting, and Record Keeping; and E.O. 9397 (SSN), as amended.

Principal Purpose Information collected is to provide the USACE leaders, soldiers, families and civilians in injury, illness, and loss data to effectively manage its safety and occupational health program.

Routine Uses In addition to those disclosures generally permitted under 5 U.S.C. 552a(b) of the Privacy Act of 1974, these records or information contained therein may specifically be disclosed outside the DoD as a routine use pursuant to 5 U.S.C. 552a(b) as follows: To the Department of Labor, the Federal Aviation Agency, the National Transportation Safety Board, and to Federal, State, and local agencies and applicable civilian organizations, such as the National Safety Council, for use in a combined effort of accident prevention. In some cases, data must also be disclosed to an employee's representative under the provisions of 29 CFR 1960.29. Records will be made available consistent with applicable laws and regulations. Information will be withheld from the public only if authorized by 5 U.S.C. Section 552 (Freedom of Information Act (FOIA), 5 U.S.C. 552a (Privacy Act)), or other statutory or regulatory authority.

Disclosure Failure to provide all the required information on the report may result in the rejection of report submission.

1. WHO IS REPORTING MISHAP

a. Name:		b. Phone number:	
c. Email address:		d. Signature:	
e. Report type:	<input type="checkbox"/> 1. Near Miss Report. <i>(No injury/illness, or property damage. Complete all fields with underlined text.)</i>	Date:	
	<input type="checkbox"/> 2. Initial Accident Report. <i>(For accident notification within 24 hrs, Complete all fields with underlined text.)</i>	Date:	
	<input type="checkbox"/> 3. Final Accident Report. <i>(For reporting findings from accident investigation, complete full form.)</i>	Date:	
f. Mishap Type. <i>(Check all that apply)</i>			
<input type="checkbox"/> Fatality	<input type="checkbox"/> Injury/Illness	<input type="checkbox"/> Property Damage	<input type="checkbox"/> Near Miss
g. Were any of the following items associated with the mishap? <input type="checkbox"/> Yes <input type="checkbox"/> No <i>(If yes, check all that apply)</i>			
<input type="checkbox"/> Electrical and/or Hazardous Energy	<input type="checkbox"/> Working at Heights	<input type="checkbox"/> Diving	<input type="checkbox"/> Load Handling Equipment or Rigging
<input type="checkbox"/> Occupational Health Exposure			

2. WHO WAS INVOLVED IN THIS MISHAP?

a. Name:		
b. Personnel Classification:		c. Time employee began work:
d. Gender:	e. Date of birth <i>(for Government personnel only):</i>	f. Age:
g. Date hired:	h. Primary language:	
i. Is individual a supervisor? <input type="checkbox"/> Yes <input type="checkbox"/> No	j. Duty status at time of mishap:	k. Years experience in job:
l. What was individual doing when mishap occurred? <i>(Select activity from the drop downs below.)</i>		
1. General activities:		2. Vehicle/Equipment/Vessel:
3. Sports/Recreation:		4. Other not listed:
m. Did individual utilize all OSHA/EM 385-1-1 required Personal Protective Equipment (PPE) for activity? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
If no, identify missing PPE:		
n. Was a Personal Flotation Device used? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	o. Was a seat belt used? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	

p. Government personnel only:		
1. Job series:	2. Rank:	3. Grade:
4. Center/Division/Lab:		5. District:
q. Contractor personnel only:		
1. Employer/Contractor name:		
2. Individual's occupation/trade:		Other not listed:
r. If mishap occurred on a contractor site, provide the following:		
1. Prime Contractor name:		
2. Contract number:	3. Contract type:	4. Funding type:
3. WHAT TYPE OF INJURY/ILLNESS OCCURRED?		
a. Severity of injury/illness?		b. Type of Injury/Illness:
c. Identify body part(s) affected by injury/illness:		
Primary body part affected:		Secondary body part affected:
d. Identify cause and source of injury/illness:		
Cause of injury/illness:		Source of injury/illness:
e. Was employee treated by a physician or health care professional provider? <input type="checkbox"/> Yes <input type="checkbox"/> No		
If yes, provide name of physician or health care professional provider?		
f. Was treatment given away from work site? <input type="checkbox"/> Yes <input type="checkbox"/> No		g. Was employee treated in an emergency room? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
h. If treatment was given away from the work-site, where was it given? (For Government Personnel Only)		
Treatment facility name:		
Address:		
City:	State:	Zip: Country:
i. Was employee hospitalized as an in-patient? <input type="checkbox"/> Yes <input type="checkbox"/> No		If yes, how many nights? Was OSHA notified? <input type="checkbox"/> Yes <input type="checkbox"/> No
Note: OSHA requires reporting all work-related fatalities within 8 hours and in-patient hospitalizations, amputations and loss of an eye within 24 hours to OSHA.		
j. Estimated days away from work:		k. Estimated days of restricted/transferred duty:
4. WHAT HAPPENED?		
a. What was the primary activity occurring at the time of the mishap?		
Other, not listed:		
b. What happened? Provide a detailed description of the mishap. (Do not include any personally identifiable information (name, etc..))		
Note: Provide supporting photos, charts, diagrams, etc. with this report.		
c. What other organizations or agencies have been notified about this mishap?		

5. WHAT TYPE OF PROPERTY/MATERIAL WAS INVOLVED?			
a. List all property/material involved in the mishap. (Include damaged and undamaged property.)			
	<i>Item A</i>	<i>Item B</i>	<i>Item C</i>
i. Type of item:			
Other not listed:			
ii. Name of item(s):			
iii. Collision type:			
Other not listed:			
iv. Ownership of item:			
v. Dollar cost of damage:			
6. WHEN DID THE MISHAP OCCUR?			
a. Date the mishap occurred:		b. Time mishap occurred:	
c. What day did mishap occur on?		d. What period of day did mishap occur?	
7. WHERE DID THE MISHAP OCCUR?			
a. Did the mishap occur on a military Base/Post? <input type="checkbox"/> Yes <input type="checkbox"/> No			
b. USACE Office/Program/Project name:			
c. Select the location type most closely associated with the mishap:			
d. Identify exact location where mishap occurred:			
Address:			
City:		State:	Zip: Country:
e. Latitude:		f. Longitude:	
8. WHY DID THE MISHAP OCCUR? (Recommend completing this section for Near Misses.)			
A. Performance Causal Factors			
1. Did a problem with performance contribute to this mishap occurring? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, select the error that contributed most to the mishap:			
2. Describe action(s) taken, anticipated or recommended to eliminate cause(s):			
B. Support Causal Factors			
1. Did a problem with resources contribute to this mishap occurring? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, select the error that contributed most to the mishap:			
2. Describe action(s) taken, anticipated or recommended to eliminate cause(s):			
C. Standards/Policy/Planning Causal Factors			
1. Did an organizational standard/policy/or plan contribute to this mishap occurring? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, select the error that contributed most to the mishap:			
2. Was a written Activity Hazard Analysis (AHA) or equivalent completed and accepted by Government Designated Authority (GDA) for task(s) being performed at time of mishap? (If yes, attach a copy to this report) <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, was the AHA available and used by worker? <input type="checkbox"/> Yes <input type="checkbox"/> No			
3. Was a written work plan (critical lift plan, fall protection plan, etc.) required, completed and accepted by the GDA for task(s) being performed at time of mishap? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, was the plan available and used by worker? <input type="checkbox"/> Yes <input type="checkbox"/> No			

4. Describe action(s) taken, anticipated or recommended to eliminate cause(s):

D. Training Causal Factors

1. Did a problem with training contribute to this mishap occurring? Yes No

If yes, select the error that contributed most to the mishap:

2. Was individual trained to perform the activity/task? Yes No

If yes, select type of training: Classroom Certification/License On the job

Other, describe:

What was date of most recent training?

3. Describe action(s) taken, anticipated or recommended to eliminate cause(s):

E. Leader/Supervisor Causal Factors

1. Did any leader/supervisory mistake/task error contribute to this mishap occurring? Yes No

If yes, select the error that contributed most to the mishap:

2. Did the safety climate/culture contribute to the mishap? Yes No

3. Did challenges with teamwork contribute to the mishap? Yes No

4. Describe action(s) taken, anticipated or recommended to eliminate cause(s):

F. Individual Causal Factors

1. Did any individual mistakes/task errors contribute to this mishap occurring? Yes No

If yes, select the error that contributed most to the mishap:

2. Describe action(s) taken, anticipated or recommended to eliminate cause(s):

G. Physical Environment Causal Factors

1. Did any physical environment contribute to this mishap occurring? Yes No

If yes, select the error that contributed most to the mishap:

2. Describe action(s) taken, anticipated or recommended to eliminate cause(s):

H. Material Causal Factors

1. Did any material failure contribute to this mishap occurring? Yes No

If yes, select the error that contributed most to the mishap:

2. Which failure is most closely associated with the material failure/malfunction?

3. Describe action(s) taken, anticipated or recommended to eliminate cause(s):

I. Environmental Causal Factors

1. Did any environmental condition contribute to this mishap occurring? Yes No

If yes, select the factor that contributed most to the mishap:

2. Describe action(s) taken, anticipated or recommended to eliminate cause(s):

J. Facility/Building Design

1. Did the design of the facility/building contribute to the mishap? Yes No

If yes, describe:

2. Describe action(s) taken, anticipated or recommended to eliminate hazard:

K. Existing Hazard

1. Did a hazard(s) contribute to the mishap? Yes No

If yes, describe the hazard(s):

2. Describe action(s) taken, anticipated or recommended to eliminate hazard(s):

9. Corrective Action plan

a. Have all corrective action(s) to prevent mishap recurrence been completed? Yes No

b. Who is responsible for the corrective action plan?

c. What date will/have all corrective action(s) be/been completed by:

d. Additional information:

10. Additional Information

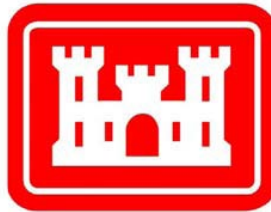
APPENDIX F

EROSION AND STORMWATER CONTROL BEST MANAGEMENT PRACTICES

Appendix F

**Alabama Best Management Practices
Corrective Measures at RSA-313-R-01
Western Side of Former High Explosive Drop Area A
Operable Unit 15
U.S. Army Garrison-Redstone
Madison County, Alabama
EPA ID No. AL7 210 020 742**

Prepared for:



**U.S. Army Engineering and Support Center
Huntsville**

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Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas. Auburn, AL, July 2022.

Site Preparation

- A. Construction Exit Pad (CEP)

Surface Stabilization

- B. Groundskeeping (GK)
- C. Mulching (MU)
- D. Permanent Seeding (PS)
- E. Temporary Seeding (TS)

Other

- F. Corrective Action Log

A. Construction Exit Pad (CEP)

Construction Exit Pad (CEP)



Practice Description

A construction exit pad is a stone base pad or manufactured product designed to provide a buffer area where mud and caked soil can be removed from the tires of construction vehicles to avoid transporting it onto public roads. This practice applies anywhere traffic will be leaving a construction site and move directly onto a public road or street.

Typical Components of the Practice

- Site Preparation
- Grading
- Stabilization with Geotextile Fabric (where needed to provide stability)
- Aggregate Placement
- Construction Verification
- Maintenance

Construction

Prior to start of construction, temporary gravel construction entrance/exit pads should be designed by a qualified design professional and plans and specifications should be available to field personnel.

Site Preparation

Remove all vegetation and other unsuitable material from the foundation area.

Grading

Grade and crown the area for positive drainage.

Utilize a diversion to direct any surface flow away from the construction exit pad.

Install pipe under the pad if needed to maintain drainage ditches along public roads.

Divert all construction exit pad runoff and drainage to a sediment trap or basin.

Stabilization

If project specified, or if wet conditions or soft soils are anticipated, place non-woven geotextile fabric on the graded foundation prior to placing the aggregate to improve stability.

Aggregate Placement

Place specified stone size to lines and grade shown on plans. Leave surface smooth and sloped for drainage.

Construction Verification

Check all components during construction and installation to ensure that specifications are being met for the components.

Common Problems

Consult with a qualified design professional if any of the following occur:

- Inadequate runoff control and sediment washes onto public road: install diversions or other runoff control measures.
- Ruts and muddy conditions develop as stone are pressed into soil; increase stone size or pad thickness, or add geotextile fabric.
- Pad too short for heavy construction traffic: consult design professional about extending pad to the necessary length.

aintenance

Remove large chunks of mud or caked soil from construction exit pad daily to minimize sediment buildup.

Inspect stone pad and sediment disposal area weekly and after storm events or heavy use.

Reshape pad as needed for drainage and runoff control.

Top-dress with clean specified stone as needed to maintain effectiveness of the practice.

Immediately remove mud or sediment tracked or washed onto public road.
Repair any broken road pavement immediately.

Remove unneeded exit pad materials from areas where permanent vegetation will be established.

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B. Groundskeeping (GK)

Groundskeeping (GK)



Practice Description

Groundskeeping or “good housekeeping” describes the various activities and measures, in addition to the specific practices used for erosion and sediment control that are essential during construction for the protection of environmental quality. Groundskeeping is applicable at all construction sites.

Typical Components of the Practice

Prior to the start of construction, Groundskeeping activities and measures should be identified by a qualified design professional and included in the construction and pollution prevention plan. The essential components of Groundskeeping should be provided to the prime contractor for a project. Groundskeeping activities and measures essential at construction sites vary based on the complexity of the site and the project. Groundskeeping typically includes the following activities and measures:

- Inspections During Construction/Installation of Erosion and Sediment Control and Stormwater Measures (BMPS)
- Spill Prevention and Material Management
- Spill Controls

- Other Potential Activities and Measures (examples: removal of contaminated soils, management of hazardous products, protection of air quality, etc.)

Details about Components

Inspections of BMPs

Inspections should be made regularly and timely to ensure that erosion and sediment control and stormwater management practices are performing as planned and whether or not maintenance is needed. In addition, inspections and reports should meet local and state requirements.

Spill Prevention and Material Management

Alabama Department Environmental Management (ADEM) regulations require that an operator/owner implement a Spill Prevention Control and Counter Measures (SPCC) Plan for all temporary and permanent onsite fuel or chemical storage tanks or facilities to address the safe storage, handling and cleanup of petroleum products and other chemicals.

All vehicles kept on the site need to be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage.

If petroleum products are stored on site, a secondary containment facility will be required if the cumulative storage capacity of all tanks, greater than 55 gallons, at the site exceeds 1,320 gallons. The secondary containment facility must be designed by a qualified design professional.

Petroleum products should be stored in labeled tightly sealed containers.

Any asphalt substances used on-site should be applied according to the manufacturer's recommendations.

Locate petroleum-based activities as far away as possible from waters of the State and stormwater inlets or conveyances so that stormwater coming into contact with these activities cannot reach water of the State. No fueling, servicing, maintenance, or repair of equipment or machinery should be done within 50 feet of a stream, or within 100 feet of a stream classified for public water supply (PWS) or Outstanding Alabama Water (OAW), or designated as an Outstanding National Resource Water (ONRW) or a sinkhole.

Only designated entrances should be used for construction access to the site. Mud tracked from the site onto streets and roads should be cleaned on a daily basis if needed. Only use “dry” methods like sweeping to remove mud from streets. DO NOT use water to flush mud from the street.

Concrete trucks should be allowed to wash only in locations where discharge is appropriately contained and meets any applicable regulatory requirements. All

the concrete truck washout or waste discharge on-site must be contained to be properly removed, recycled, or disposed of later. Containment can be in the form of metal, vinyl, plastic, or poly lined containers or pits, filter bags, or manufactured products. It is best to use proper signage at the concrete washout location. It is not permissible to discharge concrete wash directly to streams or storm drains. Concrete wash can contain sediment, as well as, alkalinity and chemical additives that could be harmful to fish, stream bottom macroinvertebrates and wildlife.

No fuels, oils, lubricants, solvents, or other hazardous materials can be disposed of on the site. All hazardous material must be properly disposed of in accordance with state law.

Waste containers should be located as far away as possible from waters of the State and stormwater inlets or conveyances so that stormwater coming into contact with these activities cannot reach water of the State. The General Contractor is responsible for disposing of all solid waste from the site in accordance with State law. Dumpsters or other collection facilities must be provided as needed. Solid waste may not be buried on the site.

Portable toilets should be located so that accidental spills will not discharge into a storm sewer or concentrated flow area.

Water for pressure testing sanitary sewers, flushing water lines, etc., may be discharged only in approved areas and to prevent discharging to surface waters. Discharge of hydrostatic test water may require additional permitting, particularly if chlorinated public water is used.

Spill Controls

The operator/owner is expected to maintain on-site or have readily available sufficient oil & grease absorbing material and flotation booms to contain and clean-up fuel or chemical spills and leaks.

Equipment and materials include, but are not limited to brooms, dust pans, mops, rags, gloves, goggles, absorbent clay, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

Spills of toxic or hazardous material must be reported immediately. The operator/owner is required to immediately notify ADEM after becoming aware of a significant spill/leak or visible oil sheen in the vicinity of the construction activity. In the event of a spill with the potential to impact groundwater or other waters of the State, the operator/owner is expected to immediately call the National Response Center (NRC) at 1-800-424-8802 and the Alabama Emergency Management Agency (AEMA) at 1-800-843-0699. The caller should be prepared to report the name, address and telephone number of person reporting spill, the exact location of the spill, the company name and location, the material spilled, the estimated quantity, the source of spill, the cause of the spill, the nearest downstream water with the potential to receive the spill, and the actions taken for containment and cleanup.

All spills need to be cleaned up immediately after discovery and properly containerized for proper disposal. Refer to Material Safety Data Sheets for safe handling procedures. Burial is not acceptable.

The spill area must be kept well ventilated and personnel need to wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

The spill prevention plan needs to be adjusted to include measures to prevent any spill from being repeated, and the plan needs to show how to clean up the spill if another one does occur.

Removal of Contaminated Soils and Underground Storage Tanks

Site assessment and removal of contaminated soils and underground storage tanks should be done following a site assessment based on procedures provided by the Alabama Department of Environmental Management.

Management of Hazardous Products

Products must be kept in original containers unless they are not resealable. If a product is transferred to a new container, it must be properly marked and labeled.

Original labels and Material Safety Data Sheets should be retained until the related product is no longer on the site.

If surplus product must be disposed of, disposal must be done in accordance with state (Alabama Department of Environmental Management regulations).

Protection of Air Quality

Smoke

Burning on the site may require a permit from the Alabama Forestry Commission. County and city ordinances may also apply. Starting disposal fires with diesel fuel, petroleum products, or old tires is not a recommended practice. Burn pits with fans to generate hot disposal fires decreases the fire time and minimizes smoke. Burning may be prohibited by State “burn bans” to reduce potential for ground-level ozone.

Dust

Dust should be controlled if it will create a problem either on or off of the site. If measures are not included in the site design plan see the practice Dust Control for potential measures to use to eliminate or minimize dust.

Other Good Groundskeeping Practices

The following measures may be needed:

- All materials stored on-site should be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products should be kept tightly sealed in their original containers with the original manufacturer's label.
- Whenever possible, all of a product should be used up before disposing of the container.
- Manufacturer's recommendations for proper use and disposal must be followed. See Material Safety Data Sheets for product of concern.

The site superintendent or a designated employee should inspect daily to ensure proper usage, storage, and disposal of material.

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C. Mulching (MU)

Mulching (MU)



Practice Description

Mulching is the application of plant residues such as straw or other suitable materials to the soil surface to minimize erosion. Mulching is used to support permanent and temporary seeding and, also, to provide short-term cover without seeding.

Typical Components of the Practice

- Site Preparation
- Application of Material
- Installation Verification
- Maintenance

Installation

Mulching should be designed by a qualified design professional and plans and specifications should be made available to field personnel prior to start of construction.

Site Preparation

Divert runoff water from areas above the site that will be mulched.

Remove stumps, roots and other debris from the construction area.

Grade area as needed to permit the use of equipment for seeding, mulching and maintenance. Shape area so that it is relatively smooth.

If the area will be seeded, follow seeding specifications in the design plan and apply mulch immediately after seeding.

Application of Material

Spread straw mulch, preferably cereal grain, uniformly over the area with a power blower, hydroseeder or by hand. Mulch should be uniformly spread and not clumped in piles. In a seeded area, about 25% of the ground surface should be visible after mulching. It is important when mulching a seeded area that an excessive quantity of straw is not applied – too much mulch will retard or reduce the future stand. When mulch is used for erosion control without seeding, 100% of the soil surface should be covered.

Hydraulic Erosion Control Products (HECPs) as defined by the Erosion Control Technology Council (ECTC) are also used for mulch and should be applied with the appropriate equipment and at the recommended or specified rates.

Apply mulches at the rates shown in the plan or in Table MU-1 if there is not a plan.

Anchor straw or wood cellulose mulch by one of the following methods:

- Crimp with a mulch anchoring tool, as near on the contour as practical, to punch the straw into the soil.
- Tack with a liquid tackifier designed to hold mulch in place. Use suitable spray equipment and follow manufacturer's recommendations.
- In more erosive areas, cover with netting, using a degradable natural or synthetic mesh. The netting should be anchored according to manufacturer's specifications (see Erosion Control Blanket practice).
- On steep slopes and other areas needing a higher degree of protection, use heavy natural nets without additional mulch, synthetic netting with additional mulch or erosion control mats/blankets. These areas include grassed waterways, swales and diversion channels.
- Install netting and mats/blankets according to manufacturer's specifications making sure materials are properly anchored (see Erosion Control Blanket). Verify wildlife friendly netting when specified.

Table MU-1 Mulching Materials and Application Rates

Material	Rate Per Acre and (Per 1000 ft.²)	Notes
Straw (with Seed)	1 ½ - 2 tons (70 lbs - 90 lbs)	Spread by hand or machine; anchor when subject to blowing.
Straw Alone (no seed)	2 ½ - 3 tons (115 lbs - 160 lbs)	Spread by hand or machine; anchor when subject to blowing.
Wood Chips	5-6 tons (225 lbs - 270 lbs)	Treat with 12 lbs. nitrogen/ton.
Bark	35 cubic yards (0.8 cubic yard)	Can apply with mulch blower.
Pine Straw	1-2 tons (45 lbs - 90 lbs)	Spread by hand or machine; will not blow like straw.
Peanut Hulls	10-20 tons (450 lbs - 900 lbs)	Will wash off slopes. Treat with 12 lbs. nitrogen/ton.
HECPs	0.75 – 2.25 tons (35 lbs – 103 lbs)	Refer to ECTC or Manufacturer's Specifications.

Installation Verification

Check materials and installation for compliance with specifications.

Common Problems

Consult with qualified design professional if either of the following occurs:

- Variations in topography on site indicate the mulching materials will not function as intended; changes in plan may be needed.
- Design specifications for mulching materials or seeding requirements cannot be met; substitution may be required. Unapproved substitutions could result in erosion or seeding failure.

Problems that require remedial actions:

- Erosion, washout, and poor plant establishment; repair eroded surface, reseed, re-mulch and anchor mulch.
- Mulch is lost to wind or stormwater runoff; reapply mulch and anchor appropriately by crimping, netting, or tacking.

Maintenance

Inspect all mulched areas periodically and after rainstorms for erosion and damage to the mulch. Repair promptly and restore to original condition. Continue inspections until vegetation is well established. Keep mower height high if netting is used to prevent netting from wrapping around mower blades or shaft.

D. Permanent Seeding (PS)

Permanent Seeding (PS)



Practice Description

Permanent seeding is the establishment of perennial vegetation from seed. This practice is used when vegetation is desired and appropriate to permanently stabilize the soil.

Typical Components of the Practice

- Scheduling
- Seedbed Preparation
- Applying Soil Amendments (lime and fertilizer)
- Planting
- Mulching or Installation of Erosion Control Blanket
- Installation Verification
- Maintenance

Installation

Prior to start of construction, plant materials, seeding rates and planting dates should be specified by a qualified design professional. Plans and specifications should be referred to by field personnel throughout the installation process.

Permanent seeding should be made during the specified planting period whenever possible. When sites are only available for planting outside of the recommended planting period, either an out-of-season permanent seeding, a temporary seeding, mulching or chemical stabilization should be applied. If lime and fertilizer application rates are not specified, take soil samples during final grading from the top 6" in each area to be seeded. Submit samples to a soil testing laboratory for lime and fertilizer recommendations.

Scheduling

The schedule for work at the site should consider the recommended planting period and whenever practical the site work should accommodate seeding during the recommended planting period.

Seedbed Preparation

Grade and loosen the soil to a smooth firm surface to enhance rooting of seedlings and reduce rill erosion. Break up large clods and loosen compacted, hard or crusted soil surfaces with a disk, ripper, chisel, harrow or other tillage equipment. Avoid preparing the seedbed under excessively wet conditions to minimize compaction. Operate the equipment on the contour.

For either broadcast seeding or drill seeding, the tillage, as a minimum, should adequately loosen the soil to a depth of at least 6", alleviate compaction, and smooth and firm the soil for the proper placement of seed.

For no-till drilling, the soil surface should not be loosened unless the site has surface compaction and if compaction exists, special care with soil loosening will be needed to retain the desired residue on the soil surface.

Incorporate lime and fertilizer to a depth of at least 6" with a disk or rotary tiller on slopes of up to 3:1. On steeper slopes, lime and fertilizer may be applied to the surface without incorporation. Lime and fertilizer may be applied through hydroseeding equipment; however, fertilizer should not be added to the seed mixture during hydroseeding. Liming materials such as liquid lime may be added with the seed mixture.

Liming

Follow the design plan or soil test recommendation. If a plan or soil test is not available, use 2 tons/acre of ground agricultural lime on clayey soils (approximately 90 lbs/acre) and 1 ton/acre on sandy soils (approximately 45 lbs/acre). Exception to situation without a design or a soil test: If the cover is tall fescue and clover, use 2 tons of agricultural lime (approximately 135 lbs/1000 ft²) on both clayey and sandy soils.

Spread the specified amount of lime and incorporate into the top 6" of soil after applying fertilizer.

Fertilizing

Apply a complete fertilizer at rates specified in the design plan or as recommended by soil tests. In the absence of soil tests, use the following as a guide:

Grass Alone

Use 8-24-24 or equivalent – apply 400 lbs/acre (approximately 9 lbs/1000 ft²) starting. When vegetation has emerged to a stand and is growing, 30 lbs/acre (approximately 0.8 lbs/10000 ft²) of additional nitrogen fertilizer should be applied.

Grass-Legume Mixture

Use 5-10-10 or equivalent – apply 800 - 1200 lbs/acre (approximately 18 – 27 lbs/1000 ft²).

Legume Alone

Use 0-20-20 or equivalent – apply 400 - 600 lbs/acre (approximately 9 – 14 lbs/1000 ft²) at planting.

Note: Fertilizer can be blended to meet exact fertilizer recommendations. Take soil test recommendations to local fertilizer dealer for bulk fertilizer blends. This may be more economical than bagged fertilizer.

Planting

Plant the species specified in the plan at the rate and depth specified. In the absence of plans and specifications, plant species and seeding rates may be selected by qualified persons using Figure PS-1 and Table PS-1.

Apply seed uniformly using a cyclone seeder, drop-type spreader, drill, cultipacker seeder or hydroseeder.

When using a drill seeder, plant grasses and legumes ¼” to ½” deep. Calibrate equipment in the field.

When planting by methods other than a drill seeder, cover seed by raking, or dragging a chain, brush, or mat. Then firm the soil lightly with a roller. Seed can also be covered with hydro-mulched wood fiber and tackifier. Legumes require inoculation with nitrogen-fixing bacteria to ensure good growth. Purchase inoculum specific for the seed and mix with seed prior to planting.

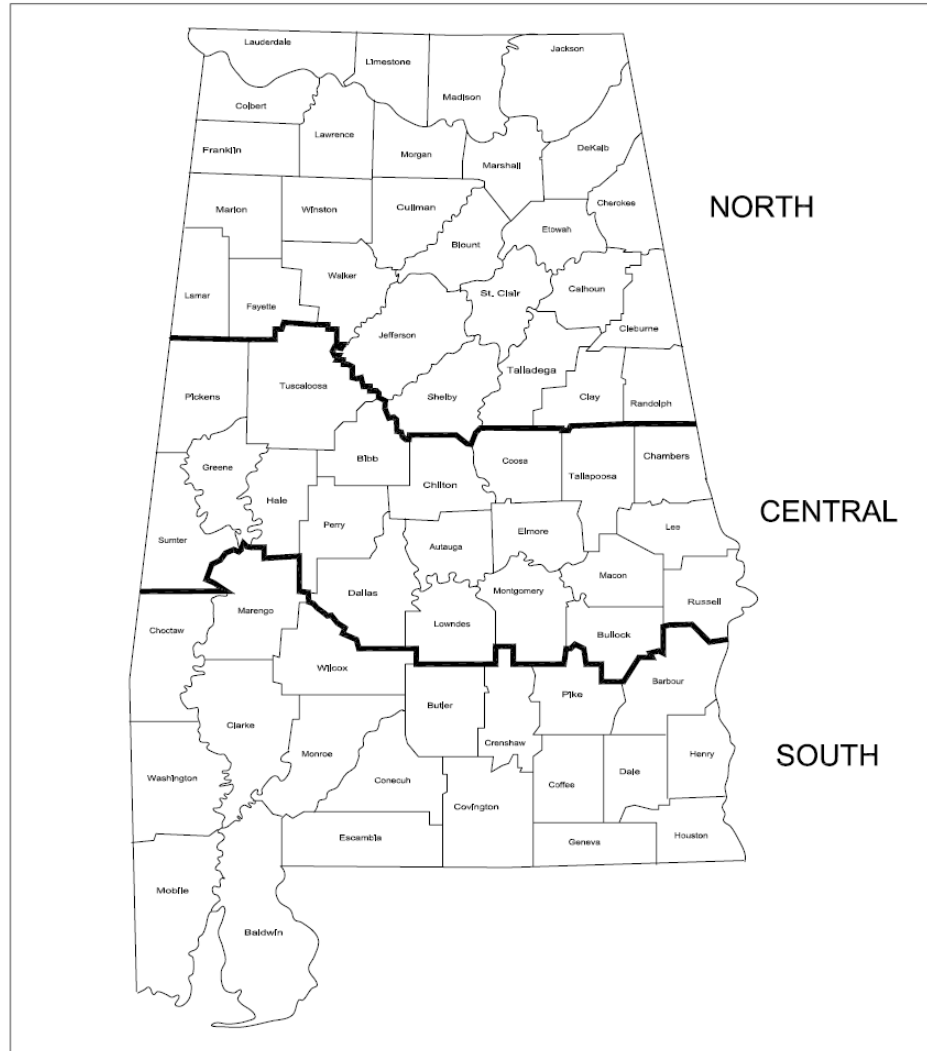


Figure PS-1 Geographical Areas for Species Adaptation

Note: Site conditions related to soils and aspect in counties adjacent to or close to county boundaries may justify adjustments in adaptable areas by qualified design professionals.

Mulching

Mulching is extremely important for successful seeding. Whether the mulching material is straw or a hydraulic erosion control product (HECP, also referred to as hydromulch), the material needs to be applied properly. Uniformly spread organic mulches by hand or with a mulch blower at a rate which provides about 75% ground cover. Spread HECPs utilizing appropriate equipment and at rates as specified in the plan or by the manufacturer. Caution, an over-application of wheat straw will reduce stand success – do not over-apply wheat straw when mulching a seeding! (See Mulching practice for more details).

Table PS-1 Commonly used Plants for Permanent Cover with Seeding Rates and Dates¹

Species	Seeding Rates/Ac PLS ²	North	Central	South
		Seeding Dates		
Bahiagrass, Pensacola	40 lbs	--	Mar 1-Jul y 1	Feb 1-Nov 1
Bermudagrass, Common	10 lbs	Apr 1-July 1	Mar 15-July 15	Mar 1-July 15
Bahiagrass, Pensacola Bermudagrass, Common	30 lbs 5 lbs	--	Mar 1-July 1	Mar 1-July 15
Bermudagrass, Hybrid (Lawn Types)	Solid Sod	Anytime	Anytime	Anytime
Bermudagrass, Hybrid (Lawn Types)	Sprigs 1/sq ft	Mar 1-Aug 1	Mar 1-Aug 1	Feb 15 - Sep 1
Fescue, Tall	40-50 lbs	Sep 1-Nov 1	Sep 1-Nov 1	--
Sericea	40-60 lbs	Mar 15-July 15	Mar 1-July 15	Feb 15 -July 15
Sericea & Common Bermudagrass	40 lbs 10 lbs	Mar 15 -July 15	Mar 1-July 15	Feb 15-July 15
Switchgrass, Alamo	4 lbs	Apr 1-Jun 15	Mar 15-Jun 15	Mar 15-June 15

1 DO NOT USE Seeding Rates as part of a mixture unless shown as a mixture in this table.

2 PLS means Pure Live Seed and is used to adjust seeding rates. For example, to plant 10 lbs PLS of a species with germination of 80% and purity of 90%, PLS= 0.8 X 0.9 = 72%. 10lbs PLS = 10/0.72 = 13.9 lbs of the species to be planted.

Hydroseeding

Surface roughening is particularly important when hydroseeding, as roughened slope will provide some natural coverage for lime, fertilizer, and seed. The surface should not be compacted or smooth. Smooth seedbed preparation is not necessary for hydroseeding operations; large clods, stones, and irregularities provide cavities in which seeds can lodge.

Mix seed, inoculant if required, and a seed carrier with water and apply as a slurry uniformly over the area to be treated. The seed carrier should be a cellulose fiber, natural wood fiber or cane fiber mulch material which is dyed an appropriate color to facilitate uniform application of seed. If adding a legume, and it does not have an inoculant included in the coating, include the correct legume inoculant at 4 times the recommended rate when adding seed to the hydroseeder slurry. The mixture should be applied within one hour after mixing to reduce damage to seed.

Fertilizer should not be mixed with the seed-inoculant mixture because fertilizer salts may damage seed and reduce germination and seedling vigor.

Fertilizer may be applied with a hydroseeder as a separate operation after seedlings are established.

Agricultural lime is usually applied as a separate operation and spread in dry form. It is not normally applied with a hydraulic seeder because it is abrasive and, also, may clog the system. On the other hand, liquid lime is applied with a hydraulic seeder but because of cost is used primarily to provide quick action for benefit of plants during their seedling stage with the bulk of liming needs to be provided by agricultural lime. Dry lime may be applied with the fertilizer mixture.

Installation Verification

Check materials and installation for compliance with specifications during installation of products.

Common Problems

Consult with a qualified design professional if the following occurs:

- Design specifications for seed variety, seeding dates or mulching cannot be met; substitutions may be required. Unapproved substitutions could lead to failure.
- Seeding at the wrong time of the year results in an inadequate stand. Reseed according to specifications of a qualified design professional (see recommendations under Maintenance)
- Inadequate mulching results in an inadequate stand, bare spots, or eroded areas - prepare seedbed, reseed, cover seed evenly and tack or tie down mulch, especially on slopes, ridges and in channels (see recommendations under Maintenance).

Maintenance

Generally, a stand of vegetation cannot be determined to be fully established until vegetative cover has been maintained for 1 year from planting.

Reseeding

Inspect seedlings monthly for stand survival and vigor. Also, inspect the site for erosion.

If stand is inadequate identify the cause of failure (choice of plant materials, lime and fertilizer quantities, poor seedbed preparation or weather) and take corrective action. If vegetation fails to grow, have the soil tested to determine whether pH is in the correct range or nutrient deficiency is a problem.

Stand conditions, particularly the coverage, will determine the extent of remedial actions such as seedbed preparation and reseeded. A qualified design professional should be consulted to advise on remedial actions. Consider drill seeding where possible.

Eroded areas should be addressed appropriately by filling and/or smoothing, and reapplication of lime, fertilizer, seed, and mulch.

Fertilizing

Satisfactory establishment may require fertilizing the stand in the second growing season. Follow soil test recommendations or the specifications provided to establish and maintain the planting. After the second year, fertilizing is often needed annually or periodically to maintain a healthy stand and cover sufficient for erosion control.

Mowing

Mow vegetation on structural practices such as embankments and grass-lined channels to prevent woody plants from invading.

Other areas should be mowed to compliment the use of the site.

Certain species can be weakened by mowing regimes that significantly reduce their food reserves stored for the next growing season: fescue should not be mowed close during the summer; sericea should not be mowed close in late summer.

Bermudagrass and bahiagrass are tolerant of most mowing regimes and can be mowed often and close, if so desired, during their growing season.

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E. Temporary Seeding (TS)

Temporary Seeding (TS)



Practice Description

Temporary seeding is the establishment of fast-growing annual vegetation from seed. Temporary vegetation provides economical erosion control for up to a year and reduces the amount of sediment moving off the site.

This practice applies where short-lived vegetation can be established before final grading or in a season not suitable for planting the desired permanent species. It helps prevent costly maintenance operations on other practices such as sediment basins and sediment barriers. In addition, it reduces problems of mud and dust production from bare soil surfaces during construction. Temporary or permanent seeding is necessary to protect earthen structures such as dikes, diversions, grass-lined channels and the banks and dams of sediment basins.

Typical Components of the Practice

- Scheduling
- Seedbed Preparation
- Applying Soil Amendments (lime and fertilizer)
- Planting
- Mulching or Installation of Erosion Control Blanket
- Installation Verification
- Maintenance

Installation

Prior to start of installation, plant materials, seeding rates and planting dates should be specified by a qualified design professional. Plans and specifications should be referred to by field personnel throughout the installation process.

Plantings should be made during the specified planting period if possible. When sites become available to plant outside of the recommended planting period, either a temporary seeding, mulching or chemical stabilization should be applied. If lime and fertilizer application rates are not specified, take soil samples during final grading from the top 6" in each area to be seeded. Submit samples to a soil testing laboratory for lime and fertilizer recommendations.

Seedbed Preparation

Grade and loosen soil to a smooth firm surface to enhance rooting of seedlings and reduce rill erosion. If compaction exists, loosen the surface to 6" to 8". Break up large clods and loosen compacted, hard or crusted soil surfaces with a disk, ripper, chisel, harrow or other tillage equipment. Avoid preparing the seedbed under excessively wet conditions to minimize soil compaction. Operate the equipment on the contour.

For either broadcast seeding or drill seeding, loosen the soil to a depth of at least 6".

For no-till drilling, the soil surface does not need to be loosened unless the site has surface compaction. If shallow compaction exists, the area should be chiseled across the slope at least 6". If compaction exists between 6" and 12" the area should be chiseled or subsoiled at least 12".

Lime and fertilizer should be incorporated during seedbed preparation.

Applying Soil Amendments

Liming

Follow the design plan or soil test recommendation. If a plan or soil test is not available, use 2 tons/acre of ground agricultural lime on clayey soils (approximately 90 lbs/1,000 ft².) and 1 ton/acre on sandy soils (approximately 45 lbs/ft²).

Spread the specified amount of lime and incorporate into the upper 6" of soil following seedbed preparation and applying fertilizer.

Agricultural lime is usually applied as a separate operation and spread in dry form. It is not normally applied with a hydraulic seeder because it is abrasive and, also, may clog the system. On the other hand, liquid lime is applied with a hydraulic seeder but because of cost, liquid lime is used primarily to provide quick action for benefit of plants during their seedling stage with the bulk of

liming needs to be provided by agricultural lime. Dry lime may be applied with the fertilizer mixture.

Fertilizing

Apply a complete fertilizer at rates specified in the design plan or as recommended by soil tests. In the absence of soil tests, use the following as a guide:

8-24-24 or equivalent – apply 400 lbs/acre (approximately 9 lbs/1000 ft²) at planting.

When vegetation has emerged to a stand and is growing, 30 to 40 lbs/acre (approximately 0.8 lbs/1000 ft²) of additional nitrogen fertilizer should be applied.

Note: Fertilizer can be blended to meet exact fertilizer recommendations. Take soil test recommendations to local fertilizer dealer for bulk fertilizer blends. This may be more economical than bagged fertilizer.

Incorporate lime and fertilizer to a depth of at least 6” with a disk or rotary tiller on slopes of up to 3:1.

On steeper slopes, lime and fertilizer may be applied to the surface without incorporation. Lime and fertilizer may be applied together; however, fertilizer should not be added to the seed mixture during hydroseeding. Lime may be added with the seed mixture.

Planting

Plant the species specified in the plan at the rate and depth specified. In the absence of plans and specifications, plant species and seeding rates may be selected by qualified persons from Table TS-1.

Apply seed uniformly using a cyclone seeder, drop-type spreader, drill, drill seeder, cultipacker seeder, by hand, or with a hydroseeder on a fresh, firm friable seedbed.

When using a drill seeder, plant seed ¼” to ½” deep. Calibrate equipment in the field.

When planting by methods other than a drill seeder or hydroseeder, cover seed by raking, or dragging a chain, brush, or mat. Then firm the soil lightly with a roller. Seed can also be covered with a hydromulch product.

Cover broadcast seed by raking or chain dragging; then firm the surface with a roller or cultipacker to provide good seed contact. Small grains should be planted no more than 1” deep and grasses and legume seed no more than ½” deep.

Table TS-1 Commonly Used Plants for Temporary Cover¹

Species	Seeding Rate/Ac PLS ²	North	Central	South
		Seeding Dates		
Millet, Browntop or German	40 lbs	May 1-Aug 1	Apr 1-Aug 15	Apr 1-Aug 15
Rye	3 bu	Sept 1-Nov 15	Sept 15-Nov 15	Sept 15-Nov 15
Ryegrass	30 lbs	Aug 1-Sept 15	Sept 1-Oct 15	Sept 1 -Nov 15
Sorghum-Sudan Hybrids	40 lbs	May 1-Aug 1	Apr 15-Aug 1	Apr 1-Aug 15
Sudangrass	40 lbs	May 1-Aug 1	Apr 15-Aug 1	Apr 1-Aug 15
Wheat Common	3 bu	Sept 1-Nov 1	Sept 15-Nov 15	Sept 15-Nov 15
Common Bermudagrass	10 lbs	Apr 1-July 1	Mar 15-July 15	Mar 1-July 15
Crimson Clover	10 lbs	Sept 1-Nov 1	Sept 1-Nov 1	Sept 1-Nov 1

1 DO NOT USE Seeding Rates as part of a mixture unless shown as a mixture in this table.

2 PLS means Pure Live Seed and is used to adjust seeding rates. For example, to plant 10 lbs PLS of a species with germination of 80% and purity of 90%, $PLS = 0.8 \times 0.9 = 72\%$. $10\text{lbs PLS} = 10/0.72 = 13.9$ lbs of the species to be planted.

Hydroseeding

Surface roughening is particularly important when hydroseeding, as roughened slope will provide some natural coverage for lime, fertilizer, and seed. The surface should not be compacted or smooth. Fine seedbed preparation is not necessary for hydroseeding operations; large clods, stones, and irregularities provide cavities in which seeds can lodge.

Mix seed, inoculant if required, and a seed carrier with water and apply as a slurry uniformly over the area to be treated. The seed carrier should be a cellulose fiber, natural wood fiber or cane fiber mulch material which is dyed an appropriate color to facilitate uniform application of seed. Use the correct legume inoculant at 4 times the recommended rate when adding inoculant to a hydroseeder slurry. The mixture should be applied within one hour after mixing to reduce damage to seed.

Fertilizer should not be mixed with the seed-inoculant mixture because fertilizer salts may damage seed and reduce germination and seedling vigor. Fertilizer may be applied with a hydroseeder as a separate operation after seedlings are established.

Whenever possible, it is often best to incorporate lime and fertilizer with a disk.

Mulching

Mulching is extremely important for successful seeding. Whether the mulching material is straw or a hydraulic erosion control product (HECP, also referred to as hydromulch), the material needs to be applied properly. Uniformly spread organic mulches by hand or with a mulch blower at a rate which provides about 75% ground cover. Spread HECPs utilizing appropriate equipment and at rates as specified in the plan or by the manufacturer. Caution, an over-application of straw mulch (wheat, oat, or rye) will reduce stand success – do not over-apply straw mulch when mulching a seeding! (*See Mulching practice for more details*). In lieu of mulch, erosion control blanket may be used (see Erosion Control Blanket practice for more details).

Installation Verification

Check materials and installation for compliance with specifications during installation of products.

Common Problems

Consult with a qualified design professional if the following occurs:

- Design specifications for seed variety, seeding dates or mulching cannot be met; substitutions may be required. Unapproved substitutions could lead to failure.
- Seeding outside of the recommended results in an inadequate stand. Reseed according to specifications of a qualified design professional (see recommendations under Maintenance).

Maintenance

Reseeding

Inspect seedings weekly until a stand is established and thereafter at least monthly for stand survival and vigor. Also, inspect the site for erosion.

Eroded areas should be addressed appropriately by filling and/or smoothing, and reapplication of lime, fertilizer, seed, and mulch.

A stand should be uniform and dense for best results. Stand conditions, particularly the coverage, will determine the extent of remedial actions such as seedbed preparation and reseeding. A qualified design professional should be consulted to advise on remedial actions. Consider drill seeding when doing a remedial planting.

Fertilizing

If vegetation fails to grow, have the soil tested to determine whether pH is in the correct range or nutrient deficiency is a problem.

Satisfactory establishment may require re-fertilizing the stand, especially if the planting is made early in the planting season. Follow soil test recommendations or the specifications provided to establish the planting.

Mowing

Temporary plantings may be mowed and baled or simply mowed to compliment the use of the site.

Millet, sorghum-sudan hybrids, sudangrass, rye and wheat may be mowed, but no lower than 6" (closer mowing may damage the stand).

Ryegrass is tolerant of most mowing regimes and may be mowed often and as close as 4" to 6" if this regime is started before it attains tall growth (over 8").

Bermudagrass is tolerant of most mowing regimes and can be mowed often and close, if so desired, during its growing season.

F. Corrective Action Log

Attachment F6 - Corrective Action Log

Project Name or Description: RSA-313-R-01 Corrective Measures Implementation

Project Location: RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Operable Unit 15, Redstone Arsenal, Madison County, AL

Inspection Date	Inspector Name(s)	Description of BMP Deficiency	Corrective Action Needed (including planned date/responsible person)	Date Action Taken/Responsible Person

APPENDIX G

CONSTRUCTION QUALITY ASSURANCE PLAN

APPENDIX G

**REVISION 2
CONSTRUCTION QUALITY ASSURANCE PLAN**

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

**U.S. ARMY GARRISON-REDSTONE
MADISON COUNTY, ALABAMA
EPA ID No. AL7 210 020 742**

Prepared for:



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

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

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June 2025

TABLE OF CONTENTS

Section	Page
1.0 INTRODUCTION	1-1
1.1 OVERALL DIRECTIVE.....	1-1
1.2 PROJECT BACKGROUND	1-1
1.3 OBJECTIVES OF THE CONSTRUCTION QUALITY ASSURANCE PROGRAM.....	1-2
1.4 PRESENTATION OF THE CONSTRUCTION QUALITY ASSURANCE PLAN	1-3
2.0 RESPONSIBILITY AND AUTHORITY	2-1
2.1 CQA ORGANIZATION AND KEY ELEMENTS.....	2-1
2.1.1 Project Manager.....	2-1
2.1.2 Oversight Agency (ADEM).....	2-1
2.1.3 Quality Control Site Manager.....	2-2
2.1.4 The Contractor and Subcontractors	2-2
2.1.5 Construction Quality Control Personnel.....	2-2
2.2 QUALIFICATIONS	2-2
2.3 CONTRACTOR PERSONNEL TRAINING.....	2-3
2.4 COMMUNICATION WITHIN THE CQA ORGANIZATION	2-4
2.5 CQA MEETINGS.....	2-4
3.0 CONTRACT SCOPE OF WORK	3-1
3.1 PROPOSED WORK ACTIVITIES.....	3-1
3.2 CQC REQUIREMENTS AND RESPONSIBILITIES.....	3-2
3.2.1 Preliminary Activities	3-2
3.2.2 Vegetation Clearing	3-2
3.2.3 Surveying	3-2
3.2.4 Excavation of Targets of Interest.....	3-3
3.2.5 Processing and Disposition of MPPEH	3-3
3.2.6 Backfill and Revegetation.....	3-3
3.2.7 Land-Use Control Sign Installation	3-3
3.2.8 Groundwater Monitoring Well Protection	3-4
3.2.9 Groundwater Sampling.....	3-4
3.2.10 Waste Transportation and Disposal	3-4
3.2.11 Final Inspection and Demobilization.....	3-4
3.3 ADDITIONAL CONSIDERATIONS	3-4
4.0 DOCUMENT CONTROL	4-1
4.1 DOCUMENTATION	4-1
4.2 DAILY CONSTRUCTION LOG.....	4-1
4.3 RECORDS	4-2
4.3.1 Evidence of Contract Compliance	4-2
4.3.2 Storage of Field Records.....	4-2
4.4 PROJECT SUBMITTALS	4-2
4.4.1 Document Submittal Register.....	4-3
4.4.2 Submittal Preparation and Transmittal	4-3
4.4.3 Resubmittals.....	4-3
5.0 NONCONFORMANCES AND CORRECTIVE ACTIONS.....	5-1

TABLE OF CONTENTS (Continued)

Section	Page
5.1	NONCONFORMANCE AND CORRECTIVE ACTIONS 5-1
5.1.1	Nonconformance Report 5-1
5.1.2	Identification of Nonconforming Items 5-1
5.1.3	Nonconformance Tracking Register 5-1
5.1.4	Control and Segregation 5-2
5.1.5	Disposition 5-2
5.1.6	Documentation 5-2
5.1.7	Corrective Actions 5-2
5.1.8	Stop Work Notice 5-2
5.1.9	Conflict Resolution 5-2
6.0	PROCUREMENT CONTROL 6-1
6.1	OVERVIEW 6-1
6.1.1	Review of Procurement Documents 6-2
6.1.2	Source Evaluation and Selection 6-2
6.1.3	Acceptance of Services 6-2
6.1.4	Receipt Inspection and Verification 6-2
6.1.5	Handling, Storage, Packaging, and Shipping 6-3
6.2	SUBCONTRACTOR QUALITY CONTROL 6-3
6.2.1	Other Subcontractors 6-4
6.2.2	Subcontractor Noncompliance 6-4
7.0	AUDITS 7-1
7.1	SCHEDULING AND PLANNING 7-1
7.2	INTERNAL PERFORMANCE AUDITS 7-1
7.3	EXECUTION OF AUDITS 7-2
7.3.1	Pre-Audit Meeting 7-2
7.3.2	Audit 7-2
7.3.3	Exit Meeting 7-2
7.3.4	Audit Report 7-2
7.4	RESPONSE 7-3
7.5	FOLLOW-UP 7-3
7.6	DOCUMENTATION 7-4
8.0	CONSTRUCTION INSPECTIONS 8-1
8.1	PREPARATORY INSPECTIONS AND MEETINGS 8-1
8.2	INITIAL INSPECTIONS 8-2
8.3	FOLLOW-UP INSPECTIONS 8-2
8.4	PRE-FINAL INSPECTION 8-2
8.5	FINAL INSPECTION 8-3
8.6	INSPECTION DOCUMENTATION 8-3
9.0	REFERENCES 9-1

LIST OF TABLES

Table G4-1	Typical Daily Construction Log
Table G5-1	Nonconformance Report
Table G5-2	Nonconformance Report Tracking Register
Table G5-3	Stop Work Notice
Table G5-4	Stop Work Notice Log

LIST OF ATTACHMENTS

Attachment 1	Field Inspection Checklist
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LIST OF ACRONYMS AND ABBREVIATIONS

ADEM	Alabama Department of Environmental Management
AGC	advanced geophysical classification
APTIM	Aptim Federal Services, LLC
CMI	corrective measures implementation
CMIP	corrective measures implementation plan
CQA	construction quality assurance
CQAP	Construction Quality Assurance Plan
CQC	construction quality control
FM	titanium tetrachloride
FS	mixture of sulfur trioxide and chlorosulfonic acid
HE	high explosive
IM-AE	isobutyl methacrylate incendiary mix
LUC	land-use control
MEC	munitions and explosives of concern
mm	millimeter
MPPEH	materially potentially presenting an explosive hazard
MRS	Munitions Response Site
NCR	nonconformance report
NEUR	Notice of Environmental Use Restriction
OSHA	Occupational Safety and Health Administration
PM	Project Manager
QA	quality assurance
QAPP	quality assurance project plane
QC	quality control
QCSM	Quality Control Site Manager
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RSA	Redstone Arsenal
SRA	saturated response area
TOI	target of interest

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

UFP	Uniform Federal Policy
WP	white phosphorus

1.0 INTRODUCTION

This construction quality assurance plan (CQAP) presents the overall program for construction quality assurance (CQA) to be implemented during corrective measures implementation (CMI) activities at Redstone Arsenal (RSA) site RSA-313-R-01. This document establishes a program to comply with requirements established in the CMI plan (CMIP) and those of the Alabama Department of Environmental Management (ADEM) and U.S. Environmental Protection Agency. The scope of work for the project is detailed in the CMIP for RSA-313-R-01 (to which this CQAP is an appendix).

1.1 OVERALL DIRECTIVE

1.1.1 The procedures and practices set forth in the CQAP should be adhered to and specifically applied to all quality-related work on the project. It is the responsibility of all personnel performing work on the project to be familiar with and implement the technical requirements referenced in this CQAP or otherwise specified for the project, as included in the CMIP.

1.1.2 Conformance to the requirements of this CQAP will provide results which will verify that the contract, when completed, will conform to the specified requirements and be documented by defensible evidence that the work performed meets or exceeds the standards set forth for the project.

1.2 PROJECT BACKGROUND

1.2.1 Available historical information indicates that RSA-313-R-01 was largely undeveloped or was farmland prior to 1941. In mid-1941, with the establishment of RSA during World War II, the Army began developing the area. Since the establishment of RSA, the western boundary has remained essentially constant. 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 or explosives testing areas. The area is within the buffer zone for two former range areas: Area 2 and RSA-071. Area 2 is a former bombing range. Munitions used at the range include AN-M76 Bombs, PT1 filled (an incendiary mixture similar to Goop); 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. RSA-071 is within the range fan that was reportedly used for various types of 4.2-inch mortars, including a 4.2-inch chemical mortar, inert (sand filled); a 4.2-inch chemical mortar, HE filled; a 4.2-inch chemical mortar, FS (a mixture of sulfur trioxide and chlorosulfonic acid); and a 4.2-inch chemical mortar, WP filled. No munitions-related items have been encountered at Munitions Response Site (MRS)-1, other than one illumination mortar discovered on the ground surface during the Zierdt Road expansion project. MRS-1 is categorized as a “Low” unexploded ordnance probability area. Munitions have been recovered from the subsurface of MRS-2 and based on the findings of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), MRS-2 is categorized as a “Moderate/High” unexploded ordnance probability area. Approximately 12.1 acres of MRS-2 were not geophysically mapped, and 208 single point anomalies selected for intrusive investigation during the RFI were not investigated

due to the discovery of a potentially liquid-filled 4.2-inch mortar that was subsequently determined to be an inert, sand-filled 4.2-inch mortar.

1.2.2 The RFI for RSA-313-R-01 defined the nature and extent of contamination and evaluated potential risks to current and future receptors (Aptim Federal Services, LLC [APTIM], 2019). The purpose of this CMIP is to describe the corrective measures necessary to address risks posed by 1) munitions and explosives of concern present in soil at RSA-313-R-01 to current and future receptors, and 2) chemicals of concern in groundwater at RSA-313-R-01 to potential future receptors if groundwater is developed as a source of potable drinking water. The RSA-313-R-01 RFI defined the nature and extent of contamination, evaluated potential risks to current and future receptors, and concluded that corrective measures are required.

1.2.3 Further site background and history are included in the RFI report (APTIM, 2019). The site map is included in the CMIP.

1.2.4 A surface sweep and advanced geophysical classification surveys were completed at MRS-2 from August through November 2022. The surface sweep consisted of 100 percent coverage of the site, and no material potentially presenting an explosive hazard (MPPEH) or munitions and explosives of concern (MEC) were recovered. Non-munitions related debris encountered during the surface sweep consisted of aluminum cans, small wire, and fence debris.

1.2.5 Following the surface sweep, dynamic and cued advanced geophysical classification surveys were completed. A total of 18.5 acres of MRS-2 were dynamically surveyed using the UltraTEM Screener. Following screening and Informed Source Selection, 2,928 targets were selected for cued survey. The cued survey was conducted using the MetalMapper 2x2, and following data processing and analysis, a total of 504 targets of interest were selected and approved for intrusive investigation. Twenty-seven (27) data gaps totaling approximately 0.14 acres and two (2) saturated response areas totaling approximately 0.28 acres were also identified during the surveys. Details of the surface sweep and advanced geophysical classification (AGC) surveys can be found in the corresponding technical memoranda, which are included in Appendix N to the CMIP.

1.3 OBJECTIVES OF THE CONSTRUCTION QUALITY ASSURANCE PROGRAM

1.3.1 The objectives of the CQA program are to provide a system of procedures, practices, guidelines, and controls which, when implemented, will provide the confidence that project activities are accomplished in accordance with the specified contracts, design criteria, plans, drawings, and CMIP developed during implementation of the corrective measures. This CQAP establishes requirements for developing the overall site-specific construction quality control (CQC) system to be implemented at RSA-313-R-01. The CQAP will be implemented during all phases of the project, including preliminary site activities, corrective measures, and closeout activities.

1.3.2 The CQAP is also applicable to off-site suppliers of equipment or services to the project, which could affect the quality of the CMI. In particular, the following items must be adhered to during the CQA activities:

- Guidelines and requirements prepared and documented in the CMIP

- Construction verification as it is performed, by inspection and verification testing, so that the design features are implemented as intended
- Evaluation of variance to the design that may occur during construction and its effect upon system performance
- Complete documentation prepared and maintained during and after construction so that it can be demonstrated that the design has been implemented and that the performance requirements have been met.

1.4 PRESENTATION OF THE CONSTRUCTION QUALITY ASSURANCE PLAN

1.4.1 This CQAP is designed so that the CQC activities for all portions of the corrective measures are executed and managed from a common set of quality objectives and practices, as described in the CQC plan, the quality assurance project plan (CMIP Appendix D) and the Installation-Wide Uniform Federal Policy Quality Assurance Program Plan. The CQA and CQC activities, as described herein, serve as the minimum requirements to verify that all work is in compliance with the quality requirements set forth in the CMIP and is consistent with the local, state, federal, and other appropriate regulatory agencies for the types of environmental activities performed.

2.0 RESPONSIBILITY AND AUTHORITY

2.1 The contractor will perform the CMI for RSA-313-R-01. RSA will observe the work as it is performed to ensure compliance with the CMIP. Observation by ADEM personnel will be dependent on the phase of the work being performed.

2.2 It is the responsibility of all project personnel to report activities that could adversely affect the CQC requirements set forth by the contract documents. The dedicated Quality Control Site Manager (QCSM) is responsible for identifying, reporting, and documenting activities affecting quality and for verifying correction of materials and activities that do not conform to the specified contract requirements. The QCSM will maintain a close working relationship with the Project Manager (PM) and RSA, keeping them advised of all situations that if not corrected or controlled could affect the resulting quality of the project.

2.3 The contractor will designate an authorized representative to be responsible for CQA, referred to as the QCSM. RSA will ultimately be responsible for providing the relevant documentation to the oversight agency (ADEM). The contractor will be responsible for furnishing appropriate documentation (outlined in this CQAP) to RSA for submittal to the oversight agencies, as required.

2.1 CQA ORGANIZATION AND KEY ELEMENTS

The contractor's PM will be responsible to ensure the execution of the CQA duties for RSA-313-R-01 that will be performed by the QCSM. RSA has retained the services of the contractor to perform the required CMI at the site. The contractor, including its subcontractors, will be responsible for field activities for the project CQC. The responsibilities of key personnel involved in the CQA and CQC activities are described in Sections 2.1.1 through 2.1.5.

2.1.1 Project Manager

The PM has the overall responsibility to ensure the execution of the work to be performed by the contractor, including efforts to ensure compliance with the requirements of ADEM. Among other duties, the PM will coordinate all financial and project-required resources (technical as well as administrative) necessary for the implementation of the project. The PM will maintain overall responsibility of the project through coordination activities with the contractor, ADEM, and the Army. The PM will verify that the corrective measures have been implemented in accordance with the CMIP. The PM has the authority to select and dismiss organizations charged with implementation of the corrective measures and is vested with the authority to stop work if conditions adverse to quality are persistent and need to be corrected before proceeding further.

2.1.2 Oversight Agency (ADEM)

The primary oversight agency for the RSA-313-R-01 CMI is ADEM. The oversight agency will provide review and comment on the CQAP to ensure that the proposed CQA program will provide for sufficient confirmation that work is being performed as intended. The oversight agency has the responsibility to review CQA documentation and, upon completion of the corrective measures, to confirm that the CQAP has been followed and that the construction has been performed in accordance with the regulatory requirements.

2.1.3 Quality Control Site Manager

2.1.3.1 The QCSM will be responsible for the review and approval of the equipment and materials supplied by the contractor (including its subcontractors). The QCSM reports directly to the contractor's Quality Assurance (QA)/Quality Control (QC) Manager. The work that the QCSM produces is subject to the review and approval of the PM, the Program QA/QC Manager, and the contractor's Project Engineer.

2.1.3.2 A few deviations from the CMIP are not uncommon during the implementation of corrective measures. As such, activities may need to be adjusted accordingly during the progress of construction. The QCSM may be requested to change some aspects of the design and/or CMIP if unexpected conditions (e.g., a change in site conditions, unanticipated logistical problems, change in construction methodology, or lack of availability of certain materials) are encountered during the construction work. Accordingly, the QCSM will be responsible for preparing the appropriate variances and providing necessary feedback to the PM or QA/QC Manager.

2.1.3.3 The QCSM is responsible for coordinating all required field activities. The results will be documented on the daily construction log. Additional responsibilities include preparing addenda to the CQAP and formulating corrective actions or variances when required.

2.1.4 The Contractor and Subcontractors

The contractor has the overall responsibility for conducting the corrective measures in accordance with the approved CMIP. The contractor, including its subcontractors, must perform CQC tests, as required by the CMIP, during project corrective measures activities and provide CQC documentation, as specified, and report variances and nonconformances, as outlined in this CQAP.

2.1.5 Construction Quality Control Personnel

Field QA/QC personnel are individuals designated by the contractor and its subcontractors whose duty it is to ensure products and services are provided to RSA in accordance with the CMIP.

2.2 QUALIFICATIONS

2.2.1 Construction QA and QC activities will be accomplished by appropriately qualified personnel. Each individual will understand and enforce the specified quality requirements and will recommend improvements in processes and/or services which, when implemented, could affect the cost, schedule, and quality of the project in a positive manner.

2.2.2 The potential key personnel involved in the CQA/CQC program, which are to be identified by the contractor, and their minimum recommended qualifications are provided in the following table:

Key Personnel in CQA/CQC Organization	Role/Minimum Qualifications Requirements
PM	The specific individual(s) to certify that the construction activities have been completed in accordance with project design CMI Plan.
Project Engineer	The individual who prepared the CMIP and designated representative of the contractor with knowledge of the design and contract requirements.
QA/QC Manager	An independent supervisor of the contractor's Site QA/QC personnel. The independent supervisor shall have 5 years of QA/QC project work.
QCSM	The manager responsible for the review and approval of the equipment and materials and coordinating all required field activities, including record keeping, sample collection and shipment. The QCSM shall have 5 years of project work experience as well as a college degree in science or technical field.
Field QA/QC Personnel	The designated contractor and/or subcontractor personnel (or independent third parties) to perform specific CQC testing. Training required, when appropriate for assigned tasks, certifications.

2.3 CONTRACTOR PERSONNEL TRAINING

2.3.1 Personnel assigned to the project, including subcontractors, are trained to ensure competence commensurate with the responsibility and qualifications necessary to perform the tasks to which they are assigned. In addition to education and experience, job-specific training may be required to qualify individuals to perform certain activities. The PM and QCSM will review and document the personnel qualifications and training to verify compliance to the subcontract requirements.

2.3.2 All personnel will be trained per Occupational Safety and Health Administration (OSHA) Section 1910.120. Project personnel will receive an orientation to the CMIP, as appropriate, to their responsibilities before participation in project activities.

2.3.3 The PM and QCSM will review the qualifications and training of all personnel assigned to the project. Training and qualification records will be maintained at the project site and available for review. Training of site personnel will be verified and documented as applicable to the work to be performed. The QCSM will monitor the training activities to verify all required training is completed for personnel performing work on the project, that the training is documented, and that current records are maintained.

2.3.4 Training will include all phases of the work, as necessary, and will be commensurate with the complexity of the activities being performed. Training methods may include formal classroom, required reading, on-the-job training, or a combination of these methods. Training procedures will be reviewed and approved of by qualified CMI contractor project personnel.

2.3.5 Training programs are conducted according to organizational needs and policies so that personnel:

- Have an acceptable understanding of the safety consideration of the work tasks;
- Possess knowledge of the processes adequate to perform assigned tasks;
- Have a working knowledge of the project or facility basis requirements;

- Have an understanding of systems, terminology, reasons for performance of specific control functions, and the acceptance and rejection criteria for the work; and
- Know the consequences of inadequate quality attainment.

2.3.6 The training program will be evaluated to determine the effectiveness of the program and instruction. If it is determined that the program content, instructor capabilities, or other conditions require changes, the program will be updated at that time. At a minimum, the training will be reviewed as part of the management assessment.

2.3.7 The contractor will maintain qualification and training records for each employee. Training records should include all documents that establish the employee's capabilities, including outside training and training performed by approved training organizations. The QCSM will verify compliance with the project requirements.

2.4 COMMUNICATION WITHIN THE CQA ORGANIZATION

2.4.1 Communication between the CQA program participants includes the exchange of information that allows work to proceed and the required reporting so that activities can be reviewed. Communication in the form of construction documents, inspection reports, audit reports, verification test results, and daily construction QC reports must be timely so that reviews and evaluations can be performed by all the parties responsible for execution of the work.

2.4.2 CQA personnel, the PM, and the contractor and its subcontractors must communicate, as required, and as addressed in this CQAP, to maximize the efficiency and effectiveness of the CMI and to minimize variance or nonconformance.

2.5 CQA MEETINGS

CQA meetings will be held throughout the progression of construction activities on an as-needed basis. Progress meetings will be documented in the form of meeting minutes prepared by the QCSM and will be maintained in the on-site CQA files.

3.0 CONTRACT SCOPE OF WORK

The complete and detailed scope of work for the planned construction activities are presented in the CMIP and the supporting documents therein. Additionally, the CMIP provides the proposed schedule and sequencing of the activities. This chapter provides a general overview of the activities and an outline of the CQC testing requirements referenced in the CMIP. Subsequent to this chapter, Chapters 4.0 through 10.0 present the necessary supporting aspects of the CQC/CQA program that must be implemented to ensure the overall objectives of the program are met and to provide evidence of compliance with all applicable project and regulatory requirements.

3.1 PROPOSED WORK ACTIVITIES

The general scope of work for RSA-313-R-01 includes the following items.

- Procurement and subcontracting
- Mobilization/demobilization
- Utility clearance and marking/obtaining a dig permit
- Vegetation clearance within MRS-2
- Protection of existing monitoring wells
- Surveying and marking of land-use control (LUC) boundaries and signage locations
- AGC and/or analog mapping of data gaps and saturated response areas (SRAs) within MRS-2, as applicable
- Excavation of targets of interest (TOIs) and data gaps/SRAs within MRS-2 via established hand excavation procedures augmented with mechanical excavation, if necessary
- Processing and disposition of MPPEH
- Site restoration, including backfilling of excavated TOIs and data gaps/SRAs, and revegetation of disturbed areas with approved grass mixtures
- Sampling of groundwater monitoring wells to establish baseline concentrations
- Implementation of LUCs including:
 - Locating, marking, and surveying of LUC boundaries and signpost areas; installation of signage at the site prohibiting soil disturbance without Army approval, on-call unexploded ordnance support, and anomaly avoidance
 - Outlining of restrictions for this site in the RSA Property Master Plan and recording the Notice or Environmental Use Restriction (NEUR) with the Madison County Office of Probate
 - Compliance with LUCs for the site and identified in the NEUR in accordance with Alabama Administrative Code r. 335-5-1-.02(3)(a)
 - Annual routine LUC inspections, sign repairs, and reporting

- Preparation of CMI completion report
- Semiannual sampling of groundwater wells and reporting (years 1 through 3 following completion of baseline groundwater sampling), with annual sampling and reporting thereafter.

3.2 CQC REQUIREMENTS AND RESPONSIBILITIES

Sections 3.2.1 through 3.2.7 present a summary of the CQC testing requirements and responsibilities of the contractor QCSM during implementation of corrective measures at RSA-313-R-01. The information presented herein is intended only to provide an overview of the requirements; the complete and full details of the planned work are contained in the CMIP and supporting documents.

3.2.1 Preliminary Activities

Preliminary activities include mobilization, requirements for base access, dig permits and utility marking, site control, surveying of site boundaries and the grid system, and vegetation clearance. The dig permit will be obtained from the Directorate of Public Works prior to commencement of the CMI. During these activities, the QCSM will be responsible for reviewing purchase orders and packing slips to ensure all materials received are in accordance with the CMI specifications. Site controls will be enforced in accordance with the site-specific safety and health plan prepared by the CMI contractor. A licensed land surveyor will be subcontracted to delineate the LUC boundaries and signage locations.

3.2.2 Vegetation Clearing

3.2.2.1 Vegetation clearance will involve a combination of brush hogging and removal of underbrush, bushes, and small trees (less than 3 inches in diameter at chest height), dependent on vegetation present. Larger trees may be limbed up to allow access to the understory, as required. Vegetation will be mulched in place or moved and spread in areas not affecting the CMI efforts.

3.2.2.2 Prior to vegetation clearing operations, the QCSM will be responsible for coordinating with RSA and verify that underground utilities have been identified.

3.2.3 Surveying

A survey plat indicating the location and dimensions of the LUCs boundaries and signage locations at RSA-313-R-01 will be prepared in accordance with the Permit Section VIII.B.5 (ADEM, 2024a). The survey will be conducted and certified by a licensed surveyor in the State of Alabama and will be in accordance with Engineer Manual 200-1-15 and Data Item Description HNC-006.03. The surveyor may also support the QC seeding and reacquisition team to identify data gaps and SRAs for AGC remapping and TOIs, if needed. This survey work (along with other referenced survey activities) will be performed using subcontracted services.

3.2.4 Excavation of Targets of Interest

Soil will be excavated to meet the requirements specified in the CMIP. It is anticipated that excavation of TOIs will remain relatively shallow and minor in areal extent. However, excavations will be completed in accordance with all applicable Safety and Health Regulations for Excavations (OSHA Code of Federal Regulations, Part 1926, Subpart P).

3.2.5 Processing and Disposition of MPPEH

Processing and disposal of MPPEH will be completed in accordance with all requirements in the CMIP, Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) (Appendix D), Accident Prevention Plan (Appendix E), Explosives Management Plan (Appendix I), and Explosives Safety Submission (Appendix J).

3.2.6 Backfill and Revegetation

3.2.6.1 Spoils will be backfilled into the source excavation(s) and tamped to the approximate consistency of the surrounding soil. Controlled, engineered compaction will not be performed for any backfilling activities.

3.2.6.2 Vegetated areas disturbed by excavation of TOIs and SRAs will be restored following completion of the remediation and removal of all equipment. Restoration will include reseeding and mulching the area. The Alabama Soil and Water Conservation Committee will be consulted to determine the grass species to use. The QCSM will be responsible for verifying that proper fill and revegetation materials are used.

3.2.7 Land-Use Control Sign Installation

3.2.7.1 LUCs as implemented by an NEUR are required when an approved CMI allows a cleanup that will not result in remediation of the property or portions of the property to unrestricted use (**Appendix H**). The purpose of LUCs is to ensure that risks to human health and/or the environment are properly managed by imposing activity and use restrictions on the applicable portions of the property and including these restrictions in the installation master plan. Based on the potential for residual MEC and COC concentrations in groundwater, the site cannot be returned to conditions meeting unrestricted use. Consequently, the Army will comply with Alabama Administrative Code r. 335-5-1-.02(3)(a) (ADEM, 2024b) for the LUCs for RSA-313-R-01.

3.2.7.2 A total of 24 LUC signs will be posted at each of the site corners and every 1,000 feet along the LUC boundary, except at locations where existing RSA installation fencing is present. Locations of signage, including coordinates, are shown on Figure 3-4 of the CMIP. Installation of signs will be conducted using on-call UXO support and anomaly avoidance procedures in accordance with the Installation-Wide SOP 28, MEC Anomaly Avoidance Support (HGL, 2019), where required. Monitoring of LUC signage is discussed in Appendix H of the CMIP and will be in accordance with the Permit.

3.2.8 Groundwater Monitoring Well Protection

One monitoring well (313-RS2285) exists within MRS-2. Two monitoring wells (313-RS2287 and 313-RS2288) exist within MRS-1, and two monitoring wells (312-RS2325 and 312-RS2326) exist just east of MRS-1 along/near the western border of RSA-312-R-01. Three additional monitoring wells (PW-RS061, 313-RS2286, and PW-RS057) exist outside of the RSA-313-R-01 site boundaries but are included in the groundwater MNA sampling. The monitoring wells in the work zones will be conspicuously marked in the field for protection during work activities. Monitoring wells will be protected during site activities that could potentially damage the wells. Should any wells become damaged during the corrective measures activities, required ADEM notification and reporting will be completed, and damaged wells will be abandoned and replaced following the applicable standard operating procedures.

3.2.9 Groundwater Sampling

A total of eight existing monitoring wells (PW-RS061, 313-RS2285, 313-RS2286, 313-RS2287, 313-RS2288, PW-RS057, 312-RS2325, and 312-RS2326) are included in the MNA groundwater sampling, as shown on Figure 3-6 of the CMIP. Groundwater sampling will be performed in accordance with the UFP-QAPP (Appendix D) and Groundwater Monitoring Plan (Appendix M).

3.2.10 Waste Transportation and Disposal

Material documented as safe generated during the CMI will be stockpiled on site and then sent to a qualified recycler to deform and scrap in accordance with regulations. All remediation-derived wastes will be managed in accordance with SOP 4.0, *Investigation-Derived Waste*, in the Installation-Wide QAPP (HydroGeoLogic, Inc., 2019). Material documented as an explosive hazard will be disposed of in accordance with the UFP-QAPP (Appendix D).

3.2.11 Final Inspection and Demobilization

3.2.11.1 When planned corrective measures activities have been completed, temporary field structures, as applicable, will be removed from the sites. A final inspection of the project site will then be conducted in accordance with the requirements as outlined in this CQAP.

3.2.11.2 After the completed work has been accepted by RSA, all personnel and equipment will be demobilized from the project site. During these activities, the QCSM will be responsible for the performance or oversight of the following:

- Oversee the removal of temporary field structures, as applicable.
- Participate in final field inspection and note deficiencies that require corrective action.
- Coordinate implementation of corrective actions and arrange for reinspection.
- Submit the final approved inspection report to RSA and CEHNC.
- Oversee demobilization activities.

3.3 ADDITIONAL CONSIDERATIONS

The information contained in the sections above only represents an overview of the proposed work activities and is intended to serve as a guide to the complete details of work as included in the

contract CMIP and other applicable supporting documents. As noted previously, the remaining chapters of this CQAP contain discussions of the additional components included in the overall CQA/CQC program, which are implemented to ensure the generation of defensible evidence of compliance with contract and regulatory requirements.

4.0 DOCUMENT CONTROL

4.1 The CQAP is a controlled document, and measures are included to maintain the currency and the use of the plan so that the CQC functions defined within are in accordance with the latest specified requirements. Distribution of the plan is controlled so that all revisions to the plan are issued to the plan holders and the superseded requirements are revised accordingly in the existing plans.

4.2 Issuance and distribution of the plan will be controlled by the PM or their designee, the document controller. The plan will be transmitted to each plan holder on the distribution list. The transmittal document will reference the assigned document control number, which will appear in the top right corner of the transmittal letter included within each document. The assigned number will be kept in a log and maintained by the PM's designee in the home office. Copies will be maintained at specific locations and available to the individuals performing the work.

4.3 Revisions to the plan will be made by sections or by the addition of supplements or amendments and will be noted with change pages or with a new final or revised document. All accepted revisions to the plan will be transmitted to the plan holders according to the distribution list. Each individual or organization designated as a plan holder will be responsible for updating their copy of the plan.

4.1 DOCUMENTATION

4.1.1 The PM will provide a document control system to provide measures for the control of issuance, distribution, storage, and maintenance of documents relating to quality, including those from the contractor and its subcontractors and other vendors or suppliers.

4.1.2 Preparation, review, issuance, and revisions to documents affecting construction quality will be controlled so that the specified contract, regulatory, and permitting requirements are clearly defined and made available to the personnel performing the work. Such documents may include but not be limited to the following:

- Correspondence
- Drawings
- Procedures
- Plans
- Reports
- CMIP.

4.1.3 The PM or their designee will review the documents to verify inclusion of the appropriate QA requirements.

4.2 DAILY CONSTRUCTION LOG

4.2.1 CQC reporting will be addressed in the daily construction log, and the contractor will document all project activities as required by the contract. The log will cover conforming and nonconforming work and will include but not be limited to the following:

- Weather conditions
- Site instructions
- Nonconforming conditions
- Results of inspections and tests
- Types of defects or causes for rejection
- Corrective actions – proposed and taken
- On-site personnel and major equipment log
- Delays and causes
- Verbal instructions.

4.2.2 A copy of a typical daily construction QC report is included as Table G4-1. RSA will be provided a copy of the daily QC reports throughout the duration of the project.

4.3 RECORDS

4.3.1 Evidence of Contract Compliance

Records will be prepared to furnish documented evidence that design, construction, and operation activities are in compliance with the quality requirements of the contract. The records will be consistent with the applicable sections of the project technical CMIP and may include one or more of the following:

- Daily CQC report
- Technical reviews
- Inspection and test reports
- Audit reports
- Monitoring and surveillance activities
- Personnel qualifications
- As-built drawings
- Nonconformance reports and corrective actions
- Design documents
- Other specified documents.

4.3.2 Storage of Field Records

Copies of field records will be maintained and stored at the project site until turnover as specified by RSA. On-site records will be readily retrievable for review and audit purposes by ADEM and RSA. The records will be controlled so that the possibility of loss, damage, or other detrimental conditions of the records is avoided. The original project documents will be stored at the contractor's home office.

4.4 PROJECT SUBMITTALS

Project submittals include documents generated or revised in the home office or the field site office at RSA. Project submittals will have tracking numbers issued with each new or revised document. In addition, project submittals specified in the contract documents and CMIP will be prepared by

the contractor and submitted to the QCSM. The PM is responsible for the preparation and maintenance of the specified submittals for the project.

4.4.1 Document Submittal Register

The project submittal register will be maintained by the contractor. Submittals returned unapproved or with comments requiring revisions will be so noted on the submittal register and re-entered as a revision. The Project Engineer or their designee will monitor the submittal register to verify submittals are being controlled, scheduled, tracked, and the status kept in an effective manner. The project submittal register will be updated continuously, as applicable, and reviewed by the Project Engineer or their designee to determine the status of the submittals and compliance to the project schedule requirements.

4.4.2 Submittal Preparation and Transmittal

Submittals will be prepared by the PM or their designee. Submittals from subcontractors or vendors will be reviewed by the QCSM prior to transmitting the submittals to the PM and Project Engineer or designees. All appropriate information will be completed prior to transmittal of the submittals. Submittals will be scheduled to coincide with the needed dates and adequate time allowed for review and approval in accordance with the contract requirements. The submittals will be reviewed for conformance to specified requirements, completeness, and accuracy. Submittals requiring modifications or changes will be returned to the PM or their designee for corrective actions and resubmitted for review.

4.4.3 Resubmittals

Submittals that are not approved by the QCSM or returned with comments that require resubmittal for approval will be processed in the same manner as the original submittals. The submittal number used for the original document will be used for each resubmittal followed by a numerical notation indicating the revision. The resubmittals will be re-entered on the project submittal register with the new revision numbers.

5.0 NONCONFORMANCES AND CORRECTIVE ACTIONS

This chapter addresses the procedure for reporting nonconformances and corrective action for variance from the contract documents.

5.1 NONCONFORMANCE AND CORRECTIVE ACTIONS

5.1.1 Nonconformance Report

Work, field testing, or materials not conforming to the CMIP or contract requirements, including noncompliances and deficiencies identified by RSA, will be documented on a nonconformance report (NCR). A sample NCR is shown in Table G5-1. At a minimum, the NCR will detail the nonconforming conditions, recommended corrective action(s), and disposition of the corrective action(s). The CMI contractor will immediately correct noncompliances or deficiencies identified by the QCSM. A master log of all NCRs will be kept by the QCSM for review by the PM. All NCRs will remain open until the nonconforming condition has been satisfactorily resolved and verified as acceptable by the QA/QC Manager.

5.1.2 Identification of Nonconforming Items

Items identified as nonconforming will be documented on the NCR, which, as applicable, will include the following:

- Description of nonconforming item or activity
- Detailed description of nonconformance
- Cause of nonconformance
- Referenced criteria
- Recommended disposition
- Disposition and verification of corrective action
- Responsible organization.

5.1.3 Nonconformance Tracking Register

5.1.3.1 Each identified nonconformance will be documented on the sample NCR tracking register (Table G5-2) which, at a minimum, will include the following information:

- NCR tracking number
- Description of nonconformance
- Issue date
- Distribution parties
- Individual or organization assigned responsibility
- NCR closeout date and initial of party responsible for closure.

5.1.3.2 The QCSM is responsible for maintaining the NCR tracking register and verifying that the corrective actions were implemented and verified prior to closing the NCR. RSA will be notified in advance of verification of the corrective actions to permit their participation in the inspections and acceptance of the results prior to closing the NCR.

5.1.4 Control and Segregation

Nonconforming materials or items will be controlled to prevent inadvertent use or further processing that would cause the nonconforming condition to be inaccessible for correction. All items identified as nonconforming will be clearly identified and segregated from acceptable items except where size, installation status, and other conditions would make it impractical to segregate from conforming items. When nonconforming items are not segregated, they will be identified and clearly marked so that they may be easily recognized as nonconforming to prevent further activities prior to the implementation of the corrective action(s).

5.1.5 Disposition

The disposition of NCRs will include the necessary actions required to bring the nonconforming condition to an acceptable one and may entail reworking, replacing, retesting, or re-inspecting. Implementation of the disposition will be in accordance with the original procedural requirements, a specific procedure, or other acceptable written instructions by the QA/QC Manager.

5.1.6 Documentation

Notifications of noncompliance and the proposed corrective actions will be documented on an NCR and processed in accordance with the provision described in this section. Corrective actions will be implemented upon receipt of the notification. The NCR will remain open until the noncompliance is resolved.

5.1.7 Corrective Actions

5.1.7.1 In addition to resolving identified nonconforming conditions, corrective actions will address the cause of adverse conditions contributing to the nonconformance and establish methods and controls to preclude the recurrence of the same or similar types of nonconformances.

5.1.7.2 The QCSM will track corrective actions to identify trends in the causes of the nonconforming conditions and initiate necessary actions to prevent recurrence. Additionally, the QCSM will monitor the corrective actions to verify that they were properly implemented and accepted and the NCR was closed.

5.1.8 Stop Work Notice

Nonconforming conditions that affect the quality of the project, threaten safety, or cause an environmental threat will be stopped through the use of a stop work notice (Table G5-3). Stop work notices may also be issued in the event of insufficient corrective actions resulting in recurring nonconforming work. The issuance and tracking of stop work notices will be documented on a stop work notice log (Table G5-4), to be maintained by the PM (or their designee).

5.1.9 Conflict Resolution

Conflicts arising from nonconformance and corrective actions that cannot be resolved at the project management and QC levels will be directed to successive levels of management as necessary to obtain resolution. The levels of management will include the QCSM, QA/QC Director, and PM.

All conflicts will be resolved within the specified requirements of the contract and the governing regulatory documents.

6.0 PROCUREMENT CONTROL

This chapter addresses the procedure for ensuring that procured items and services meet established requirements and perform, as specified, within procurement standard operating procedures.

6.1 OVERVIEW

6.1.1 Prospective suppliers will be evaluated and selected on the basis of the specified criteria. The contractor will ensure that approved suppliers can provide acceptable items and services, as required by the contract. The Project Engineer will review and approve all materials and supplies that may affect quality of the project. Upon approval of purchase requisitions, the QCSM will receive a copy of the approved purchase requisition. When materials and supplies arrive at the project site, the QCSM will be responsible to ensure the items and services meet the requirements listed in the purchase requisition and that no items are installed prior to the approval of all applicable submittals.

6.1.2 The procurement details include provisions for the following, as applicable to the scope of work or services:

- **Scope of Work.** A statement of the scope of work to be performed by the subcontractor will be in the procurement documents.
- **Technical Requirements.** Technical requirements will be specified. Where necessary, these requirements will be specified by reference to CMIP, codes, regulations, procedures, QA program documents, and statement of work requirements that describe the services to be furnished. The procurement documents will provide for identification of inspection, verification, and acceptance requirements for monitoring and evaluating the supplier's performance.
- **QA Program Requirements.** Procurement documents will require that subcontractors have a documented quality system that implements portions or all of the requirements of this plan, as applicable. The extent of the suppliers' quality system will depend on the type and use of the service being procured.
- **Right of Access.** At each tier of procurement, the procurement documents will provide for access to supplier's facilities and records for inspection or audit by the contractor or its authorized representative.
- **Documentation Requirements.** Procurement documents at each tier of procurement will identify the documentation required to be submitted to the contractor for information, review, or approval and the time of submittal. The retention times and the disposition requirements for specific quality records will be prescribed.
- **Questionable or Unusable Data.** The procurement documents will include requirements for reporting and approving disposition of questionable or unusable data.

6.1.1 Review of Procurement Documents

6.1.1.1 The QCSM will ensure that site-initiated procurement documents and changes transmitted to the prospective supplier include adequate requirements, performance standards, and quality criteria. The purchase requisition will then go through the proper approval process, which require the signature(s) of the PM, the Project Engineer, and the Procurement Leader, or others, as specified.

6.1.1.2 The review of changes and their effects will be completed prior to transmittal to the prospective supplier. This review will include the considerations that the appropriate requirements are specified, additional or modified performance criteria determined, and analysis of exceptions or changes requested or specified by the supplier.

6.1.2 Source Evaluation and Selection

The selection of suppliers and subcontractors will be based on an evaluation of their capability to provide items and/or services in accordance with the specified requirements. Measures for evaluating and selecting procurement sources will be documented and may include one or more of the following:

- Evaluation of the supplier's history of providing an identical or similar service, which reflects the current capability
- Reviews of the supplier's current QA records supported by documented qualitative and quantitative information that can be objectively evaluated
- Evaluation of the supplier's technical and quality capability, as determined by a direct assessment of their facilities, personnel, and effectiveness of their implementation of their quality system
- Submittals pertaining to the items or services to be provided must be approved prior to use or initiation of the work on the project site.

6.1.3 Acceptance of Services

The procurement control will include flow-down provisions of the contract and site-specified task order. The acceptance methods used (e.g., source verification, receipt inspection, and technical verification of data produced) will be verified. Confirmation of specific characteristics will be performed at intervals and to a depth consistent with the service's complexity, quantity and frequency of procurement, and statement of work requirements.

6.1.4 Receipt Inspection and Verification

The QCSM or designee will develop and implement procedures for receipt inspection and verification of purchased items. These controls will provide for the following, as applicable:

- Verification that the items received is in accordance with purchase order requirements
- Inspection for evidence of breakage, damage, or otherwise being unfit for use

- Verification that required documentation is received and acceptable
- Verification that the items conform to the supplier's published requirements that were provided submitted and approved.

6.1.5 Handling, Storage, Packaging, and Shipping

6.1.5.1 The handling, storage, cleaning, preservation, packaging, and shipping of items will be controlled to prevent damage or deterioration that would jeopardize the specified performance of the items.

6.1.5.2 Procurement documents shall include the following:

- Requirements for sellers to establish special procedures, when necessary, to ensure cleanliness, identification, and proper handling
- Requirements for the preparation of items for shipment, as necessary, to prevent damage or deterioration of the supplied items
- Requirements for material and equipment storage instructions, when specified, to be available at the site well in advance of the arrival of material or equipment.

6.2 SUBCONTRACTOR QUALITY CONTROL

6.2.1 All subcontractors performing work for a project are responsible for compliance to the requirements of their respective subcontracts. Subcontractors include organizations supplying quality-related items or services to the project. The overall responsibility for conformance to the quality requirements for the subcontracted items and services is retained by the contractor.

6.2.2 The requirements for personnel qualifications, technical performance levels, QC procedures, acceptability levels, and documentation will be included as part of the subcontract documents. The PM or designee will review the subcontract procurement documents to verify that QC requirements are passed on to the subcontractor.

6.2.3 The QCSM is responsible for the implementation of inspections, surveillance, document review, audits, and other QC activities for monitoring the subcontractor to verify compliance with the contract and subcontract requirements. These activities will be documented on inspection reports, audit reports, field logs, or other forms appropriate to the function performed.

6.2.4 For field operations, the field QA/QC personnel will provide QC checks before, during, and at the completion of the subcontractor's activities to determine that the subcontractor is in compliance with the QC measures set forth by the contract, the applicable subcontract documents, and the subcontractor's approved QC plan, including the following:

- Meeting quality requirements
- Generating, controlling, and maintaining required documentation
- Performing and documenting required inspections and tests
- Identifying, reporting, and correcting nonconforming conditions
- Turnover to the contractor.

6.2.1 Other Subcontractors

Subcontractors performing work will be monitored by the QCSM or field QA/QC personnel to verify conformance to the contract and subcontract quality requirements. The monitoring activities will include audits, surveillances, witnessing of inspections and tests, document reviews, and interfacing with the subcontractor's QC or project management. All monitoring activities will be documented on the appropriate form or included in the daily construction log.

6.2.2 Subcontractor Noncompliance

Work performed by subcontractors that does not comply with the specified requirements will be identified, reported, controlled, tracked, and corrected.

7.0 AUDITS

7.1 Audits may be performed to verify compliance with aspects of the project documents. Audits will be performed with checklists and include a review of documents and records to determine if the CQAP and supporting procedures are being implemented. A site-specific assessment checklist for RSA-313-R-01 is provided as Attachment 1 of this CQAP. The individual elements of the checklist are based on the site-specific requirements presented in Worksheet No. 14 (Appendix D of the CMIP).

7.2 An audit will note findings and observations. A finding will be a documented statement of fact concerning a noncompliance or deviation from established requirements. An observation will be a statement of fact regarding the potential for a noncompliance.

7.3 Audits will be performed by qualified personnel and include individuals technically knowledgeable in the areas to be assessed. Audit results will be documented and sent to the appropriate management.

7.1 SCHEDULING AND PLANNING

7.1.1 Audits typically will be performed early in the life of the activity as practical and continue until completion of the activity. The Auditor will provide written notification to the organization to be audited informing them of the scheduled audit date.

7.1.2 Audit schedules may be prioritized based on the importance of the activity, previously identified deficiencies of the activity, and the size or complexity of the activity. The QCSM will develop a schedule for the performance of audits. The audit schedule will be posted and distributed to project staff and managers. Unscheduled audits may be used to supplement scheduled audits when conditions warrant.

7.2 INTERNAL PERFORMANCE AUDITS

Performance audits are conducted on site by an auditor who directly observes specific project activities to determine if these activities are being conducted in accordance with the contract requirements. The Auditor will be technically competent in the activities to be audited and independent of the subject work. The audit of project deliverables will be for the purpose of determining compliance with the procedures set forth in this plan (i.e., technical reviews, documentation of reviews, document control, and other procedures). Checklist items to be examined may include the following:

- Availability and implementation of approved work instructions
- Field documentation and checking
- Subcontractor performance
- Review of personnel training and qualification records
- Review of process controls and associated records to determine compliance with CMIP
- Review of work areas for evidence of implementation of procedures and instructions

- Review of documentation indicating compliance with plan, document and design preparation, review, and approval procedures
- Change and nonconformance documentation and disposition.

7.3 EXECUTION OF AUDITS

Audits will normally be conducted as described below.

7.3.1 Pre-Audit Meeting

The Auditor will conduct a brief pre-audit meeting with management or supervisory personnel of the organization to be audited to confirm the audit scope, discuss the audit sequence, establish a tentative time for the post-audit meeting, and establish channels of communication.

7.3.2 Audit

The Auditor will follow checklists (developed prior to the audit) to evaluate existing project records provided by designated project staff and may observe work in progress. If noncompliances are observed or uncovered during the audit, the Auditor will discuss these potential findings with the individuals being audited so that findings are accurate and understood. In addition to identifying noncompliances, the audit results may include observations of notable areas of strength.

7.3.3 Exit Meeting

Upon completion of the audit, the Auditor will discuss observations and findings with the group or organizations audited and, whenever possible, agree on corrective actions. Minor administrative findings that can be resolved to the satisfaction of the audit team during the audit are not required to be documented as items requiring corrective actions. All findings that are not resolved during the course of the audit and findings affecting quality will be noted on the audit checklists.

7.3.4 Audit Report

7.3.4.1 The Auditor will prepare and issue an audit report, which provides the following information at a minimum:

- Unique audit number;
- Description of the audit scope
- Audited organization and location
- Persons contacted during the audit activities
- Audit dates
- Summary of audit results, including a statement on the effectiveness of the quality management elements that were audited
- Suggested opportunities for improvement in the form of observations and comments

- Description of each reported audit finding in sufficient detail to enable corrective action to be performed
- Due date for completion of corrective actions and/or audit response (typically 30 days).

7.3.4.2 Audit results will include findings and observations. Findings are items that require corrective action. Findings will be documented on an audit finding report or equivalent. Observations are nonmandatory recommendations to improve project quality. The Auditor may make recommendations for corrective actions; however, the ultimate responsibility for taking corrective action lies with the auditee. The report will be signed by the Auditor. Checklists do not need be included with the audit report but should be maintained as records in the project files.

7.3.4.3 The Auditor will prepare an audit report cover letter or memorandum for signature and issuance by the PM. The audit report will be issued to the management of the audited organization.

7.4 RESPONSE

The response prepared by the auditee will clearly state for each finding the corrective action taken or planned, the cause of the deficiency, and the action to prevent recurrence. For each observation, the response will indicate actions taken or planned for quality improvement. The response will, at a minimum, be sent to the PM and the Auditor.

7.5 FOLLOW-UP

7.5.1 The QCSM or designee will track all audit findings to assure that all findings are appropriately addressed and to track audit findings for significant conditions adverse to quality. The QCSM or designee will maintain the status of audit findings for active audits and prepare correspondence relating to overdue audit responses. When responses are overdue, the QCSM or designee notifies the responsible organization by telephone that responses are overdue and prepares a memorandum or letter indicating a new response due date. If a request for extension of response is received, an evaluation will be made and a formal response submitted to the requesting organization.

7.5.2 The PM or designee, upon receipt of responses to audit findings, will coordinate with the Auditor for the evaluation of responses. The responsible evaluator will document the results of the evaluation. Unacceptable responses will be noted together with the specific reason for rejection. The PM or designee will prepare transmittal correspondence to the responsible organization to inform them of a new response due date.

7.5.3 Follow-up actions, possibly including re-audit of deficient areas, will be taken to verify whether corrective action is accomplished as scheduled. The QCSM or designee will assure that verifications of corrective action implementation are accomplished and document the results of verification.

7.5.4 Following acceptance and verification of all corrective actions, an audit closure document will be issued by the Auditor to the same distribution as the audit report. The closure document will indicate that corrective actions have been satisfactorily completed and will contain a statement that the audit is closed.

7.6 DOCUMENTATION

The following documents generated before, during and after the audit process will be maintained in the record file system in accordance with Chapter 4.0 of this plan:

- Audit report
- Audit responses
- Audit closure letter
- Correspondence related to the audit.

8.0 CONSTRUCTION INSPECTIONS

The primary function of inspections is to establish the measures required to verify the quality of work performed and compliance to the specified requirements, including the inspection of materials and workmanship before, during, and after each work element.

8.1 PREPARATORY INSPECTIONS AND MEETINGS

8.1.1 Along with representatives of RSA, the PM, the QCSM, and the Site Supervisor will conduct preparatory inspections/meetings at RSA-313-R-01. Preparatory inspections/meetings will be performed prior to starting definable features of work. Typical definable tasks and related inspection requirements can be modified based on project requirements. Where more than one work element is included in one work activity, one preparatory meeting may cover several work elements for the site. Likewise, a number of work activities, where feasible, can be combined into individual preparatory meetings. The preparatory inspection/meeting will be attended by the Army, applicable contractor personnel and subcontractors involved with the feature of work, and responsible field QA/QC personnel. The QCSM will be notified in advance to coordinate participation in the inspection. The preparatory meeting may include but not be limited to:

- Review the basic elements of the work.
- Review documentation and reporting requirements.
- Review pertinent contract requirements.
- Review materials and equipment documentation for required tests, submittals, and approvals.
- Review required QC inspections and test requirements.
- Establish that the preliminary work required to begin the feature of work is complete and conforms to approved drawings and submittal data.
- Establish that the required materials and equipment for commencement of the work are on hand or available for use on the feature of work and that all equipment is properly calibrated and in proper working condition.
- Ensure the securing of utility clearances (“dig permits”).
- Address basic site health and safety considerations.
- Establish hours of operation.

8.1.2 Preparatory inspections will be reported on the daily QC reports. The detailed results of the preparatory inspection will be documented.

8.1.3 Personnel performing work activities affected by a preparatory inspection will be directed in the acceptable level of the workmanship involved for the feature of work covered by the inspection.

8.2 INITIAL INSPECTIONS

8.2.1 The initial inspection may be conducted at the beginning of the work element. The inspection will be performed when it is determined that a sufficient portion of the work element has been accomplished to evaluate the following criteria:

- Compliance with the CMIP, drawings, submittals, and other contract requirements
- Acceptable levels of workmanship
- Quality of materials
- Resolution of differences (when applicable).

8.2.2 Initial inspections will include participation of the responsible personnel, including appropriate subcontractors and the field QA/QC personnel involved with the work element. The Army will be notified in advance of each initial inspection to coordinate participation in the inspection. The initial inspections will be reported on the daily QC reports.

8.3 FOLLOW-UP INSPECTIONS

8.3.1 Follow up inspections will be performed throughout the course of work. The number of follow-up inspections will be dependent upon the extent of work being performed on each particular work element. Follow-up inspections will be performed every two weeks, at a minimum, on all ongoing work. Follow-up inspections will also be performed on completed work phase prior to starting subsequent phases. Deficiencies identified will be corrected in a timely manner or identified on a punch list that will be used as a tracking method until the work is completed and verified and the punch list item signed off. Deficiencies that would be made inaccessible for correction by subsequent work activities will be corrected and accepted prior to starting the new work.

8.3.2 The follow-up inspections will be reported on the daily QC reports and copies of the inspection forms as applicable.

8.4 PRE-FINAL INSPECTION

8.4.1 Near the completion of the work or increment thereof as established (e.g., completion of sign post installation), the QCSM will conduct an inspection of the work and develop a punch list of items that do not conform to the approved CMI plan. The list of deficiencies will become a part of the CQC documentation, which will include the estimated date by which the deficiencies will be corrected. The QCSM will then make a second inspection to ensure that all deficiencies have been corrected. Once this is completed, the contractor will notify the QCSM that the site is ready for pre-final inspection.

8.4.2 The Army will perform the pre-final inspection to verify that the site work has been satisfactorily completed. A pre-final “punch list” may be developed by the QCSM as a result of this inspection. The QCSM will then make sure that all items on this list have been corrected and then notify the PM so that a final inspection with RSA can be scheduled. Items noted in the pre-final inspection will be completed in a timely manner. These inspections and deficiency corrections will be accomplished within the time frame slated for completion of the project.

8.5 FINAL INSPECTION

8.5.1 The PM, the QCSM, and the Army will be in attendance at this inspection. The RSA representative will formally schedule the Final Inspection based on completion of the results of the pre-final inspection. Notice will be given to the Army at least 14 days prior to the final inspection and must include the contractor's assurance that all the specific items previously identified as being unacceptable will be completed by the date scheduled for the final inspection.

8.5.2 The contractor will prepare the punch list. The punch list will identify all nonconforming or incomplete work. Upon completion of the punch list items, a second inspection will be conducted by RSA and the contractor to verify all of the items conform to the requirements. The QA/QC Manager will be the final authority to accept all of the punch list items as having been corrected.

8.6 INSPECTION DOCUMENTATION

The QCSM is responsible for the maintenance of the inspection records. Inspection records will be legible and clearly provide all information necessary to verify the items or activities inspected conform to the specified requirements or, in the case of nonconforming conditions, provide evidence that the conditions were brought into conformance or otherwise accepted by the Army.

9.0 REFERENCES

Alabama Department of Environmental Management (ADEM), 2024a, *Redstone Arsenal's Alabama Hazardous Wastes Management and Minimization Act Hazardous Waste Storage Facility, Thermal Treatment, Solid Waste Management Unit Corrective Action Permit, AL7 210 020 742, Modification No. 2*, May 3.

Alabama Department of Environmental Management (ADEM), 2024b, *Alabama Department of Environmental Management Land Divisions-Uniform Federal Covenants Program Administrative Code, Chapter 335-5-1*, Revised Effective February 12, 2024.

Aptim Federal Services, LLC (APTIM), 2019, *Revision 1 Resource Conservation and Recovery Act 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*, Prepared for Mission & Installation Contracting Command, September.

HydroGeoLogic, Inc., 2019, *Final Revision 4 Installation-Wide Quality Assurance Program Plan, U.S. Army Garrison – Redstone, Madison County, Alabama, Volumes I and II, prepared for U.S. Army Corps of Engineers, Huntsville District, U.S. Army Engineering and Support Center, Huntsville*, December.

TABLES

Table G4-1

**Typical Daily Construction Log
Redstone Arsenal, Madison County, Alabama**

Date: _____					
Contractor: _____			Project No.: _____		
Contract Title: _____				Report No.: _____	
Area: _____	Unit: _____	Work: Contract (✓) _____	WO # _____		
Shift: _____	Hrs. _____	Wkd: From _____	To _____	Weather _____	
				Temp. _____	L H
Manpower	No.	Total Hrs.	Major Equipment	No.	Total Hrs.
Description of Work Performed Today:					
Remarks by Contractor: (Delays, interruptions, deviations, extra work activities, unusual occurrences, etc., relevant to today's work.)					
For Contractor: _____		Title: _____		Date: _____	
USACE Comments and/or Exceptions:					
For USACE: _____		Title: _____		Date: _____	

Table G5-1

**Nonconformance Report
Redstone Arsenal, Madison County, Alabama**

Linked w/Variance No: Page __ of __

Project Name:	Project Number:
Date of Issue:	Report Number:
-- Nonconformance Report --	
I. Description of the Nonconformance, include requirement violated: (by the person identifying the nonconformance)	
Identified by:	Date:
Root Cause of nonconformance:	
II. Recommended Corrective Action: (by the person identifying the nonconformance and the review committee)	
To Be Performed by:	Date:
To Be Verified by:	Date:
III. Corrective Action Implementation: (by those implementing the corrective action)	
Was Performed by:	Date:
Was Verified by:	Date:
How was the Corrective Action Verified?	
IV. Nonconformance Resolution, include action taken to preclude recurrence: (by the review committee)	
Affected Organization:	-- Signatures --
<u>Distribution List:</u>	Requested by: _____ Date: _____ (printed name and date) Signature:
	QC Approved by: _____ Date: _____ (printed name and date) Signature:
	Proj. Mgr. Approval: _____ Date: _____ (printed name and date) Signature:
	Client QA Approval: _____ Date: _____ (printed name and date) Signature:

Table G5-3

**Stop Work Notice
Redstone Arsenal, Madison County, Alabama**

Project Name/Location: _____ Project No. _____ D.O. No. _____

S.W.O. No. _____ Date: _____ Page ___ of ___

1. Written Notice Issued to: Name: _____ Title: _____ Org.: _____	2. P.O. # or Activity: _____ 3. Location: _____ 4. Issued by (name): _____ Issued by (title): _____
5. Verbal Notice Issued to: Name: _____ Title: _____	Date: _____ Time: _____
6. Associated NCR No.: _____	7. Associated CAR No.: _____
8. Stop Work Order Condition Description: _____	Attachment _____
9. Remedial Action Required: By Whom: _____ Required Remedial Action Determined by: Project Manager: _____ CQA Director/Field CQA Coordinator: _____	By When: _____ Attachment _____ Date: _____ Date: _____
10. Follow-up of Remedial Action Taken: Verbal Notice to Resume Operations Given to: Name: _____ Title: _____ Stop Work Order Cancellation Authorized by: CQA Director/Field CQA Coordinator: _____	Attachment _____ Date: _____ Time: _____ Date: _____

ATTACHMENT 1
FIELD INSPECTION CHECKLIST

	Contract No: W912DY-17-D-0003 EPA ID No. AL7 210 020 742	Controlling Document: Corrective Measures Implementation (CMI) work plan
Location: Redstone Arsenal, Madison County, Alabama		
Inspection Type: Field Inspection Checklist Subject: RSA-313-R-01 CMIP	Inspection Date:	
Descriptor / Requirements	Comments	Results

4.0 Corrective Measures Implementation		
This section provides an overview of the field activities planned to complete Corrective Measures Implementation (CMI) at RSA-313-R-01. Work presented in this section will be completed in accordance with the procedures described in the CMI work plan and other approved documentation as appropriate. RSA-313-R-01 CMI work plan Chapter 4.0		
4.1 General Scope		
The general scope of work (SOW) includes the following: <ul style="list-style-type: none"> • Procurement and subcontracting; • Site mobilization and setup; • Utility clearance and marking, dig permit; • Vegetation clearance (MRS-2); • Protection of existing monitoring wells; • Civil surveying; • Advance geophysical classification (AGC) and/or analog surveying of data gaps and saturated response areas; • Excavation/removal of targets of interest (TOIs); • Munitions potentially presenting an explosive hazard (MPPEH) handling and disposal; • Waste disposal; • Implementation of Land Use Controls (LUCs), including installation of signage; • Groundwater sampling; and • Site restoration and demobilization. RSA-313-R-01 CMIP Chapter 4.0		

Location: Redstone Arsenal, Madison County, Alabama		
Inspection Type: Field Inspection Checklist		
Subject: RSA-313-R-01 CMI Work Plan		
Descriptor / Requirements	Comments	Results
4.2 Preliminary Activities		
Preliminary activities include mobilization, requirements for base access, dig permits and utility marking, site control, and surveying of site boundaries and grid system within MRS-2. The dig permit will be obtained from the Directorate of Public Works prior to commencement of the CMI. All field personnel will follow this work plan including the attached Quality Assurance Program Plan (QAPP) and Accident Prevention Plan (APP) with Site Safety and Health Plan (SSHP) including updates to these attached plans prepared by the Contractor as required.		
4.2.1 Mobilization		
All contractor and subcontractor personnel have completed required training and health and safety requirements. This includes: <ul style="list-style-type: none"> • Occupational Safety and Health Administration (OSHA) 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) and 8 hour updates • Reviewed and signed site specific health and safety plan • Any additional site or contract specific training or health and safety requirements RSA-313-R-01 CMIP Chapter 4.0		
4.2.2 Locating, Marking, and Surveying of Site Boundaries and Grids		
The site boundaries have been surveyed by a licensed land surveyor. RSA-313-R-01 CMIP Chapter 4.0		
Survey boundaries are marked by highly visible wooden stakes, tape, or pin flags. RSA-313-R-01 CMIP Chapter 4.0		
4.2.3 Digging Permit and Utility Marking		
A current dig permit is available on site. RSA-313-R-01 CMIP Chapter 4.0		
4.2.4 Site Control		
CMI contractor is using temporary construction fencing materials, barricades, and warning tape, as necessary, to delineate work zones in compliance with the site-specific safety and health plan. RSA-313-R-01 CMIP Chapter 4.0		
4.2.5 Vegetation Clearing		
Vegetation clearance is being performed in accordance with the CMIP. RSA-313-R-01 CMIP Chapter 4.0		

Location: Redstone Arsenal, Madison County, Alabama		
Inspection Type: Field Inspection Checklist		
Subject: RSA-313-R-01 CMI Work Plan		
Descriptor / Requirements	Comments	Results

4.3 Excavation Activities		
Excavations are being conducted in accordance with the CMIP and QAPP. RSA-313-R-01 CMIP Chapter 4.0		
4.4 Groundwater Sampling Activities		
Groundwater samples from eight existing monitoring wells (PW-RS061, 313-RS2285, 313-RS2286, 313-RS2287, 313-RS2288, PW-RS057, 312-RS2325, and 312-RS2326) were collected and analyzed in accordance with the CMIP and QAPP. RSA-313-R-01 CMIP Chapter 4.0		
4.5 Civil Surveying		
Land use control boundaries have been surveyed by a licensed surveyor in accordance with the CMIP and CQAP. RSA-313-R-01 CMIP Chapter 4.0		
Land use control signage has been installed in accordance with the CMIP and CQAP. RSA-313-R-01 CMIP Chapter 4.0		
4.6 Waste Transportation and Disposal		
MDAS has been transported to a qualified recycler in accordance with the CMIP. RSA-313-R-01 CMIP Chapter 4.0		
4.7 Post-Excavation Activities		
Spoils from excavations will be backfilled into their source excavations and hand compacted to the approximate consistency of the surrounding soil. Disturbed areas will be seeded and mulched to stimulate revegetation in the affected areas and reduce the potential for soil erosion. Seed and mulch will be applied according to the BMP handbook from the Alabama Soil and Water Conservation Committee (ASWOC) (ASWCC, 2022). RSA-313-R-01 CMIP Chapter 4.0		

Results:

- S = Satisfactory**
- I = Incomplete at the time of audit or surveillance. To be verified at a later date**
- O = Observation**
- F = Finding**
- NA = Not Applicable**

Comments: _____

QA Manager: _____

Date: _____

APPENDIX H
LAND USE CONTROLS

APPENDIX H

REVISION 2 LAND-USE CONTROLS

CORRECTIVE MEASURES IMPLEMENTATION WORK 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
EPA ID No. AL7 210 020 742**

Prepared for:



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

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

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June 2025

TABLE OF CONTENTS

Page

1.0	INTRODUCTION	H-1-1
2.0	SITE BACKGROUND.....	H-2-1
2.1	SITE HISTORY/CONDITIONS	H-2-1
2.2	SUMMARY OF NEED FOR ACTION	H-2-3
2.3	CORRECTIVE MEASURES ACTIVITIES	H-2-3
2.4	REASON FOR THE LAND-USE CONTROLS.....	H-2-4
3.0	LAND-USE CONTROLS	H-3-1
4.0	ONGOING OBLIGATIONS AND RESPONSIBILITIES	H-4-1
4.1	INSPECTIONS AND REPAIRS MONITORING	H-4-1
4.2	REPORTING	H-4-1
4.3	NOTICES.....	H-4-1
5.0	REFERENCES	H-5-1

LIST OF ACRONYMS AND ABBREVIATIONS

AAC	Alabama Administrative Code
ADEM	Alabama Department of Environmental Management
ALDOT	Alabama Department of Transportation
APTIM	Aptim Federal Services, LLC
CMI	Corrective Measures Implementation
CMIP	Corrective Measures Implementation Plan
DNT	dinitrotoluene
FM	titanium tetrachloride
FS	mixture of sulfur trioxide and chlorosulfonic acid
HE	high explosive
IM-AE	isobutyl methacrylate incendiary mix
LUC	land-use control
MEC	munitions and explosives of concern
mm	millimeter
MRS	Munitions Response Site
NEUR	Notice of Environmental Use Restriction
NT	nitrotoluene
RFI	Resource Conservation and Recovery Act Facility Investigation
RSA	Redstone Arsenal
Shaw	Shaw Environmental, Inc.
SVOC	semivolatile organic compound
TA	Test Area
TCE	trichloroethene
UXO	unexploded ordnance
VOC	volatile organic compound

1.0 INTRODUCTION

1.1 The U.S. Army Garrison–Redstone is completing studies of the environmental impact of known or suspected waste sites at Redstone Arsenal (RSA), Madison County, Alabama, under the management of the U.S. Army Environmental Command. This land-use controls (LUCs) document has been prepared for RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Operable Unit 15, in accordance with Alabama Administrative Code (AAC) r. 335-5-1.02(3) (Alabama Department of Environmental Management [ADEM], 2024) since the site will not be returned to unrestricted use following implementation of the corrective measures. This draft LUCs document will be finalized based on comments provided by ADEM. Upon ADEM approval of the corrective measures implementation (CMI) completion report for the corrective measures performed at RSA-313-R-01, the Notice of Environmental Use Restriction (NEUR) will be filed with ADEM, the LUCs will be incorporated into the RSA Installation Master Plan, and the NEUR will be recorded into applicable land records with Madison County, as required by AAC r. 335-5-1-.02(3)(a)(1)(iv) (ADEM, 2019). If the property is transferred to an owner that is not the federal government, an Environmental Covenant will be executed and filed in accordance with AAC r. 335-5-1-.02(3)(a)(1)(i) and (iii) (ADEM, 2024).

1.2 The remainder of this document provides descriptions of site background; the need for and nature of corrective measures; the need for LUCs; the use restrictions; and ongoing Army obligations and responsibility for inspections, repairs, monitoring, reporting, and notices.

2.0 SITE BACKGROUND

2.1 SITE HISTORY/CONDITIONS

2.1.1 RSA-313-R-01 occupies approximately 96.46 acres in the northwestern portion of RSA, west of Anderson Road, along the western RSA boundary, and extends from I-565 along the western RSA boundary, approximately 4,100 feet south of Martin Road (Figure 1-1 in the Corrective Measures Implementation Plan [CMIP]). Road construction for widening Zierdt Road was recently completed in the area between I-565 and Martin Road. During the road construction activities, a total of 63.17 acres of the site between Martin Road and I-565 were subjected to extensive road construction including widening, earth movement, and paving. The remainder of RSA-313-R-01 consists of 33.27 acres and was essentially divided into two unrelated areas (Figure 1-2 in the CMIP): RSA-313 North (18.67 acres) and RSA-313 South (14.60 acres). Due to the differing site conditions for RSA-313 North and RSA-313 South, the Army recommended dividing the site into two separate Munitions Response Sites (MRS): MRS-1 and MRS-2 (Aptim Federal Services, LLC [APTIM], 2019). As shown on Figure 1-3 in the CMIP, MRS-1 consists of 77.8 acres and includes the area west of RSA-313 North and south to the southern border of the site, and part of this MRS falls in the area of the Zierdt Road expansion project. MRS-2 consists of 18.67 acres and includes the area of the site investigated and known as RSA-313 North. MRS-2 also includes a 1.9-acre area as part of the RSA-071 range safety fan that was not included in the area affected by the Zierdt Road expansion project.

2.1.2 The western boundaries of Test Area (TA) 3 and TA-6 are included in RSA-313-R-01 (Figure 1-2 in the CMIP). 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. As shown on Figure 1-2 in the CMIP, 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 the site on the north and south sides of Martin Road.

2.1.3 According to the Installation Master Plan, land use within and surrounding RSA-313-R-01 is designated as an industrial zone (U.S. Army Garrison-Redstone, 2013); previous planning documents designated the potential land use to include research, development, testing, and evaluation. The site is currently not in use except as a buffer zone along the western edge of RSA. The newly implemented land use includes Zierdt Road as a result of the road expansion project. The Army has put an easement in place with the city of Huntsville for the expansion of Zierdt Road. The easement for the expansion of Zierdt Road extends eastward to the eastern boundary of RSA-313-R-01, along the length of Zierdt Road. The Alabama Department of Transportation (ALDOT) has notified the Army that the previously planned traffic ramp connector from Zierdt Road to I-565 is no longer planned or anticipated and ALDOT has no immediate plans to execute the Gate 7 expansion project. The land is and remains owned (fee simple) by the Army. The road construction activities for widening Zierdt Road are underway and nearly complete in the area between Martin Road and I-565. Following expansion, the eastern, widened portion of Zierdt Road is now present within the RSA-313-R-01 site boundary.

2.1.4 Available historical information indicates that RSA-313-R-01 was largely undeveloped or was farmland prior to 1941. In mid-1941, with the development of RSA during World War II, the Army began developing the area. Since the establishment of RSA, the western boundary has remained essentially constant. 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 or explosives testing areas.

2.1.5 The area is within the buffer zone for two former range areas: Area 2 and RSA-071. Area 2 is a former bombing range. Munitions used at the range include AN-M76 Bombs, PT1 filled (an incendiary mixture similar to Goop); 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.

2.1.6 RSA-071 is within the range fan that was reportedly used for various types of 4.2-inch mortars, including a 4.2-inch chemical mortar, inert (sand filled); a 4.2-inch chemical mortar, HE filled; a 4.2-inch chemical mortar, an FS (a mixture of sulfur trioxide and chlorosulfonic acid); and a 4.2-inch chemical mortar, WP filled.

2.1.7 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 (Figure 1-4 in the CMIP). The northern and southern areas of RSA-313-R-01 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, but a man-made lake, Lady Ann Lake, intersects the site and extends to the west of RSA. Five different palustrine wetlands are located within the boundaries of the site; three of the five palustrine wetland areas are classified as forested, one is scrub-shrub, and the other is classified as emergent. The surface water and wetland areas present within the site boundary are shown on Figure 1-4 in the CMIP. An approximately 17-acre area of the site, located immediately south of Lady Ann Lake and identified as “Bobcat Cave,” is identified as an ecologically sensitive area for the federally endangered Alabama cave shrimp.

2.1.4 Portions of the site are also identified as potential habitat for the gray bat. The gray bat (*Myotis grisescens*) is a Federally listed endangered species, and in the state of Alabama is protected by non-game species regulations. Gray bat habitat is mapped within the site, excluding the central portion of MRS-1 and all of MRS-2 as shown on Figure 1-4 of the CMIP. However, the habitat present is not used for nesting, but rather provides migration corridors for this species. This habitat carries restrictions to protect the gray bat by limiting habitat disturbances (i.e., no tree cutting or other sensitive habitat destruction) to maintain healthy migration corridors (Redstone Arsenal, 2017). This restricted gray bat habitat is not associated with feeding or roosting/nesting habitat required for this species.

2.1.4 Based on the results of the Resource Conservation and Recovery Act facility investigation (RFI), the conceptual site models for munitions and explosives of concern (MEC) and munitions constituents were revised (Figures 2-15, 2-16, and 2-17 in the CMIP), and the final conceptual site model includes the following components:

- Surface soil, subsurface soil, surface water, sediment, and groundwater samples were obtained and analyzed for metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOC)/polycyclic aromatic hydrocarbons, and explosives. Additionally, surface water and sediment samples were analyzed for perchlorate.
- Current and potential receptors evaluated in the RFI Report (APTIM, 2019) included a groundskeeper, construction worker, and commercial worker. Future potential receptors include all current receptors plus a residential and recreational user.
- The fate and transport evaluation in the RFI Report (APTIM, 2019) determined that no chemicals of concern were present in surface or subsurface soils at concentrations that pose a leaching threat to groundwater.
- The quantitative risk assessment concluded that exposure to surface media poses no unacceptable risk to human health or ecological receptors or leaching threats to groundwater. However, several VOCs, SVOCs, and explosive compounds in groundwater were found to pose unacceptable risks if groundwater were developed for potable uses.
- Based on investigative results and site history, the unexploded ordnance (UXO) probability for RSA-313-R-1 is “Low” for MRS-1, and “Moderate/High” for MRS-2. There is no known or suspected chemical warfare materiel hazard at the site.

2.2 SUMMARY OF NEED FOR ACTION

2.2.1 The RFI (APTIM, 2019) defined the nature and extent of contamination, evaluated potential risks and hazards to current and future receptors, and concluded that corrective measures are warranted at RSA-313-R-01 to address the potential risks posed by MEC to current and future receptors, particularly in the northern portion of the site (MRS-2, “Moderate/High” UXO probability area).

2.2.2 The Army’s historical operations at this site have not resulted in a release of hazardous chemicals to soil, surface water, or sediment that pose an unacceptable risk to human health or the environment, and there is no leaching threat to groundwater. Therefore, no corrective measures are needed for chemicals present in these media at RSA-313-R-01. Although precluded by in the installation-wide groundwater Interim Record of Decision (Shaw Environmental, Inc. [Shaw], 2007; 2009), development of groundwater as a potable source could pose an unacceptable threat to human health due to the presence of 2,4-dinitrotoluene (DNT), 2,6-DNT, 2-nitrotoluene (NT), bis(2-ethylhexyl)phthalate, and trichloroethene (TCE). Therefore, corrective measures are warranted for groundwater to ensure that future unacceptable risk due to this exposure pathway do not occur.

2.3 CORRECTIVE MEASURES ACTIVITIES

The CMIP for RSA-313-R-01 describes the corrective measures consisting of removal of subsurface geophysical anomalies using advanced geophysical classification and implementation of LUCs. Removal of the remaining geophysical anomalies within MRS-2 will allow reduction of this area to a “Low” MEC probability. Implementation of LUCs will prevent site user exposure to potential buried MEC. Figure 3-3 in the CMIP shows the areas included in this corrective measures.

2.4 REASON FOR THE LAND-USE CONTROLS

2.4.1 Selected corrective measures at RSA-313-R-01 will not restore the surface media to conditions suitable for unrestricted use because of the potential presence of buried MEC; therefore, LUCs for potential MEC will be required at RSA-313-R-01 per AAC r. 335-5-1-.02(3) (ADEM, 2024). Figure 3-4 in the CMIP shows the proposed LUCs boundary areas and coordinates for RSA-313-R-01.

2.4.2 LUCs will require “on-call” UXO support and anomaly avoidance for intrusive activities due to potential buried MEC.

2.4.3 A survey plat indicating the locations and dimensions of the LUCs area at RSA-313-R-01 will be prepared in accordance with the Permit Section VIII.B.5 (ADEM, 2021). The survey plat will be prepared and certified by a licensed surveyor in the state of Alabama and included with the NEUR. The survey plat will be part of the NEUR submitted to the Madison County Probate Office, which has jurisdiction over local land use, and to ADEM as part of the final NEUR.

2.4.4 Due to the presence of 2,4-DNT, 2,6-DNT, 2-NT, bis(2-ethylhexyl)phthalate, and TCE, groundwater could pose a threat to human health if developed as a potable source. Development of groundwater beneath the site as a potable source is currently precluded by the installation-wide groundwater Interim Record of Decision (Shaw, 2007; 2009). Also, restrictions associated with groundwater use will be implemented as part of the corrective measures for the underlying RSA-150 and RSA-153 groundwater units following Permit modification approval and are therefore not included in this corrective measures.

3.0 LAND-USE CONTROLS

The following controls will be implemented at RSA-313-R-01:

- Implementation of an NEUR in accordance with AAC r. 335-5-1-.02(3) (ADEM, 2024) that will restrict land use at RSA-313-R-01 and require on-call UXO support for any intrusive work. The draft NEUR will be included in the CMI report for this site for ADEM review and approval.
 - Land-use restrictions at RSA-313-R-01 will remain in place until the Army can demonstrate that the site is suitable for unrestricted use.
- Incorporation of the NEUR into the RSA Real Property Master Plan, as required by AAC r. 335-5-1-.02(3)(a)(1)(iv) (ADEM, 2024).

Recording of the NEUR in the land records for the property, as required by AAC r. 335-5-1-.02(3)(a)(1)(iv) (ADEM, 2024).

4.0 ONGOING OBLIGATIONS AND RESPONSIBILITIES

4.1 INSPECTIONS AND REPAIRS MONITORING

4.1.1 The following inspections will be conducted on an annual basis:

- Inspection of the warning signs will occur on an annual basis to ensure that they are still present and legible. If repairs or replacements are needed, they must be initiated within 10 days of identifying the need for repair/replacement.
- Inspections to identify undocumented activities inconsistent with the LUCs are not occurring at the site.
- Inspection for any changes in use or construction inconsistent with the restrictions included in Section 3.0 will occur on an annual basis. If inconsistent use or construction activities are identified, ADEM shall be notified within 10 days.

4.1.2 If uses inconsistent with the LUCs are identified, ADEM will be notified within 10 days after such uses are identified.

4.2 REPORTING

An annual monitoring report will be submitted to ADEM. This report will document the inspections and identify the status of the NEUR and how any deficiencies or inconsistent uses have been addressed. The annual report will address whether the state and local agencies were notified of the use restrictions and controls affecting the property and whether the use of the property has conformed with such restrictions and controls. The report will include a copy of the inspection forms, any violations noted and procedures followed to address the violations, and recommendations for any changes to the NEUR.

4.3 NOTICES

Notices regarding any observed changes in use, identified proposed changes in use, applications for building permit, or proposals for site work inconsistent with the NEUR will be provided to ADEM as part of the annual inspection report. RSA shall notify ADEM at least 90 days in advance of the proposed closing on any sale or other conveyance of any interest in any or all of the Property, as recommended in accordance with AAC r. 335-5-1.02(3) (ADEM, 2024) and the Permit (ADEM, 2021).

5.0 REFERENCES

- Alabama Department of Environmental Management (ADEM), 2024, *Alabama Department of Environmental Management Land Divisions—Uniform Federal Covenants Program, Administrative Code, Chapter 335-5-1*, Revised Effective February 12, 2024.
- ADEM, 2021, *Redstone Arsenal’s Alabama Hazardous Waste Management and Minimization Act Hazardous Waste Storage Facility, Thermal Treatment, Solid Waste Management Unit Corrective Action Permit*, July 19.
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APPENDIX I

EXPLOSIVES MANAGEMENT PLAN

APPENDIX I

**REVISION 2
EXPLOSIVES MANAGEMENT PLAN**

**CORRECTIVE MEASURES IMPLEMENTATION PLAN AT
RSA-313-R-01, WESTERN SIDE OF FORMER HIGH
EXPLOSIVE DROP AREA A, OPERABLE UNIT 15**

**U.S. ARMY GARRISON-REDSTONE
MADISON COUNTY, ALABAMA
EPA ID No. AL7 210 020 742**

Prepared for:



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

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

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June 2025

TABLE OF CONTENTS

Section	Page
1.0 INTRODUCTION	1
2.0 LICENSES/PERMITS	1
3.0 ACQUISITION.....	1
4.0 INITIAL RECEIPT.....	1
5.0 STORAGE	1
5.1 INSPECTION OF MAGAZINES.....	2
5.2 LOCATION OF THE MAGAZINES.....	2
5.3 PHYSICAL SECURITY OF STORAGE FACILITIES.....	2
5.4 SMOKING AND OPEN FLAMES	2
5.5 EXPLOSIVES STORAGE WITHIN A MAGAZINE	2
5.6 HOUSEKEEPING	3
6.0 TRANSPORTATION.....	3
6.1 ON-SITE TRANSPORTATION PROCEDURES	3
6.2 VEHICLE REQUIREMENTS.....	3
7.0 RECEIPT PROCEDURES	4
7.1 INVENTORY CONTROL AND RECORDS MANAGEMENT.....	4
7.2 AUTHORIZED INDIVIDUALS	5
7.3 END USER CERTIFICATION	5
7.4 RECONCILING DISCREPANCIES.....	5
8.0 INVENTORY OF STORED EXPLOSIVES AND MEC	5
9.0 LOST, STOLEN, OR UNAUTHORIZED USE OF EXPLOSIVES.....	5
10.0 REFERENCES	6

LIST OF ACRONYMS AND ABBREVIATIONS

AR	Army Regulation
ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives
CFR	Code of Federal Regulations
DoD	U.S. Department of Defense
HAZMAT	hazardous materials
MEC	munitions and explosives of concern
MPPEH	material potentially presenting an explosive hazard
NEW	net explosive weight
OESS	Ordnance and Explosives Safety Specialist
PM	Project Manager
RSA	Redstone Arsenal
SUXOS	Senior Unexploded Ordnance Supervisor
UXO	unexploded ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer

1.0 INTRODUCTION

This Explosives Management Plan provides details for the management of explosives during the corrective measures activities. This plan was developed in accordance with Federal Acquisition Regulation 52.245-2 (United States, 2012); state and local laws and regulations; Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) Publication 5400.7 (ATF, 2012); U.S. Department of Defense's (DoD) Defense Explosives Safety Regulation 6055.09 (DoD, 2019); U.S. Department of Transportation regulations; and Army Regulation (AR) 190-11 (Army, 2013b).

2.0 LICENSES/PERMITS

The Contractor maintains a valid Federal Explosives License issued by the ATF and complies with the appropriate portions of ATF Publication 5400.7, *Federal Explosives Law and Regulations* (ATF, 2012). The Contractor's demolition team will consist of at least two unexploded ordnance (UXO) technicians qualified in accordance with Department of Defense Explosives Safety Board Technical Paper-18 for demolition services, if required. Copies of most recent permitted Contractor ATF licenses will be maintained on site during field activities.

3.0 ACQUISITION

The Contractor will acquire commercial explosives from a local vendor or vendors who will deliver the materials to the project site or explosives magazines located in the 8200 block. Explosives vendors with a valid dealer ATF license will be used. A copy of the ATF dealer license and the Contractor's user permit will be maintained at the project site. It will be made available upon request by any local, state, or federal authority. The type, amount, class, and net explosive weight (NEW) of the donor explosives will not exceed 150 pounds NEW at any given time.

4.0 INITIAL RECEIPT

The explosives vendor will deliver the explosive materials to the project on an as-needed basis. An initial receipt inventory will then be conducted. Explosives in unsealed boxes containing partial lots will be opened, and the contents of the box will be counted. Any discrepancies between the actual type and quantity of explosives received and the shipping documentation will be noted on the shipping documentation with the signatures of both the delivery driver and the individual authorized to receive such explosives. A legible copy will be filed on site. The authorized individual designated by the Senior UXO Supervisor (SUXOS) receiving the explosives will immediately inform the SUXOS of any discrepancy, who will in turn notify the U.S. Army Engineering and Support Center, Huntsville Ordnance and Explosives Safety Specialist (OESS) and Project Manager (PM). A copy of the receipt documentation will be filed at the on-site office and placed in the project's permanent archive file.

5.0 STORAGE

Segregation and separation of initiators (blasting caps) from the donor charge explosives will be maintained by the use of two ATF Type II explosives magazines. One ATF Type II Magazine will

be utilized for the storage of initiators and the other ATF Type II magazine will be for storage of the donor charges. Both magazines will be housed within the 8200 block in accordance with the requirements of the *Explosive Destruction System, Assessment and Storage Complex at the Redstone Arsenal 8200 Block Site Plan* (Army, 2016b). The magazines will be grounded and certified by a Redstone Arsenal (RSA) electrician. A copy of the approved siting for this magazine will be maintained on site. All commercial donor explosives will have assigned DoD hazard division/storage compatibility groups and will be stored and secured in accordance with DoD's Defense Explosives Safety Regulation 6055.09 (DoD, 2019) and Department of the Army Pamphlet 385-64 (Army, 2013a).

5.1 INSPECTION OF MAGAZINES

The donor explosives magazines will be inspected upon entry by the UXO Quality Control Specialist (UXOQCS), or a minimum of weekly (when explosives are present), in order to determine whether there has been an unauthorized entry or attempted entry into the magazine, or unauthorized removal of the contents of the magazine. In the event the magazine doors are unsecured, a complete inventory of internal magazines will be conducted.

5.2 LOCATION OF THE MAGAZINES

The RSA magazines will be sited in a secured location in the 8200 block at RSA in accordance with the *Explosive Destruction System, Assessment and Storage Complex at the Redstone Arsenal 8200 Block Site Plan* (Army, 2016b, or current version).

5.3 PHYSICAL SECURITY OF STORAGE FACILITIES

Prior to storing explosives, the magazines will each have an Intrusion Detection System installed within an enclosed and gated chain-link fence, which is in accordance with AR 190-11 (Army, 2013b). The magazines will be locked with two high-security padlocks that meet ATF Publication 5400.7 Section 55.208 (a) (2012). Keys to the magazines will be controlled by the SUXOS and locked in a secure safe. Key Control Officers will be designated in writing. Keys will only be issued to Key Control Officers. A key control log will be maintained. A separate lockable key box will be placed inside the safe. Keys to the separate internal lockable key box will be controlled by the UXOQCS. Keys will be returned to the safe prior to the close of business. The SUXOS is solely responsible for controlling access to the magazines. The magazines will be inspected weekly by the SUXOS or UXOQCS to ensure the integrity of the magazines. At a minimum, two qualified UXO personnel are required to access the magazines for inspection, removal of explosives, or to return explosives to the magazines.

5.4 SMOKING AND OPEN FLAMES

Smoking, matches, open flames, and spark-producing devices are not permitted within 50 feet of the magazines.

5.5 EXPLOSIVES STORAGE WITHIN A MAGAZINE

5.5.1 Any explosive item shall be stored so that it can be easily counted and checked upon inspection. Explosives items are not to be packed and/or repacked inside a magazine or within 50

feet of a magazine and must not be unpacked or repacked close to other explosive materials. All containers with explosives must be closed while being stored.

5.6 HOUSEKEEPING

The explosive storage magazines will be kept clean, dry, and free of grit, paper, empty packages and containers, and rubbish. The area surrounding the magazines is to be kept clear of rubbish, brush, dry grass, or trees (except live trees more than 10 feet tall, for not less than 25 feet in all directions). Volatile materials are to be kept a distance of not less than 50 feet from the magazines.

6.0 TRANSPORTATION

This section presents the vehicle requirements and on-site transportation procedures for explosives during the site characterization activities.

6.1 ON-SITE TRANSPORTATION PROCEDURES

6.1.1 Explosives will be delivered to the project by a licensed and permitted commercial explosives vendor. When explosives are required, vendor personnel will transport the explosives to an area designated by the Contractor's UXO personnel. The explosives will either be transported directly to the 8200 block for storage or to the project site for immediate use.

6.1.2 The qualified driver of any explosive-laden vehicle shall have all applicable licenses and will ensure that the load is properly braced and that the initiators are separated from the main-charge explosives. Smoking will be strictly forbidden among all personnel involved in the handling or transportation of explosives.

6.2 VEHICLE REQUIREMENTS

Vehicles transporting explosives on the project site will comply with the following requirements:

- If required, the vehicle will be properly placarded per U.S. Department of Transportation requirements.
- The vehicles will be equipped with a first aid kit, two 10-BC fire extinguisher(s), and a means of communication with the UXO Safety Officer (UXOSO).
- Vehicles transporting explosives will be inspected using DD Form 626 and any applicable contractor inspection forms. The inspections will be documented on an explosives transportation vehicle safety checklist, which will be kept in the vehicle during transport.
- The engine will be off when loading and unloading explosives.
- The wheels will be chocked during loading and unloading to prevent movement.
- At no time will any bare explosives be allowed to come into contact with spark-producing metal. Vehicle cargo beds will have wooden or plastic liners, dunnage, or sandbags to protect the explosives from contacting the metal bed and fittings.

- Explosives will be placed in an ATF Type 3 magazine (day box) meeting the design specification of ATF Publication 5400.7, 27 Code of Federal Regulations (CFR) § 555.203(c) or transported in approved shipping containers.
- Initiating explosives, such as blasting caps, will remain separated from other explosives at all times. Blasting caps may be transported in the same vehicle as donor explosives as long as they are in a separate container conforming to Institute of Makers of Explosives standards and secured away from other explosive items.
- Separate containers will be used to transport blasting caps and donor explosives. The two containers will be placed in the bed of a vehicle, blocked, and braced separately using ratchet tie-down straps, bolts, or other suitable means to keep the containers from shifting.
- Compatibility requirements will always be observed.
- Only UXO-qualified personnel who have been “cleared” by the ATF will have access and authority to issue explosive materials. The receiving party will sign the receipt documents for accountability.
- When transporting 1,000 pounds or less of Compatibility Group 1.4B and 1.4S, 99 pounds or less of Compatibility Group 1.4D (detonating cord explosive content does not exceed 100 grains per linear foot), a commercial driver’s license and vehicle placarding are not required. If the above are not applicable, the driver will have a commercial Class C driver’s license with a hazardous materials (HAZMAT) endorsement when transporting HAZMAT on public roads.
- If the above are not applicable, the driver will have a commercial Class C driver’s license with a HAZMAT endorsement when transporting HAZMAT on public roads.
- Vehicle operators will comply with posted speed limits but will not exceed a safe and reasonable speed for road/field conditions. Vehicles transporting explosives off road will not exceed 25 miles per hour.
- Personnel will not ride in the cargo compartment of a vehicle transporting explosives.
- Smoking, matches, open flames, and spark-producing devices are only permitted at areas designated by the RSA Facility Manager and not within 50 feet of the magazine(s).

7.0 RECEIPT PROCEDURES

This section describes the procedures that the Contractor will use to maintain records of explosives received.

7.1 INVENTORY CONTROL AND RECORDS MANAGEMENT

7.1.1 Upon receipt the type, quantity, and lot number of each explosive item will be checked against the manifest and recorded on the Magazine Data Card. The original receipt documents and an inventory will be maintained on file by the SUXOS. The Magazine Data Card will remain in the magazine with the explosive items and be annotated and updated for each issue and receipt. Copies of all records will be maintained on-site by the SUXOS and be available for inspection by authorized agencies. Explosives items will be tracked by lot number until the item is expended.

7.1.2 The SUXOS will review all requests for explosives from the Demolition Team Leader. Only sufficient explosives for the day's operations will be requested and issued. This procedure will ensure that the issued explosives are accounted for while they are in the possession of the individual users. Entries made on the Munitions and Explosives of Concern (MEC)-Material Potentially Presenting an Explosive Hazard (MPPEH) Disposal and Donor Explosives Consumption Log and Magazine Data Cards will be verified through physical count by the Demolition Team Leader when drawing or turning in explosives and verified by the UXOQCS.

7.1.3 The UXOQS will be responsible for performing a weekly inventory of explosives in the magazines and results provided to the SUXOS. Entries made on the MEC-MPPEH Disposal and Donor Explosives Consumption Log and Magazine Data Cards will be verified through physical count, by the UXOQCS and authorized UXO Technician designated by the SUXOS.

7.2 AUTHORIZED INDIVIDUALS

The Contractor's Federal Explosives License lists all authorized users. The SUXOS will be responsible for the proper issue of explosives to the authorized UXO personnel.

7.3 END USER CERTIFICATION

The SUXOS and UXO Technician III (acting as the demolition supervisor), as the end user of explosives, will certify in writing that the explosives were used for their intended purpose. This information is tracked on the MEC/MPPEH Disposal and Donor Explosives Consumption Log.

7.4 RECONCILING DISCREPANCIES

In the event that there is a discrepancy with any aspect of the management of explosives, the SUXOS will be immediately notified. The SUXOS, together with the UXOSO and UXOQCS, will review documentation to determine whether the discrepancy is a paperwork error or whether explosives have been lost or stolen. If it is concluded that explosives have been lost or stolen, the incident will be immediately reported as discussed in Section 9.0.

8.0 INVENTORY OF STORED EXPLOSIVES AND MEC

8.1 An accurate running inventory of all MEC stored in consolidation points will be maintained. A minimum of two copies of the inventory shall be retained. One copy will be maintained at the consolidation point, and the second copy will be maintained by the SUXOS in the field office.

8.2 An accurate running inventory of all donor explosives stored in the magazines will be maintained. A minimum of two copies of the inventory shall be retained. One copy will be maintained at the magazines, and the second copy will be maintained by the SUXOS in the field office. The Contractor will provide a weekly update of the inventory to the OESS.

9.0 LOST, STOLEN, OR UNAUTHORIZED USE OF EXPLOSIVES

9.1 If explosives are discovered to be lost, stolen, or used without authorization, or if the donor explosives magazine has been determined to be breached, the incident will be immediately

reported to the SUXOS, OESS, and the Contractor's PM, who in turn, will inform the RSA Military Munitions Response Program PM and RSA Installation Emergency Operations Center.

9.2 As the federal licensee, the Contractor is required by law (27 CFR 55.30) to report the theft or loss of explosives to the ATF within 24 hours. In the event of such an occurrence, the following procedures will be followed:

- The Contractor will make the appropriate notifications in accordance with 27 CFR 55.30 (2002). These will include calling the ATF (800-461-8841 or 888-283-2662) and the local law enforcement authorities.
- The Contractor will be responsible for completing and forwarding ATF Form 5400.5. This form will be completed by the SUXOS, and a copy will be provided to the RSA Military Munitions Response PM and OESS.

10.0 REFERENCES

Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), 2012, *Publication of Federal Explosives Laws and Regulations* (ATF P 5400.7), U.S. Department of Justice Bureau of Alcohol, Tobacco, Firearms and Explosives Enforcement Programs and Services.

Department of Defense Explosives Safety Board (DDESB), 2019, *Defense Explosives Safety Regulation 6055.09, Edition 1*, January.

Department of the Army, 2019, Regulation 190-11, *Physical Security of Army Ammunition and Explosives*, January.

APPENDIX J

EXPLOSIVES SAFETY SUBMISSION

Not provided in accordance with Army guidance

APPENDIX K
SUPPORT PLANS

**01 CONTRACTOR CORRECTIVE MEASURES COMMUNICATIONS
PLAN**

**CORRECTIVE MEASURES
FIELD COMMUNICATIONS PLAN
REDSTONE ARSENAL, MADISON COUNTY, ALABAMA**

Revision: March 30, 2021

1.0 PURPOSE

The purpose of this Field Communication Plan is to identify the methods and processes by which the Contractor will conduct operational communications during field activities on sites potentially containing munitions and explosives of concern (MEC) and that require corrective measures at the Redstone Arsenal (RSA), Madison County, Alabama, under Contract Number W912DY-17-D-0003, Delivery Order number W912DY19F1116. Effective field communications will enable clear and timely communication of relevant information to affected stakeholders.

2.0 CATEGORIES OF COMMUNICATIONS

This communication plan identifies and defines two major categories of communication.

2.1 ESSENTIAL COMMUNICATIONS

Essential communications are identified as communications related to the initial, follow-up, and final reporting of serious incidents that may occur during conduct of field operations. These serious incidents can include:

1. Injury or death of a site worker or site visitor
2. Discovery of MEC that has been compromised and poses a threat to non-essential workers on RSA
3. Severe or adverse weather that poses a potential safety risk to site workers
4. Damage to equipment or property
5. Transmission of sensitive or classified information

2.2 NONESSENTIAL COMMUNICATIONS

Non-essential communications are identified as all other communications between operational and command assets to include communication with HydroGeoLogic, Inc., management, U.S. Army Engineering Support Center, Huntsville management, RSA management, and coordination with RSA Installation Emergency Operations Center (IEOC). Examples of non-essential communications include:

1. Common Operating Picture reporting
2. Quality Assurance/Quality Control reporting

3. Safety monitoring reporting
4. Field team verbal communication
5. Discovery of MEC that has not been compromised and does not pose a threat to non-essential workers on RSA
6. Requesting non-emergency information from RSA IEOC or other emergency entities

3.0 COMMUNICATION METHODS

To ensure continuity of communication, three separate methods of communication have been identified. These lines of communication are tailored based upon the type of communication as provided in the following table:

Method	Field Team	IEOC	External
Face-to-Face	Primary	“Does not apply”	“Does not apply”
Radio	Secondary	Primary 1	“Does not apply”
Email	“Does not apply”	Primary 2	Primary
Cellular Phone	Tertiary	Secondary	Secondary
Satellite Phone	“Does not apply”	Tertiary	Tertiary

4.0 POINTS OF CONTACT

Command Post Radio Call Sign: *Dragon 1* (for communicating with IEOC and EOC)

RSA IEOC Email: usarmy.redstone.usag.mbx.ioc@mail.mil

**02 CONTRACTOR CORRECTIVE MEASURES SITE ACCESS AND
VISITATION PLAN**

**CORRECTIVE MEASURES
SITE ACCESS AND VISITATION PLAN
REDSTONE ARSENAL, MADISON COUNTY, ALABAMA**

Revision: March 30, 2021

1.0 SITE ACCESS AND VISITATION POLICY

1.0.1 In the following text, the term “facility” applies to the entire Redstone Arsenal (RSA) installation, the term “site” applies to locations of environmental concern as identified in Alabama Department of Environmental Management (ADEM) Hazardous Waste Facility Permit #AL7 210 020 742, and “exclusion zone” (EZ) refers to the safety zone established around a munitions and explosives of concern (MEC)-related operation work area, which is off-limits to unauthorized entry because of elevated levels of risk. Access to these locations by site workers, essential personnel, and authorized visitors are governed by Engineer Manual (EM) 385-1-97 and other site-specific safety and health plans (SSHPs).

1.0.2 **Site Workers** consist of the personnel directly necessary to perform general site work either inside or outside an exclusion zone. Site workers include designated prime contractor site personnel, their designated subcontractors, and any other personnel directly necessary to perform site operations.

1.0.3 **Essential Personnel** is a term applicable to MEC sites. In accordance with EM 385-1-97, essential personnel are defined as U.S. Army Engineering Support Center, Huntsville (CEHNC) and contractor project personnel necessary for the safe and efficient completion of field operations conducted in an EZ. This is limited to contractor work team members including the Unexploded Ordnance (UXO) Safety Officer (UXOSO), UXO Quality Control Supervisor, Senior UXO Supervisor, and CEHNC Ordnance and Explosives Safety Specialist (OESS).

1.0.4 **Authorized Visitors** are defined as U.S. Department of Defense, Department of the Army, U.S. Army Corps of Engineers, or other personnel conducting project or mission-related functions, such as quality assurance representatives, safety and quality inspectors, and project management personnel authorized by the Army to visit a site (EM 385-1-97). ADEM representatives are included in this category of personnel.

2.0 FACILITY SITE ACCESS REQUIREMENTS

Site access requirements are summarized in **Attachment 1**. In order to be granted access to RSA, all personnel must have a valid RSA Visitor Badge or be escorted while on RSA.

3.0 GENERAL SITE ACCESS REQUIREMENTS

3.0.1 Prior to visiting any site under the control of the Army or its prime contractor, all site workers and authorized visitors must sign in at the designated project office and receive a safety briefing by the Site Safety and Health Officer (SSHO) or the UXOSO on the hazards present and any access requirements or restrictions for sites they plan to visit. Many sites contain potential surface hazards, and therefore, require a site safety escort. Site workers and authorized visitors

are responsible for compliance with the requirements specified in applicable site-specific safety and health plans, including wearing the correct personal protective equipment.

3.0.2 Authorized visitors are required to provide evidence of meeting all training and medical requirements specified in the applicable site-specific plans. This includes but is not limited to Hazardous Waste Operations and Emergency Response (HAZWOPER) 40-hour training, 8-hour HAZWOPER refresher within the past 12 months if the original 40-hour HAZWOPER course was completed more than 1 year previously (in accordance with 29 Code of Federal Regulations [CFR] 1910.120), physical examination and participation in a medical surveillance program per 29 CFR 1910.120, and participation in the prime contractor's safety orientation/indoctrination training by the SSHO/UXOSO in accordance with the APP/SSHP.

4.0 ADDITIONAL EZ ACCESS REQUIREMENTS FOR MEC SITES

4.0.1 Any visitor to the site requesting entry to the EZ during MEC operations is required to submit and gain approval to enter the EZ as an authorized visitor. All requests for approval as an authorized visitor will be submitted to the CEHNC Project Manager for approval at least 2 working days prior to the planned site visit. All visitor authorization requests will be prepared and submitted in accordance with EM 385-1-97, Section I.2.G.02.04. Visitors will be escorted by a UXO Technician II or higher (as outlined in Department of Defense Explosives Safety Board [2004] Technical Paper 18), and/or a CEHNC OESS. All authorized visitors must follow the direction of their escort.

4.0.2 While MEC procedures are being conducted, only essential personnel and authorized visitors will be allowed to enter an EZ. When nonessential personnel enter the EZ, all MEC operations will cease. Tasks not necessary to the operation will be prohibited within the immediate area of the hazard produced by the MEC operation.

4.0.3 No more than two authorized visitors will be permitted in any MEC EZ at any given time (EM 385-1-97, Sec. I.2.G.02).

ATTACHMENT 1
ACCESS REQUIREMENTS

Access Requirements

FACILITY ACCESS REQUIREMENTS

- US Citizen
- Approved Visitor Request/Badge
- Acceptable Identification
- Driver's Operation Permit (if operating a vehicle)
- Vehicle Registration (if operating a vehicle)
- Proof of Insurance (if operating a vehicle)
- Any other security requirement that may be stipulated by the RSA Provost Marshall

GENERAL SITE ACCESS REQUIREMENTS

- All of the above
- Evidence of 40-Hour HAZWOPER Training in accordance with (IAW) 29 CFR 1910.120
- Evidence of current 8-Hour HAZWOPER Refresher Training, IAW 29 CFR 1910.120
- Evidence of participation in OSHA Medical Surveillance Program, IAW 29 CFR 1910.120
- Documented prior training by the Contractor IAW the site-specific APP/SSHP
- Site Safety Briefing and Sign Safety Acknowledgement
- Site Safety Escort
- Any other site-specific safety requirement that may be stipulated in the applicable site plan

EZ Access Requirements

- All of the above
- Any other site-specific safety requirement that may be stipulated in the applicable site plan

Additional EZ Access Requirements for MEC Sites

- All of the above
- No more than two (2) Authorized Visitors at any given time
- Escort by UXO Technician II or higher and/or CEHNC OESS
- Any other site-specific safety requirement that may be stipulated in the applicable site plan

APPENDIX L

FORMS

General Project Forms

- 01-Field Activity Daily Log
- 02-APP/SSHP Acceptance Form
- 03-Safety Meeting/Training Attendance Log
- 04-Tailgate Safety Meeting Log
- 05-Health and Safety Site Visitor Log
- 06-Field Work Variance Form
- 07-Risk Mitigation Two-Week Look Ahead
- 08-Root Cause Analysis Form
- 09-Explosive Vehicle Inspection Form DD 626
- 10-HGL Incident Report
- 11-Accident Investigation Report Form
- 12-OSHA 300 Form
- 13-Lost, Damaged, or Destroyed Form
- 14-Vehicle Safety Inspection

Quality Control Forms

- 15-Site Safety Inspection Log
- 16-Explosive Security Survey Checklist
- 17-Key Control Registry Log
- 18-Quality Compliance Checklist
- 19-Quality Control Preparatory Phase Checklist
- 20-Quality Control Initial Phase Checklist
- 21-Quality Control Vegetation Removal Checklist
- 22-Quality Control Civil Survey Checklist
- 23-Quality Control Geophysical Survey Checklist
- 24-Quality Control Single Point Anomaly Excavation Checklist
- 25-Heavy Equipment Inspection Checklist

Field Work Forms

- 26-Grid Drawing Sheet
- 27-Team Leader Grid Sheet
- 28-Demolition-Burn Notification Checklist
- 29-General Demolition Safety
- 30-RSA Demolition Brief and Plan
- 31-Demolition Shot Record
- 32-MEC_Demil_Disposal_Acct_Record
- 33-Explosive Material Disposition Record-Bill of Lading
- 34-Manufacturer of Explosive Record of Acquisition
- 35-ATF Form f_5400.5
- 36-DoD Form 1348-1A
- 37-DD Form 1911 Materiel Courier Receipt
- 38-Instrument Calibration Log
- 39-Well Development Log
- 40-Groundwater Field Sampling Data Log
- 41-Field Sampling Report



**DAILY STATUS REPORT/DAILY QC
REPORT CORRECTIVE MEASURES AT
RSA-313-R-01**

Project Name:	Corrective Measures Implementation at Multiple (9) Sites at the Redstone Arsenal (RSA-313-R-01)	Project Number:	AP5001
Contract No.:	W912DY-17-D-0003	Project Location:	Redstone Arsenal, Madison County, AL
Delivery Order:	W912DY19F1116	Daily Report Date:	No.: 001

KEY PROJECT PERSONNEL	
Project Management Personnel	
CEHNC COR/PM	Nicholas Konovodoff
CEHNC Geophysicist	Amy Walker, Daryl Donatelli
CEHNC Ordnance & Explosives Safety Specialist (OESS)	Kenny Jones
RSA Site Manager	Clay Smith
Contractor Program Manager	Keller Davis
Contractor PM	Mark Shoemaker
Contractor Program Quality Assurance (QA) Manager	Ken Walker
Subcontractor Program Manager	Janardan Patel
Subcontractor PM	Tim Hiles
Subcontractor QA Manager	Theresa Rojas
Subcontractor Program Geophysicist	Heesoo Chung
Field Personnel	
Subcontractor Senior UXO Supervisor (SUXOS)	John Hoover
Subcontractor UXO Safety Officer (UXOSO)	Josh Rhymes
Subcontractor UXO Quality Control Specialist (UXOQCS)	Braden Livingstone
Subcontractor Site Geophysicist	Josh DeFrates

**Corrective Measures Implementation at RSA-313-R-01
Redstone Arsenal, Madison County, Alabama Project
Daily Status Report**

2.0 Personnel Record					
2.1 Field Personnel (excluding Site Visitors)					
Name	Organization	Position	Comments	On-site (Y/N)	Hours
2.2 Site Visitors					
Name	Organization	Purpose of Visit	Safety Brief (Y/N)		

3.0 Equipment Onsite					
3.1 Vehicles					
Vehicle	Source	VIN	Assigned to:	On Site:	Off Site:
3.2 Contractor Rental Equipment On Site					
Equipment Type	SS#	Vendor	On Site:	Off Site:	
3.3 Subcontractor Equipment On Site					
Equipment Type	SS#	Vendor	On Site:	Off Site:	

**Corrective Measures Implementation at RSA-313-R-01
Redstone Arsenal, Madison County, Alabama Project
Daily Status Report**

4.0 List of MEC Recovered to date				
Date	Type (mod/mark required)	QTY	Location	Date of Demo

5.0 Demolition Materials Accounting			
Delivered Item	QTY	QTY Used	QTY Stored

6.0 Completion Status of Site Activities					
Activity	Estimated/Total	Completed Today	Cumulative	Percent Complete	Comments

**Corrective Measures Implementation at RSA-313-R-01
Redstone Arsenal, Madison County, Alabama Project
Daily Status Report**

7.0 Exposure Data				
Company	Daily Total for Week Ending – X/X/202X		Cumulative	
	Hours	Miles	Hours (total)	Miles (total)
HGL				
APTIM				

8.0 Instructions from Government Personnel
None

9.0 Signatures		
Signed by:		
	John Hoover (SUXOS)	Date
	Braden Livingstone (UXOQCS)	Date

**PLAN ACCEPTANCE FORM
ACCIDENT PREVENTION PLAN / SITE SAFETY AND HEALTH PLAN**

Instructions: This form is to be completed by each person to work on the subject project work site and returned to the Site Safety and Health Officer.

I have read and agree to abide by the contents of the Accident Prevention Plan / Site Safety and Health Plan for the following project:

**Corrective Measures Implementation at RSA-313-R-01
Redstone Arsenal, Madison County, Alabama**

Name (print)

Signature

Date

Return to UXO Safety Officer before starting work at the site.

Safety Meeting/Training Attendance Log

Date:		Time:		Conducted by:	
Site Name/Location:	RSA-313-R-01, Redstone Arsenal, Madison County, AL				
Contract Number:	W912DY-17-D-0003	Delivery/Task Order Number:	W912DY19F1116		
Project Manager:		Site Manager (when applicable):	N/A		
(Senior) UXO Supervisor:		Site Safety Officer/Unexploded Ordnance Safety Health Officer:			

Training Provided: Initial Site Hazard Daily Safety Meeting Other:
 Weekly Safety Training Task/Hazard Specific

Weather Conditions: **Temperature (Low/High):** **Wind speed:** mph **Precipitation:** %
 Fair Poor to °F **Direction:** **Humidity:** %

I. TRAINING TOPICS COVERED

- | | | |
|--|--|--|
| <input type="checkbox"/> Planned Site Activities | <input type="checkbox"/> Heat or Cold Stress | <input type="checkbox"/> Respirator Use |
| <input type="checkbox"/> Demolition Operations | <input type="checkbox"/> Biological Hazards | <input type="checkbox"/> Decontamination Procedures |
| <input type="checkbox"/> Site Controls | <input type="checkbox"/> Chemical Hazards | <input type="checkbox"/> Emergency Procedures/Route |
| <input type="checkbox"/> Exclusion Zone/Personnel Limits | <input type="checkbox"/> Routes of Chemical Exposure | <input type="checkbox"/> First Aid Procedures |
| <input type="checkbox"/> Site Communications | <input type="checkbox"/> Chemical Exposure Symptoms | <input type="checkbox"/> Buddy Team Procedures |
| <input type="checkbox"/> Physical Hazards | <input type="checkbox"/> Level/Type of PPE | <input type="checkbox"/> Other (describe topic(s) below) |

Explain: _____

Hospital/Clinic:	Address:	Phone:
-------------------------	-----------------	---------------

II. SITE PERSONNEL / TRAINING ATTENDEES (Continued on 2nd page)

	Name	Signature	Company
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

III. SAFETY BRIEF / TRAINING VERIFICATION

I certify that the personnel listed on this roster have received the safety and health training described above.

 Site Manager or Senior UXO Supervisor

 Site Safety and Health Officer or UXO Safety Officer

Safety Meeting and Training Attendance Log

II. SITE PERSONNEL / TRAINING ATTENDEES (continued from 1st page)			
	Name	Signature	Company
11.			
12.			
13.			
14.			
15.			
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50.			

HGL MEC Form 15.18 (Oct 2010)

TAILGATE SAFETY MEETING LOG

DATE		TEAM NO.	
SITE NAME/LOCATION	RSA-313-R-01 Redstone Arsenal, Madison County, AL	GRID NO.	

1. Safety Topics Discussed:

<input type="checkbox"/> Site Description	<input type="checkbox"/> Environmental Concerns/Hazards
<input type="checkbox"/> Site Controls	<input type="checkbox"/> Emergency Procedures/Route
<input type="checkbox"/> Personal Protective Equipment	<input type="checkbox"/> First Aid Procedures
<input type="checkbox"/> Emergency Procedures/Equipment	<input type="checkbox"/> Injury Reporting
<input type="checkbox"/> Site Evacuation	<input type="checkbox"/> Safe Work Practices
<input type="checkbox"/> Physical/Biological Hazards	<input type="checkbox"/> Other:
<input type="checkbox"/> Heat or Cold Stress	<input type="checkbox"/> Other:
<input type="checkbox"/> Communication/Radio Procedure	<input type="checkbox"/> Other:

2. Task Operation and Remarks:

<hr/> <hr/>

3. Attendees:

	Print Name	Signature	Company
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Meeting Conducted by:

Signature:

--	--

Health and Safety Site Visitor Log

Project Name:	Corrective Measures Implementation at Multiple (9) Sites at the Redstone Arsenal (RSA-313-R-01)	Project Number:	AP5001	Delivery/Task Order:	W912DY19F1116
Site Name:	RSA-31-R-01	Location:	Redstone Arsenal, Madison County, AL		

This form shall be used to track entry into and departure from the ***EXCLUSION ZONE, CONTAMINATION REDUCTION ZONES, OR OTHER WORK ZONES*** on all HydroGeoLogic, Inc. sites. All Personnel shall sign in and out on the form by printing their name, initializing the form and noting the time in/out.

Date	Name	Representing	Purpose of visit	Escort Required		Equipment/ PPE Level	Time	
				Yes	No		In	Out

Health and Safety Site Visitor Log

Date	Name	Representing	Purpose of visit	Escort		Equipment/ PPE Level	Time	
				Yes	No		In	Out

FIELD WORK VARIANCE

PROJECT NO.: AP5001

DATE:

VARIANCE NO.:

PROJECT NAME: Corrective Measures Implementation at Multiple (9) Sites at the Redstone Arsenal
(RSA-313-R-01)

PAGE 1 OF 2

CONTRACT NO.: W912DY-17-D-0003

DELIVERY ORDER NO.: W912DY19F1116

PRESENT REQUIREMENTS:

REQUESTED BY:

PROPOSED CHANGE:

TECHNICAL JUSTIFICATION:

COST/SCHEDULE IMPACT:

REASON FOR CHANGE:

ADDITION

DELETION

CHANGE ORDER

REQUIRED: NO

YES

CHANGE ORDER NO. _____

APPLICABLE DOCUMENT:

cc: Distribution

APPROVED BY _____
Project Manager

DATE _____

APPROVED BY _____
Quality Control Systems Manager

DATE _____

APPROVED BY _____
USACE Project Manager

DATE _____

**RISK MITIGATION TWO-WEEK LOOK AHEAD
CORRECTIVE MEASURES IMPLEMENTATION AT
MULTIPLE (9) SITES AT THE REDSTONE ARSENAL**

Project Name:	Corrective Measures Implementation at Multiple (9) Sites at the Redstone Arsenal (RSA-313-R-01)	Project Number:	AP5001	
	Contract No.: W912DY18F0721		W912DY-17-D-0003	Project Location:
	W912DY19F1116	Meeting Date:		

1.0 General Information	
Safety Plan for Week Ending:	
Plan Prepared by:	
Subcontractors Involved:	

2.0 Identified Risks/Exposures/Hazards

3.0 Control Measures for Identified Risks/Exposures/Hazards

4.0 Additional Activity Hazard Analyses Required

5.0 Subcontractors Mobilizing or Demobilizing

6.0 Audits or Inspections Scheduled

7.0 Competent Persons Changes

8.0 Planned Orientation or Training

9.0 Recommendations/Comments/Concerns

ROOT CAUSE ANALYSIS

Project:			
Subject:			
Date:		RCA No.:	

Description of Condition Found:
Actual Cause:
Action Taken to Correct Condition: (Corrective Action should address root cause of condition found, not symptoms)
Action Taken to Prevent Recurrence:
Action Taken to Monitor Effectiveness of Corrective Action: (Generate data as proof. State the monitoring method put in place and who is responsible for reviewing data.)

<i>Preparer</i>	<i>Project Title/Role</i>	<i>Date</i>
<i>Lead Technical Representative</i>	<i>Project Title/Role</i>	<i>Date</i>
<i>Contractor Approver</i>	<i>Project Manager</i>	<i>Date</i>

MOTOR VEHICLE INSPECTION (TRANSPORTING HAZARDOUS MATERIALS)

(Read Instructions before completing this form.)

This form applies to all vehicles which must be marked or placarded in accordance with Title 49 CFR.

1. BILL OF LADING/TRANSPORTATION CONTROL NUMBER

SECTION 1 - DOCUMENTATION

ORIGIN
a.

DESTINATION
b.

2. CARRIER/GOVERNMENT ORGANIZATION

3. DATE/TIME OF INSPECTION

4. LOCATION OF INSPECTION

5. OPERATOR(S) NAME(S)

6. OPERATOR(S) LICENSE NUMBER(S)

7. MEDICAL EXAMINER'S CERTIFICATE*

8. *(X if satisfactory at origin)*

9. CVSA DECAL DISPLAYED ON COMMERCIAL EQUIPMENT* YES NO

a. HAZMAT ENDORSEMENT

d. ERG OR EQUIVALENT COMMERCIAL: YES NO

b. VALID LEASE*

e. DRIVER'S VEHICLE INSPECTION REPORT*

a. TRUCK/TRACTOR

c. ROUTE PLAN

f. COPY OF 49 CFR PART 397

b. TRAILER

SECTION II - MECHANICAL INSPECTION

All items shall be checked on empty equipment prior to loading. Items with an asterisk shall be checked on all incoming loaded equipment.

10. TYPE OF VEHICLE(S)

11. VEHICLE NUMBER(S)

12. PART INSPECTED
(X as applicable)

ORIGIN (1)		DESTINATION (2)	
SAT	UNSAT	SAT	UNSAT

ORIGIN (1)		DESTINATION (2)	
SAT	UNSAT	SAT	UNSAT

COMMENTS
(3)

a. SPARE ELECTRICAL FUSES

k. EXHAUST SYSTEM

b. HORN OPERATIVE

l. BRAKE SYSTEM*

c. STEERING SYSTEM

m. SUSPENSION

d. WINDSHIELD/WIPERS

n. COUPLING DEVICES

e. MIRRORS

o. CARGO SPACE

f. WARNING EQUIPMENT

p. LANDING GEAR*

g. FIRE EXTINGUISHER*

q. TIRES, WHEELS, RIMS

h. ELECTRICAL WIRING

r. TAILGATE/DOORS*

i. LIGHTS AND REFLECTORS

s. TARPULIN*

j. FUEL SYSTEM*

t. OTHER *(Specify)*

13. INSPECTION RESULTS *(X one)* ACCEPTED

REJECTED

(If rejected give reason under "Remarks". Equipment will be approved if deficiencies are corrected prior to loading.)

14. SATELLITE MOTOR SURVEILLANCE SYSTEM: *(X one)* ACCEPTED

REJECTED

15. REMARKS

16. INSPECTOR SIGNATURE *(Origin)*

17. INSPECTOR SIGNATURE *(Destination)*

SECTION III - POST LOADING INSPECTION

This section applies to Commercial and Government/Military vehicles. All items will be checked prior to release of loaded equipment and shall be checked on all incoming loaded equipment.

ORIGIN (1)		DESTINATION (2)	
SAT	UNSAT	SAT	UNSAT

COMMENTS
(3)

18. LOADED IAW APPLICABLE SEGREGATION/COMPATIBILITY TABLE OF 49 CFR

19. LOAD PROPERLY SECURED TO PREVENT MOVEMENT

20. SEALS APPLIED TO CLOSED VEHICLE; TARPULIN APPLIED ON OPEN EQUIPMENT

21. PROPER PLACARDS APPLIED

22. SHIPPING PAPERS/DD FORM 2890 FOR GOVERNMENT VEHICLE SHIPMENTS

23. COPY OF DD FORM 626 FOR DRIVER

24. SHIPPED UNDER DOT SPECIAL PERMIT 868

25. INSPECTOR SIGNATURE *(Origin)*

26. DRIVER(S) SIGNATURE *(Origin)*

27. INSPECTOR SIGNATURE *(Destination)*

28. DRIVER(S) SIGNATURE *(Destination)*

INSTRUCTIONS

SECTION I - DOCUMENTATION

General Instructions.

All items (2 through 9) will be checked at origin prior to loading. Items with an asterisk (*) apply to commercial operators or equipment only. Only Items 2 through 7 are required to be checked at destination.

Items 1 through 5. Self explanatory.

Item 6. Enter operator's Commercial Driver's License (CDL) number or Military OF-346 License Number. CDL and OF-346 must have the HAZMAT and other appropriate endorsements IAW 49 CFR 383.

Item 7. *Enter the expiration date listed on the Medical Examiner's Certificate.

Item 8.a. Hazardous Materials Certification. In accordance with applicable service regulations, ensure operator has been certified to transport hazardous materials. Check the expiration date on driver's HAZMAT Certification.

b. *Valid Lease. Shipper will ensure a copy of the appropriate contract or lease is carried in all leased vehicles and is available for inspection. (49 CFR 376.12 and 376.11(c)(2)).

c. Route Plan. Prior to loading any Hazard Class/Division 1.1, 1.2, or 1.3 (Explosives) for shipment, ensure that the operator possesses a written route plan in accordance with 49 CFR Part 397. Route Plan requirements for Hazard Class 7 (Radioactive) materials are found in 49 CFR 397.101.

d. Emergency Response Guidebook (ERG) or Equivalent. Commercial operators must be in possession of an ERG or equivalent document. Shipper will provide applicable ERG page(s) to military operators.

e. *Driver's Vehicle Inspection Report. Review the operator's Vehicle Inspection Report. Ensure that there are no defects listed on the report that would affect the safe operation of the vehicle.

f. Copy of 49 CFR Part 397. Operators are required by regulation to have in their possession a copy of 49 CFR Part 397 (Transportation of Hazardous Materials Driving and Parking Rules). If military operators do not possess this document, shipper will provide a copy to operator.

Item 9. *Commercial Vehicle Safety Alliance (CVSA) Decal. Check to see if equipment has a current CVSA decal and mark applicable box. Vehicles without CVSA, check documentation of the last vehicle periodic inspection and perform DD Form 626 inspection.

SECTION II - MECHANICAL INSPECTION

General Instructions.

All items (12.a. through 12.t.) will be checked on all incoming empty equipment prior to loading. All UNSATISFACTORY conditions must be corrected prior to loading. Items with an asterisk (*) shall be checked on all incoming loaded equipment. Unsatisfactory conditions that would affect the safe off-loading of the equipment must be corrected prior to unloading.

SECTION II (Continued)

Item 12.a. Spare Electrical Fuses. Check to ensure that at least one spare fuse for each type of installed fuse is carried on the vehicle as a spare or vehicle is equipped with an overload protection device (circuit breaker). (49 CFR 393.95)

b. Horn Operative. Ensure that horn is securely mounted and of sufficient volume to serve purpose. (49 CFR 393.81)

c. Steering System. The steering wheel shall be secure and must not have any spokes cracked through or missing. The steering column must be securely fastened. Universal joints shall not be worn, faulty or repaired by welding. The steering gear box shall not have loose or missing mounting bolts or cracks in the gear box mounting brackets. The pitman arm on the steering gear output shaft shall not be loose. Steering wheel shall turn freely through the limit of travel in both directions. All components of a power steering system must be in operating condition. No parts shall be loose or broken. Belts shall not be frayed, cracked or slipping. The power steering system shall not be leaking. (49 CFR 396 Appendix G)

d. Windshield/Wipers. Inspect to ensure that windshield is free from breaks, cracks or defects that would make operation of the vehicle unsafe; that the view of the driver is not obscured and that the windshield wipers are operational and wiper blades are in serviceable condition. Defroster must be operative when conditions require. (49 CFR 393.60, 393.78 and 393.79)

e. Mirrors. Every vehicle must be equipped with two rear vision mirrors located so as to reflect to the driver a view of the highway to the rear along both sides of the vehicle. Mirrors shall not be cracked or dirty. (49 CFR 393.80)

f. Warning Equipment. Equipment must include three bidirectional emergency reflective triangles that conform to the requirements of FMVSS No. 125. FLAME PRODUCING DEVICES ARE PROHIBITED. (49 CFR 393.95)

g. Fire Extinguisher. Military vehicles must be equipped with one serviceable fire extinguisher with an Underwriters Laboratories rating of 10 BC or more. (Commercial motor vehicles must be equipped with one serviceable 10 BC Fire Extinguisher). Fire extinguisher must be located so that it is readily accessible for use and securely mounted on the vehicle. The fire extinguisher must be designed, constructed and maintained to permit visual determination of whether it is fully charged. (49 CFR 393.95)

h. Electrical Wiring: Electrical wiring must be clean and properly secured. Insulation must not be frayed, cracked or otherwise in poor condition. There shall be no uninsulated wires, improper splices or connections. Wires and electrical fixtures inside the cargo area must be protected from the lading. (49 CFR 393.28)

INSTRUCTIONS

SECTION II (Continued)

i. Lights/Reflectors. (Head, tail, turn signal, brake, clearance, marker and identification lights, Emergency Flashers). Inspect to see that all lighting devices and reflectors required are operable, of proper color and properly mounted. Ensure that lights and reflectors are not obscured by dirt or grease or have broken lenses. High/Low beam switch must be operative. Emergency Flashers must be operative on both the front and rear of vehicle. (49 CFR 393.24, 25, and 26)

j. Fuel System. Inspect fuel tank and lines to ensure that they are in serviceable condition, free from leaks, or evidence of leakage and securely mounted. Ensure that fuel tank filler cap is not missing. Examine cap for defective gasket or plugged vent. Inspect filler necks to see that they are in completely serviceable condition and not leaking at joints. (49 CFR 393.83)

k. Exhaust System. Exhaust system shall discharge to the atmosphere at a location to the rear of the cab or if the exhaust projects above the cab, at a location near the rear of the cab. Exhaust system shall not be leaking at a point forward of or directly below the driver compartment. No part of the exhaust system shall be located where it will burn, char or damage electrical wiring, fuel system or any other part of the vehicle. No part of the exhaust system shall be temporarily repaired with wrap or patches. (49 CFR 393.83)

l. Brake System (to include hand brakes, parking brakes and Low Air Warning devices). Check to ensure that brakes are operational and properly adjusted. Check for audible air leaks around air brake components and air lines. Check for fluid leaks, cracked or damaged lines in hydraulic brake systems. Ensure that parking brake is operational and properly adjusted. Low Air Warning devices must be operative. (49 CFR 393.40, 41, 42, 43, 44, 45, 47, 48, 49, 50, 51, 52, 53, and 55)

m. Suspension. Inspect for indications of misaligned, shifted or cracked springs, loosened shackles, missing bolts, spring hangers unsecured at frame and cracked or loose U-bolts. Inspect for any unsecured axle positioning parts, and sign of axle misalignment, broken torsion bar springs (if so equipped). (49 CFR 393.207)

n. Coupling Devices (Inspect without uncoupling). Fifth Wheels: Inspect for unsecured mounting to frame or any missing or damaged parts. Inspect for any visible space between upper and lower fifth wheel plates. Ensure that the locking jaws are around the shank and not the head of the kingpin. Ensure that the release lever is seated properly and safety latch is engaged. Pintle Hook, Drawbar, Towbar Eye and Tongue and Safety Devices: Inspect for unsecured mounting, cracks, missing or ineffective fasteners (welded repairs to pintle hook is prohibited). Ensure safety devices (chains, hooks, cables) are in serviceable condition and properly attached. (49 CFR 393.70 and 71)

o. Cargo Space. Inspect to ensure that cargo space is clean and free from exposed bolts, nuts, screws, nails or inwardly projecting parts that could damage the lading. Check floor to ensure it is tight and free from holes. Floor shall not be permeated with oil or other substances. (49 CFR 393.84)

p. Landing Gear. Inspect to ensure that landing gear and assembly are in serviceable condition, correctly assembled, adequately lubricated and properly mounted.

SECTION II (Continued)

q. Tires, Wheels and Rims: Inspect to ensure that tires are properly inflated. Flat or leaking tires are unacceptable. Inspect tires for cuts, bruises, breaks and blisters. Tires with cuts that extend into the cord body are unacceptable. Thread depth shall not be less than: 4/32 inches for tires on a steering axle of a power unit, and 2/32 inches for all other tires. Mixing bias and radial on the steering axle is prohibited. Inspect wheels and rims for cracks, unseated locking rings, broken, loose, damaged or missing lug nuts or elongated stud holes. (49 CFR 393.75)

r. Tailgate/Doors. Inspect to see that all hinges are tight in body. Check for broken latches and safety chains. Doors must close securely. (49 CFR 177.835(h))

s. Tarpaulin. If shipment is made on open equipment, ensure that lading is properly covered with fire and water resistant tarpaulin. (49 CFR 177.835(h))

t. Other Unsatisfactory Condition. Note any other condition which would prohibit the vehicle from being loaded with hazardous materials.

Item 14. For AA&E and other shipments requiring satellite surveillance, ensure that the Satellite Motor Surveillance System is operable. The DTTS Message Display Unit, when operative, will display the signal "DTTS ON". The munitions carrier driver, when practical, will position the DTTS message display unit in a manner that allows the shipping inspector or other designated shipping personnel to observe the "DTTS ON" message without climbing aboard the cab of the motor vehicle.

SECTION III - POST LOADING INSPECTION

General Instructions.

All placarded quantities items will be checked prior to the release of loaded equipment. Shipment will not be released until deficiencies are corrected. All items will be checked on incoming loaded equipment. Deficiencies will be reported in accordance with applicable service regulations.

Item 18. Check to ensure shipment is loaded in accordance with 49 CFR Part 177.848 and the applicable Segregation or Compatibility Table of 49 CFR 177.848.

Item 19. Check to ensure the load is secured from movement in accordance with applicable service outload drawings.

Item 20. Check to ensure seal(s) have been applied to closed equipment; fire and water resistant tarpaulin applied on open equipment.

Item 21. Check to ensure each transport vehicle has been properly placarded in accordance with 49 CFR 172.504.

Item 22. Check to ensure operator has been provided shipping papers that comply with 49 CFR 172.201 and 202. For shipments transported by Government vehicle, shipping paper will be DD Form 2890.

Item 23. Ensure operator(s) sign DD Form 626, are given a copy and understand the hazards associated with the shipment.

Item 24. Applies to Commercial Shipments Only. If shipment is made under DOT Special Permit 868, ensure that shipping papers are properly annotated and copy of Special Permit 868 is with shipping papers.

Item 26. Ensure driver/operator signs DD Form 626 at origin.

Item 28. Ensure driver/operator signs DD Form 626 at destination.

HGL INCIDENT REPORT

Section 1 – General Information			
Date of Occurrence	Date Reported	Reported to whom?	Time of Occurrence
Employee Name	Work Address	City, State, Zip Code	Work Phone Number
Date of Birth	Home Address	City, State, Zip Code	Home Phone Number
Occupation (Title)		Full time <input type="checkbox"/> Part time <input type="checkbox"/> Temporary <input type="checkbox"/>	
Location of Occurrence	Address	City, State, Zip Code	
Description of Incident (include what employee was doing, work process, cause, injury and body part)			
Witness(es)	Address	City, State, Zip Code	Work Phone Number
Was First Aid given on-site? Yes <input type="checkbox"/> No <input type="checkbox"/> By whom?			
Was employee taken to hospital? Yes <input type="checkbox"/> No <input type="checkbox"/> Ambulance Yes <input type="checkbox"/> No <input type="checkbox"/> If so, provide name, address, and phone number of hospital and name of attending physician below:			
Name of Hospital:	Address:	City, State, Zip Code:	Phone Number:
Attending Physician:			
Did employee seek medical attention other than an emergency room? Yes <input type="checkbox"/> No <input type="checkbox"/> If so, provide practice name, address, phone number and name of attending physician below:			
Practice Name:	Address:	City, State, Zip Code:	Phone Number:
Attending Physician:			
Did employee lose time on the job? Yes <input type="checkbox"/> No <input type="checkbox"/> If so, how many days after the initial injury date? _____			
Was employee assigned light duty? Yes <input type="checkbox"/> No <input type="checkbox"/> If so, how many days after the initial injury date? _____			
Supervisor (print):	Signature:		Date:
Employee (print):	Signature:		Date:
Witness (print):	Signature:		Date:
Witness (print):	Signature:		Date:
Director, Health & Safety:	Signature:		Date:

<i>(For safety staff only)</i>	REPORT NO.	EROC CODE	UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT For use of this form, see Help Menu and USACE Supplement to AR 385-40 The proponent agency is CESO	REQUIREMENT CONTROL SYMBOL: CEEC-S-8 (R2)
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1. ACCIDENT CLASSIFICATION					
PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE		MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT <input type="checkbox"/> CIVILIAN <input type="checkbox"/> MILITARY	<input type="checkbox"/>	<input type="checkbox"/> FIRE INVOLVED	<input type="checkbox"/> OTHER	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> CONTRACTOR	<input type="checkbox"/>	<input type="checkbox"/> FIRE INVOLVED	<input type="checkbox"/> OTHER	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> PUBLIC	<input type="checkbox"/> FATAL <input type="checkbox"/> OTHER	PROPERTY DAMAGE		<input type="checkbox"/>	DIVING

2. PERSONAL DATA				
a. NAME <i>(Last, First MI.)</i>	b. AGE	c. SEX <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE
f. JOB SERIES/TITLE	g. DUTY STATUS AT TIME OF ACCIDENT <input type="checkbox"/> ON DUTY <input type="checkbox"/> TDY <input type="checkbox"/> OFF DUTY		h. EMPLOYMENT STATUS AT TIME OF ACCIDENT <input type="checkbox"/> ARMY ACTIVE <input type="checkbox"/> ARMY RESERVE <input type="checkbox"/> VOLUNTEER <input type="checkbox"/> PERMANENT <input type="checkbox"/> FOREIGN NATIONAL <input type="checkbox"/> SEASONAL <input type="checkbox"/> TEMPORARY <input type="checkbox"/> STUDENT <input type="checkbox"/> OTHER <i>(Specify)</i> _____	

3. GENERAL INFORMATION			
a. DATE OF ACCIDENT <i>(YYYYMMDD)</i>	b. TIME OF ACCIDENT <i>(Military Time)</i> hrs.	c. EXACT LOCATION OF ACCIDENT	d. CONTRACTOR'S NAME (1) PRIME
e. CONTRACT NUMBER <input type="checkbox"/> CIVIL WORKS <input type="checkbox"/> MILITARY <input type="checkbox"/> OTHER <i>(Specify)</i> _____	f. TYPE OF CONTRACT <input type="checkbox"/> CONSTRUCTION <input type="checkbox"/> SERVICE <input type="checkbox"/> A/E <input type="checkbox"/> DREDGE <input type="checkbox"/> OTHER <i>(Specify)</i> _____	g. HAZARDOUS/TOXIC WASTE ACTIVITY <input type="checkbox"/> SUPERFUND <input type="checkbox"/> DERP <input type="checkbox"/> IRP <input type="checkbox"/> OTHER <i>(Specify)</i> _____	(2) SUBCONTRACTOR

4. CONSTRUCTION ACTIVITIES ONLY <i>(Fill in line and corresponding code number in box from list - see help menu)</i>	
a. CONSTRUCTION ACTIVITY (CODE) # <input style="width:50px;" type="text"/>	b. TYPE OF CONSTRUCTION EQUIPMENT (CODE) # <input style="width:50px;" type="text"/>

5. INJURY/ILLNESS INFORMATION <i>(Include name on line and corresponding code number in box for items e, f & g - see help menu)</i>			
a. SEVERITY OF ILLNESS/INJURY (CODE) # <input style="width:50px;" type="text"/>	b. ESTIMATED DAYS LOST	c. ESTIMATED DAYS HOSPITALIZED	d. ESTIMATED DAYS RESTRICTED DUTY
e. BODY PART AFFECTED (CODE) PRIMARY # <input style="width:50px;" type="text"/> (CODE) SECONDARY # <input style="width:50px;" type="text"/>	g. TYPE AND SOURCE OF INJURY/ILLNESS (CODE) TYPE # <input style="width:50px;" type="text"/> (CODE) SOURCE # <input style="width:50px;" type="text"/>		
f. NATURE OF ILLNESS / INJURY (CODE) # <input style="width:50px;" type="text"/>			

6. PUBLIC FATALITY <i>(Fill in line and correspondence code number in box - see help menu)</i>	
a. ACTIVITY AT TIME OF ACCIDENT (CODE) # <input style="width:50px;" type="text"/>	b. PERSONAL FLOTATION DEVICE USED? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A

7. MOTOR VEHICLE ACCIDENT							
a. TYPE OF VEHICLE		b. TYPE OF COLLISION		c. SEAT BELTS	USED	NOT USED	NOT APPLICABLE
<input type="checkbox"/> <input type="checkbox"/> PICKUP/VAN <input type="checkbox"/> <input type="checkbox"/> AUTOMOBILE <input type="checkbox"/> <input type="checkbox"/> TRUCK <input type="checkbox"/> <input type="checkbox"/> OTHER (Specify) _____		<input type="checkbox"/> SIDE SWIPE <input type="checkbox"/> HEAD ON <input type="checkbox"/> REAR END <input type="checkbox"/> BROADSIDE <input type="checkbox"/> ROLL OVER <input type="checkbox"/> BACKING <input type="checkbox"/> OTHER (Specify) _____		(1) FRONT SEAT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				(2) REAR SEAT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. PROPERTY MATERIAL INVOLVED							
a. NAME OF ITEM			b. OWNERSHIP		c. AMOUNT OF DAMAGE		
(1)							
(2)							
(3)							
9. VESSEL/FLOATING PLANT ACCIDENT (Fill in line and correspondence code number in box from list - see help menu)							
a. ACTIVITY AT TIME OF ACCIDENT			(CODE)	a. ACTIVITY AT TIME OF ACCIDENT			(CODE)
_____ # <input style="width: 50px;" type="text"/>				_____ # <input style="width: 50px;" type="text"/>			
10. ACCIDENT DESCRIPTION (Use additional paper, if necessary, see attached page 4.)							
11. CAUSAL FACTOR(s) (Read instructions before completing)							
a. (Explain YES answers in item 13)							
DESIGN: Was design of facility, workplace or equipment a factor?					YES	NO	
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?					<input type="checkbox"/>	<input type="checkbox"/>	
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?					<input type="checkbox"/>	<input type="checkbox"/>	
OPERATING PROCEDURES: Were operating procedures a factor?					<input type="checkbox"/>	<input type="checkbox"/>	
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?					<input type="checkbox"/>	<input type="checkbox"/>	
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?					<input type="checkbox"/>	<input type="checkbox"/>	
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?					<input type="checkbox"/>	<input type="checkbox"/>	
CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as, noise, radiation, etc., contribute to accident?					<input type="checkbox"/>	<input type="checkbox"/>	
OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?					<input type="checkbox"/>	<input type="checkbox"/>	
SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?					<input type="checkbox"/>	<input type="checkbox"/>	
PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?					<input type="checkbox"/>	<input type="checkbox"/>	
DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident?					<input type="checkbox"/>	<input type="checkbox"/>	
b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT? (If yes, attach a copy.)					<input type="checkbox"/>	<input type="checkbox"/>	
12. TRAINING							
a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?			b. TYPE OF TRAINING		c. DATE OF MOST RECENT FORMAL TRAINING (YYYYMMDD)		
<input type="checkbox"/> YES <input type="checkbox"/> NO			<input type="checkbox"/> CLASSROOM <input type="checkbox"/> ON JOB				
13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES (See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)							
a. DIRECT CAUSE(s) (Attach additional sheets as needed, See page 4)							
b. INDIRECT CAUSE(s) (Attach additional sheets as needed, See page 5)							

14. ACTION(s) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(s)

DESCRIBE FULLY (*Attach additional sheets as necessary, See page 5*)

15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.

a. BEGINNING (YYYYMMDD)		b. ANTICIPATED COMPLETION (YYYYMMDD)	
c. DATE SIGNED (YYYYMMDD)	d. TITLE OF SUPERVISOR COMPLETING REPORT	e. CORPS SIGNATURE, SUPERVISOR COMPLETING REPORT	
c. DATE SIGNED (YYYYMMDD)	d. TITLE OF SUPERVISOR COMPLETING REPORT	e. CONTRACTOR SIGNATURE, SUPERVISOR COMPLETING REPORT	
f. ORGANIZATION IDENTIFIER (<i>Division, Branch, Section, etc.</i>)		g. OFFICE SYMBOL	

16. MANAGEMENT REVIEW (1st)

a. CONCUR b. NONCONCUR c. COMMENTS

DATE (YYYYMMDD)	TITLE	SIGNATURE
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17. MANAGEMENT REVIEW (2nd - Chief Operations, Construction, Engineering, etc.)

a. CONCUR b. NONCONCUR c. COMMENTS

DATE (YYYYMMDD)	TITLE	SIGNATURE
-----------------	-------	-----------

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. CONCUR b. NONCONCUR c. ADDITIONAL ACTIONS/COMMENTS

DATE (YYYYMMDD)	TITLE	SIGNATURE
-----------------	-------	-----------

19. COMMAND APPROVAL

COMMENTS

DATE (YYYYMMDD)	COMMANDER SIGNATURE
-----------------	---------------------

10.

ACCIDENT DESCRIPTION *(Continuation)*

13a.

DIRECT CAUSE(s) *(Continuation)*

13b.

INDIRECT CAUSE(s) (Continuation)

14.

ACTION(s) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(s) (Continuation)

GENERAL. Complete a separate report for each person who was injured, caused, or contributed to the accident (*excluding uninjured personnel and witnesses*). Use of this form for reporting USACE employee first-aid type injuries not submitted to the Office of Workers' Compensation Programs (OWCP) shall be at the discretion of the FOA commander. Please type or print legibly. Appropriate items shall be marked with an "X" in box(es). If additional space is needed, provide the information on a separate sheet and attach to the completed form. Ensure that these instructions are forwarded with the completed report to the designated management reviewers indicated in sections 16 and 17.

INSTRUCTIONS FOR SECTION 1 - ACCIDENT CLASSIFICATION

(Mark All Boxes That Are Applicable)

a. GOVERNMENT. Mark "CIVILIAN" box if accident involved government civilian employee; mark "MILITARY" box if accident involved U.S. military personnel.

(1) INJURY/ILLNESS/FATALITY - Mark if accident resulted in any government civilian employee injury, illness, or fatality that requires the submission of OWCP Forms CA-1 (*injury*), CA-2 (*illness*) or CA-6 (*fatality*) to OWCP; mark if accident resulted in military personnel lost-time or fatal injury or illness.

(2) PROPERTY DAMAGE - Mark the appropriate box if accident resulted in any damage of \$1000 or more to government property (*including motor vehicles*).

(3) VEHICLE INVOLVED - Mark if accident involved a motor vehicle, regardless of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.

(4) DIVING ACTIVITY - Mark if the accident involved an in-house USACE diving activity.

b. CONTRACTOR.

(1) INJURY/ILLNESS/FATALITY - Mark if accident resulted in any contractor lost-time injury/illness or fatality.

(2) PROPERTY DAMAGE - Mark the appropriate box if accident resulted in any damage of \$1000 or more to contractor property (*including motor vehicles*).

(3) VEHICLE INVOLVED - Mark if accident involved a motor vehicle, regardless of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.

(4) DIVING ACTIVITY - Mark if the accident involved a USACE Contractor diving activity.

c. PUBLIC.

(1) INJURY/ILLNESS/FATALITY - Mark if accident resulted in public fatality or permanent total disability. (*The "OTHER" box will be marked when requested by the FOA to report an unusual non-fatal public accident that could result in claims against the government or as otherwise directed by the FOA Commander*).

(2) VOID SPACE - Make no entry.

(3) VEHICLE INVOLVED - Mark if accident resulted in a fatality to a member of the public and involved a motor vehicle, regardless of whether "INJURY/ILLNESS/FATALITY" is marked.

(4) VOID SPACE - Make no entry.

INSTRUCTIONS FOR SECTION 2 - PERSONAL DATA

a. NAME - (*MANDATORY FOR GOVERNMENT ACCIDENTS. OPTIONAL AT THE DISCRETION OF THE FOA COMMANDER FOR CONTRACTOR AND PUBLIC ACCIDENTS*). Enter last name, first name, middle initial of person involved.

b. AGE - Enter age.

c. SEX - Mark appropriate box.

d. SOCIAL SECURITY NUMBER - (*FOR GOVERNMENT PERSONNEL ONLY*) Enter the social security number (*or other personal identification number if no social security number issued*).

e. GRADE - (*FOR GOVERNMENT PERSONNEL ONLY*) Enter pay grade. Example: 0-6; E-7; WG-8; WS-12; GS-11; etc.

f. JOB SERIES/TITLE - For government civilian employees enter the pay plan, full series number, and job title, e.g., GS-0810/Civil Engineer. For military personnel enter the primary military occupational specialty (*PMOS*), e.g., 15A30 or 11G50. For contractor employees enter the job title assigned to the injured person, e.g., carpenter, laborer, surveyor, etc.

g. DUTY STATUS - Mark the appropriate box.

(1) ON DUTY - Person was at duty station during duty hours or person was away from duty station during duty hours but on official business at time of the accident.

(2) TDY - Person was on official business, away from the duty station and with travel orders at time of accident. Line-of-duty investigation required.

(3) OFF DUTY - Person was not on official business at time of accident.

h. EMPLOYMENT STATUS - (*FOR GOVERNMENT PERSONNEL ONLY*) Mark the most appropriate box. If "OTHER" is marked, specify the employment status of the person.

INSTRUCTION FOR SECTION 3 - GENERAL INFORMATION

- a. DATE OF ACCIDENT - Enter the month, day, and year of accident.
- b. TIME OF ACCIDENT - Enter the local time of accident in military time. Example: 1430 hrs (*not* 2:30 p.m.).
- c. EXACT LOCATION OF ACCIDENT - Enter facts needed to locate the accident scene, (*installation/project name, building number, street, direction and distance from closest landmark, etc.*).
- d. CONTRACTOR NAME
 - (1) PRIME - Enter the exact name (*title of firm*) of the prime contractor.
 - (2) SUBCONTRACTOR - Enter the name of any subcontractor involved in the accident.
- e. CONTRACT NUMBER - Mark the appropriate box to identify if contract is civil works, military, or other: if "OTHER" is marked, specify contract appropriation on line provided. Enter complete contract number of prime contract, e.g., DACW 09-85-C-0100.
- f. TYPE OF CONTRACT - Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.
- g. HAZARDOUS/TOXIC WASTE ACTIVITY (*HTW*) - Mark the box to identify the HTW activity being performed at the time of the accident. For Superfund, DERP, and Installation Restoration Program (*IRP*) HTW activities include accidents that occurred during inventory, predesign, design, and construction. For the purpose of accident reporting, DERP Formerly Used DoD Site (*FUDS*) activities and IRP activities will be treated separately. For Civil Works O&M HTW activities mark the "OTHER" box.

INSTRUCTIONS FOR SECTION 4 - CONSTRUCTION ACTIVITIES

- a. CONSTRUCTION ACTIVITY - Select the most appropriate construction activity being performed at time of accident from the list below. Enter the activity name and place the corresponding code number identified in the box.

CONSTRUCTION ACTIVITY LIST

- | | |
|-------------------------|----------------------------|
| 1. MOBILIZATION | 13. CARPENTRY |
| 2. SITE PREPARATION | 14. ELECTRICAL |
| 3. EXCAVATION/TRENCHING | 15. SCAFFOLDING/ACCESS |
| 4. GRADING (EARTHWORK) | 16. MECHANICAL |
| 5. PIPING/UTILITIES | 17. PAINTING |
| 6. FOUNDATION | 18. EQUIPMENT/MAINTENANCE |
| 7. FORMING | 19. TUNNELING |
| 8. CONCRETE PLACEMENT | 20. WAREHOUSING/STORAGE |
| 9. STEEL ERECTION | 21. PAVING |
| 10. ROOFING | 22. FENCING |
| 11. FRAMING | 23. SIGNING |
| 12. MASONRY | 24. LANDSCAPING/IRRIGATION |
| | 25. INSULATION |
| | 26. DEMOLITION |

- b. TYPE OF CONSTRUCTION EQUIPMENT - Select the equipment involved in the accident from the list below. Enter the name and place the corresponding code number identified in the box. If equipment is not included below, use code 24, "OTHER", and write in specific type of equipment.

CONSTRUCTION EQUIPMENT

- | | |
|---|---------------------------------------|
| 1. GRADER | 12. DUMP TRUCK (<i>HIGHWAY</i>) |
| 2. DRAGLINE | 13. DUMP TRUCK (<i>OFF HIGHWAY</i>) |
| 3. CRANE (<i>ON VESSEL/BARGE</i>) | 14. TRUCK (<i>OTHER</i>) |
| 4. CRANE (<i>TRACKED</i>) | 15. FORKLIFT |
| 5. CRANE (<i>RUBBER TIRE</i>) | 16. BACKHOE |
| 6. CRANE (<i>VEHICLE MOUNTED</i>) | 17. FRONT-END LOADER |
| 7. CRANE (<i>TOWER</i>) | 18. PILE DRIVER |
| 8. SHOVEL | 19. TRACTOR (<i>UTILITY</i>) |
| 9. SCRAPER | 20. MANLIFT |
| 10. PUMP TRUCK (<i>CONCRETE</i>) | 21. DOZER |
| 11. TRUCK (<i>CONCRETE/TRANSIT MIXER</i>) | 22. DRILL RIG |
| | 23. COMPACTOR/VIBRATORY ROLLER |
| | 24. OTHER |

INSTRUCTIONS FOR SECTION 5 - INJURY/ILLNESS INFORMATION

- a. SEVERITY OF INJURY/ILLNESS - Reference paragraph 2-10 of USACE Supplement 1 to AR 385-40 and enter code and description from list below.

- | | |
|-----|---|
| NOI | NO INJURY |
| FAT | FATALITY |
| PTL | PERMANENT TOTAL DISABILITY |
| PPR | PERMANENT PARTIAL DISABILITY |
| LWD | LOST WORKDAY CASE INVOLVING DAYS AWAY FROM WORK |
| NLW | RECORDABLE CASE WITHOUT LOST WORKDAYS |
| RFA | RECORDABLE FIRST AID CASE |
| NRI | NON-RECORDABLE INJURY |

- b. ESTIMATED DAYS LOST - Enter the estimated number of workdays the person will lose from work.

c. ESTIMATED DAYS HOSPITALIZED - Enter the estimated number of workdays the person will be hospitalized.

d. ESTIMATED DAYS RESTRICTED DUTY - Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties.

e. BODY PART AFFECTED - Select the most appropriate primary and when applicable, secondary body part affected from the list below. Enter body part name on line and place the corresponding code letters identifying that body part in the box.

GENERAL BODY AREA	CODE	BODY PART NAME				
ARM/WRIST	AB	ARM AND WRIST	HEAD, EXTERNAL	H1	EYE EXTERNAL	
	AS	ARM OR WRIST		H2	BOTH EYES EXTERNAL	
TRUNK, EXTERNAL MUSCULATURE	B1	SINGLE BREAST	KNEE	H3	EAR EXTERNAL	
	B2	BOTH BREASTS		H4	BOTH EARS EXTERNAL	
	B3	SINGLE TESTICLE		HC	CHIN	
	B4	BOTH TESTICLES		HF	FACE	
	BA	ABDOMEN		HK	NECK/THROAT	
	BC	CHEST		HM	MOUTH/LIPS	
	BL	LOWER BACK		HN	NOSE	
	BP	PENIS		HS	SCALP	
	BS	SIDE		LEG, HIP, ANKLE, BUTTOCKS	KB	BOTH KNEES
	BU	UPPER BACK			KS	KNEE
	BW	WAIST		BUTTOCK	LB	BOTH LEGS/HIPS/ ANKLES/
	BZ	TRUNK OTHER			LS	SINGLE LEG/HIP/ ANKLE/BUTTOCK
HEAD, INTERNAL	C1	SINGLE EAR INTERNAL	HAND	MB	BOTH HANDS	
		BOTH EARS INTERNAL		MS	SINGLE HAND	
	C3	SINGLE EYE INTERNAL	FOOT	PB	BOTH FEET	
	C4	BOTH EYES INTERNAL		PS	SINGLE FOOT	
	CB	BRAIN	TRUNK, BONES	R1	SINGLE COLLAR BONE	
	CC	CRANIAL BONES		R2	BOTH COLLAR BONES	
	CD	TEETH		R3	SHOULDER BLADE	
	CJ	JAW		R4	BOTH SHOULDER BLADES	
	CL	THROAT, LARYNX		RB	RIB	
	CM	MOUTH		RS	STERNUM (BREAST BONE)	
	CN	NOSE		RV	VERTEBRAE (SPINE; DISC)	
	CR	THROAT, OTHER		RZ	TRUNK BONES OTHER	
	CT	TONGUE		SHOULDER	SB	BOTH SHOULDERS
	CZ	HEAD OTHER INTERNAL			SS	SINGLE SHOULDER
ELBOW	EB	BOTH ELBOWS		THUMB	TB	BOTH THUMBS
	ES	SINGLE ELBOW			TS	SINGLE THUMB
FINGER	F1	FIRST FINGER		TRUNK, INTERNAL ORGANS	V1	LUNG, SINGLE
	F2	BOTH FIRST FINGERS			V2	LUNGS, BOTH
	F3	SECOND FINGER	V3		KIDNEY, SINGLE	
	F4	BOTH SECOND FINGERS	V4		KIDNEYS, BOTH	
	F5	THIRD FINGER	VH		HEART	
	F6	BOTH THIRD FINGERS	VL		LIVER	
	F7	FOURTH FINGER	VR		REPRODUCTIVE ORGANS	
	F8	BOTH FOURTH FINGERS	VS		STOMACH	
TOE	G1	GREAT TOE		VV	INTESTINES	
	G2	BOTH GREAT TOES		VZ	TRUNK, INTERNAL; OTHER	
	G3	TOE OTHER				
	G4	TOES OTHER				

f. NATURE OF INJURY/ILLNESS - Select the most appropriate nature of injury/illness from the list below. This nature of injury/illness shall correspond to the primary body part selected in 5e, above. Enter the nature of injury/illness name on the line and place the corresponding CODE letters in the box provided.

* The injury or condition selected below must be caused by a specific incident or event which occurred during a single work day or shift.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME			
*TRAUMATIC INJURY OR DISABILITY	TA	AMPUTATION	PARASITIC DISEASE	TU	BURN, SCALD, SUNBURN
	TB	BACK STRAIN		TI	TRAUMATIC SKIN DISEASES/ CONDITIONS INCLUDING DERMATITIS
	TC	CONTUSION; BRUISE; ABRASION		TR	TRAUMATIC RESPIRATORY DISEASE
	TD	DISLOCATION		TQ	TRAUMATIC FOOD POISONING
	TF	FRACTURE		TW	TRAUMATIC TUBERCULOSIS
	TH	HERNIA		TX	TRAUMATIC VIROLOGICAL/INFECTIVE/
	GENERAL NATURE CATEGORY	CODE		NATURE OF INJURY NAME	CONDITION/STROKE
	TK	CONCUSSION		T2	TRAUMATIC HEARING LOSS
	TL	LACERATION, CUT		T3	TRAUMATIC HEART CONDITION
	TP	PUNCTURE		T4	TRAUMATIC MENTAL DISORDER, STRESS; NERVOUS CONDITION
	TS	STRAIN, MULTIPLE		T8	TRAUMATIC INJURY - OTHER (EXCEPT DISEASE, ILLNESS)

** A nontraumatic physiological harm or loss of capacity produced by systemic infection; continued or repeated stress or strain; exposure to toxins, poisons, fumes, etc.; or other continued and repeated exposures to conditions of the work environment over a long period of time. For practical purposes, an occupational illness/disease or disability is any reported condition which does not meet the definition of traumatic injury or disability as described above.

GENERAL NATURE

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME		
**NON-TRAUMATIC ILLNESS/DISEASE OR DISABILITY				
RESPIRATORY DISEASE	RA	ASBESTOSIS	DD	ENDEMIC DISEASE (OTHER THAN CODE TYPES R&S)
	RB	BRONCHITIS		
	RE	EMPHYSEMA	DE	EFFECT OF ENVIRONMENTAL
	RP	PNEUMOCONIOSIS	CONDITION	
	RS	SILICOSIS	DH	HEARING LOSS
	R9	RESPIRATORY DISEASE, OTHER	DK	HEART CONDITION
VIROLOGICAL, INFECTIVE & PARASITIC DISEASES			DM	MENTAL DISORDER, EMOTIONAL STRESS, NERVOUS CONDITION
	VB	BRUCELLOSIS	DR	RADIATION
	VC	COCCIDIOMYCOSIS	DS	STRAIN, MULTIPLE
	VF	FOOD POISONING	DU	ULCER
	VH	HEPATITIS	DV	OTHER VASCULAR CONDITIONS
	VM	MALARIA	D9	DISABILITY, OTHER
	VS	STAPHYLOCOCCUS		
	VT	TUBERCULOSIS	SKIN DISEASE OR	
	V9	VIROLOGICAL/INFECTIVE/ PARASITIC - OTHER	CONDITION	
			SB	BIOLOGICAL
DISABILITY, OCCUPATIONAL	DA	ARTHRITIS, BURSITIS	SC	CHEMICAL
	DB	BACK STRAIN, BACK SPRAIN	S9	DERMATITIS, UNCLASSIFIED
	DC	CEREBRAL VASCULAR CONDITION; STROKE		

g. TYPE AND SOURCE OF INJURY/ILLNESS (CAUSE) - Type and Source Codes are used to describe what caused the incident. The Type Code stands for an ACTION and the Source Code for an OBJECT or SUBSTANCE. Together, they form a brief description of how the incident occurred. Where there are two different sources, code the initiating source of the incident (see example 1, below). Examples:

(1) An employee tripped on carpet and struck his head on a desk. TYPE: 210 (fell on same level) SOURCE: 0110 (walking/working surface).

NOTE: This example would NOT be coded 120 (struck against) and 0140 (furniture).

(2) A Park Ranger contracted dermatitis from contact with poison ivy/oak.

TYPE: 510 (contact) SOURCE: 0920 (plant)

(3) A lock and dam mechanic punctured his finger with a metal sliver while grinding a turbine blade.

TYPE: 410 (punctured by) SOURCE: 0830 (metal)

(4) An employee was driving a government vehicle when it was struck by another vehicle.

TYPE: 800 (traveling in) SOURCE: 0421 (government-owned vehicle, as driver)

NOTE: The Type Code 800, "Traveling In" is different from the other type codes in that its function is not to identify factors contributing to the injury or fatality, but rather to collect data on the type of vehicle the employee was operating or traveling in at the time of the incident.

Select the most appropriate TYPE and SOURCE identifier from the list below and enter the name on the line and the corresponding code in the appropriate box.

CODE	TYPE OF INJURY NAME	CODE	SOURCE OF INJURY NAME
			EXERTED
		0610	LIFTED, STRAINED BY (SINGLE ACTION)
		0620	STRESSED BY (REPEATED ACTION)
0110	STRUCK		EXPOSED
0111	STRUCK BY	0710	INHALED
0120	STRUCK BY FALLING OBJECT	0720	INGESTED
	STRUCK AGAINST	0730	ABSORBED
	FELL, SLIPPED, TRIPPED	0740	EXPOSED TO
0210	FELL ON SAME LEVEL	0800	TRAVELING IN
0220	FELL ON DIFFERENT LEVEL		
0230	SLIPPED, TRIPPED (NO FALL)		
	CAUGHT		
0310	CAUGHT ON		
0320	CAUGHT IN	0100	BUILDING OR WORKING AREA
0330	CAUGHT BETWEEN	0110	WALKING/WORKING SURFACE (FLOOR, STREET, SIDEWALKS, ETC.)
	PUNCTURED, LACERATED		
0410	PUNCTURED BY	0120	STAIRS, STEPS
0420	CUT BY	0130	LADDER
0430	STUNG BY	0140	FURNITURE, FURNISHINGS, OFFICE EQUIPMENT
0440	BITTEN BY	0150	BOILER, PRESSURE VESSEL
	CONTACTED	0160	EQUIPMENT LAYOUT (ERGONOMIC)
0510	CONTACTED WITH (INJURED PERSON MOVING)	0170	WINDOWS, DOORS
0520	CONTACTED BY (OBJECT WAS MOVING)	0180	ELECTRICITY

0200	ENVIRONMENTAL CONDITION	0631	CARBON MONOXIDE
0210	TEMPERATURE EXTREME (INDOOR)	0640	MIST, STEAM, VAPOR, FUME
0220	WEATHER (ICE, RAIN, HEAT, ETC.)	0641	WELDING FUMES
0230	FIRE, FLAME, SMOKE (NOT TOBACCO)	0650	PARTICLES (UNIDENTIFIED)
0240	NOISE	0700	CHEMICAL, PLASTIC, ETC.
0250	RADIATION	0711	DRY CHEMICAL - CORROSIVE
0260	LIGHT	0712	DRY CHEMICAL - TOXIC
0270	VENTILATION	0713	DRY CHEMICAL - EXPLOSIVE
0271	TOBACCO SMOKE	0714	DRY CHEMICAL FLAMMABLE
0280	STRESS (EMOTIONAL)	0721	LIQUID CHEMICAL - CORROSIVE
0290	CONFINED SPACE	0722	LIQUID CHEMICAL - TOXIC
0300	MACHINE OR TOOL	0723	LIQUID CHEMICAL - EXPLOSIVE
0310	HAND TOOL (POWERED; SAW, GRINDER, ETC.)	0724	LIQUID CHEMICAL - FLAMMABLE
0320	HAND TOOL (NONPOWERED)	0730	PLASTIC
0330	MECHANICAL POWER TRANSMISSION APPARATUS	0740	WATER
0340	GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK)	0750	MEDICINE
0350	VIDEO DISPLAY TERMINAL	0800	INAMINATE OBJECT
0360	PUMP, COMPRESSOR, AIR PRESSURE TOOL	0810	BOX, BARREL, ETC.
0370	HEATING EQUIPMENT	0820	PAPER
0380	WELDING EQUIPMENT	0830	METAL ITEM, MINERAL
0400	VEHICLE	0831	NEEDLE
0411	AS DRIVER OF PRIVATELY OWNED/RENTAL VEHICLE	0840	GLASS
0412	AS PASSENGER OF PRIVATELY OWNED/RENTAL VEHICLE	0850	SCRAP, TRASH
0421	DRIVER OF GOVERNMENT VEHICLE	0860	WOOD
0422	PASSENGER OF GOVERNMENT VEHICLE	0870	FOOD
0430	COMMON CARRIER (AIRLINE, BUS, ETC.)	0880	CLOTHING, APPAREL, SHOES
0440	AIRCRAFT (NOT COMMERCIAL)	0900	ANIMATE OBJECT
0450	BOAT, SHIP, BARGE	0911	DOG
0500	MATERIAL HANDLING EQUIPMENT	0912	OTHER ANIMAL
0510	EARTHMOVER (TRACTOR, BACKHOE, ETC.)	0920	PLANT
0520	CONVEYOR (FOR MATERIAL AND EQUIPMENT)	0930	INSECT
0530	ELEVATOR, ESCALATOR, PERSONNEL HOIST	0940	HUMAN (VIOLENCE)
0540	HOIST, SLING CHAIN, JACK	0950	HUMAN (COMMUNICABLE DISEASE)
0550	CRANE	0960	BACTERIA, VIRUS (NOT HUMAN CONTACT)
0551	FORKLIFT	1000	PERSONAL PROTECTIVE EQUIPMENT
0560	HANDTRUCK, DOLLY	1010	PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES
0600	DUST, VAPOR, ETC.		
0610	DUST (SILICA, COAL, ETC.)	1020	RESPIRATOR, MASK
0620	FIBERS	1021	DIVING EQUIPMENT
0621	ASBESTOS	1030	SAFETY BELT, HARNESS
0630	GASES	1040	PARACHUTE

INSTRUCTIONS FOR SECTION 6 - PUBLIC FATALITY

a. **ACTIVITY AT TIME OF ACCIDENT** - Select the activity being performed at the time of the accident from the list below. Enter the activity name on the line and the corresponding number in the box. If the activity performed is not identified on the list, select from the most appropriate primary activity area (*water related, non-water related or other activity*), the code number for "Other", and write in the activity being performed at the time of the accident.

WATER RELATED RECREATION

1. Sailing
2. Boating-powered
3. Boating-unpowered
4. Water skiing
5. Fishing from boat
6. Fishing from bank dock or pier
7. Fishing while wading
8. Swimming/supervised area
9. Swimming/designated area
10. Swimming/other area
11. Underwater activities (*skin diving, scuba, etc.*)
12. Wading
13. Attempted rescue
14. Hunting from boat
15. Other

NON-WATER RELATED RECREATION

16. Hiking and walking
17. Climbing (*general*)
18. Camping/picnicking authorized area

19. Camping/picnicking unauthorized area
20. Guided tours
21. Hunting
22. Playground equipment
23. Sports/summer (*baseball, football, etc.*)
24. Sports/winter (*skiing, sledding, snowmobiling etc.*)
25. Cycling (*bicycle, motorcycle, scooter*)
26. Gliding
27. Parachuting
28. Other non-water related

OTHER ACTIVITIES

29. Unlawful acts (*fight, riots, vandalism, etc.*)
30. Food preparation/serving
31. Food consumption
32. Housekeeping
33. Sleeping
34. Pedestrian struck by vehicle
35. Pedestrian other acts
36. Suicide
37. "Other" activities

b. **PERSONAL FLOTATION DEVICE USED** - If fatality was water-related was the victim wearing a person flotation device? Mark the appropriate box.

INSTRUCTIONS FOR SECTION 7 - MOTOR VEHICLE ACCIDENT

a. **TYPE OF VEHICLE** - Mark appropriate box for each vehicle involved. If more than one vehicle of the same type is involved, mark both halves of the appropriate box. USACE vehicle(s) involved shall be marked in left half of appropriate box.

b. **TYPE OF COLLISION** - Mark appropriate box.

c. **SEAT BELT** - Mark appropriate box.

INSTRUCTIONS FOR SECTION 8 - PROPERTY/MATERIAL INVOLVED

a. **NAME OF ITEM** - Describe all property involved in accident. Property/material involved means material which is damaged or whose use or misuse contributed to the accident. Include the name, type, model; also include the National Stock Number (NSN) whenever applicable.

b. **OWNERSHIP** - Enter ownership for each item listed. (Enter one of the following: USACE; OTHER GOVERNMENT; CONTRACTOR; PRIVATE)

c. **\$ AMOUNT OF DAMAGE** - Enter the total estimated dollar amount of damage (parts and labor), if any.

INSTRUCTIONS FOR SECTION 9 - VESSEL/FLOATING PLANT ACCIDENT

a. **TYPE OF VESSEL/FLOATING PLANT** - Select the most appropriate vessel/floating plant from list below. Enter name and place corresponding number in box. If item is not listed below, enter item number for "OTHER" and write in specific type of vessel floating plant.

VESSEL/FLOATING PLANTS

1. ROW BOAT
2. SAIL BOAT
3. MOTOR BOAT
4. BARGE
5. DREDGE/HOPPER
6. DREDGE/SIDE CASTING
7. DREDGE/DIPPER
8. DREDGE/CLAMSHELL, BUCKET
9. DREDGE/PIPE LINE
10. DREDGE/DUST PAN
11. TUG BOAT
12. OTHER

b. **COLLISION/MISHAP** - Select from the list below the object(s) that contributed to the accident or were damaged in the accident.

COLLISION/MISHAP

1. COLLISION W/OTHER VESSEL
2. UPPER GUIDE WALL
3. UPPER LOCK GATES
4. LOCK WALL
5. LOWER LOCK GATES
6. LOWER GUIDE WALL
7. HAULAGE UNIT
8. BREAKING TOW
9. TOW BREAKING UP
10. SWEEPED DOWN ON DAM
11. BUOY/DOLPHIN/CELL
12. WHARF OR DOCK
13. OTHER

INSTRUCTIONS FOR SECTION 10 - ACCIDENT DESCRIPTION

DESCRIBE ACCIDENT - Fully describe the accident. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Continue on blank sheets if necessary and attach to this report.

INSTRUCTIONS FOR SECTION 11 - CAUSAL FACTORS

a. Review thoroughly. Answer each question by marking the appropriate block. If any answer is yes, explain in item 13 below. Consider, as a minimum, the following:

- (1) **DESIGN** - Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?
- (2) **INSPECTION/MAINTENANCE** - Did inadequately or improperly maintained equipment, tools, workplace, etc. create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?
- (3) **PERSON'S PHYSICAL CONDITION** - Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was over exertion a factor?
- (4) **OPERATING PROCEDURES** - Did a lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?
- (5) **JOB PRACTICES** - Were any of the provisions of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?
- (6) **HUMAN FACTORS** - Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person; i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach, strength, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?
- (7) **ENVIRONMENTAL FACTORS** - Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun, temperature changes, wind, tides, floods, currents, dust, mud, glare, pressure changes, lightning, etc., play a part in the accident?

- (8) CHEMICAL AND PHYSICAL AGENT FACTORS - Did exposure to chemical agents (*either single shift exposure or long-term exposure*) such as dusts, fibers (*asbestos, etc.*), silica, gases (*carbon monoxide, chlorine, etc.*), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (*UV radiation created during welding, etc.*) contribute to the accident/incident?
- (9) OFFICE FACTORS - Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?
- (10) SUPPORT FACTORS - Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (*in terms of employee skills, number of workers, and adequate supervision*) available to get the job done properly? Was funding available, utilized, and adequate to provide proper tools, equipment, personnel, site preparation, etc.?
- (11) PERSONAL PROTECTIVE EQUIPMENT - Did the person fail to use appropriate personal protective equipment (*gloves, eye protection, hard-toed shoes, respirator, etc.*) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?
- (12) DRUGS/ALCOHOL - Is there any reason to believe the person's mental or physical capabilities, judgment, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".
- b. WRITTEN JOB/ACTIVITY HAZARD ANALYSIS - Was a written Job/Activity Hazard Analysis completed for the task being performed at the time of the accident? Mark the appropriate box. If one was performed, attach a copy of the analysis to the report.

INSTRUCTIONS FOR SECTION 12 - TRAINING

- a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? - For the purpose of this section "trained" means the person has been provided the necessary information (*either formal and/or on-the-job (OJT) training*) to competently perform the activity/task in a safe and healthful manner.
- b. TYPE OF TRAINING - Mark the appropriate box that best indicates the type of training; (*classroom or on-the-job*) that the injured person received, before the accident happened.
- c. DATE OF MOST RECENT TRAINING - Enter YYYYMMDD of the last formal training completed that covered the activity task being performed at the time of the accident.

INSTRUCTIONS FOR SECTION 13 - CAUSES

- a. DIRECT CAUSES - The direct cause is that single factor, which most directly lead to the accident. See examples below.
- b. INDIRECT CAUSES - Indirect causes are those factors which contributed to but did not directly initiate the occurrence of the accident.

Examples for section 13:

- a. Employee was dismantling scaffold and fell 12 feet from unguarded opening.

Direct cause: failure to provide fall protection at elevation. Indirect causes: failure to enforce USACE safety requirements; improper training/motivation of employee (*possibility that employee was not knowledgeable of USACE fall protection requirements or was lax in his attitude towards safety*); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

- b. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by USACE vehicle. (*Note: USACE vehicle was in proper/safe working condition*).

Direct cause: failure of USACE driver to maintain control of and stop USACE vehicle within safe distance.

Indirect cause: failure of employee to pay attention to driving (*defensive driving*).

INSTRUCTIONS FOR SECTION 14 - ACTION TO ELIMINATE CAUSE(s)

DESCRIPTION - Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/illnesses. Continue on blank sheets of paper if necessary to fully explain and attach to the completed report form.

INSTRUCTIONS FOR SECTION 15 - DATES FOR ACTION

- a. **BEGIN DATE** - Enter the date YYYYMMDD when the corrective action(s) identified in section 14 will begin.
- b. **COMPLETE DATE** - Enter the date YYYYMMDD when the corrective action(s) identified in section 14 will be completed.
- c. **DATE SIGNED** - Enter YYYYMMDD that the report was signed by the responsible supervisor.
- d.e.. **TITLE AND SIGNATURE** - Enter the title and signature of supervisor completing the accident report. For a GOVERNMENT employee accident/illness the immediate supervisor will complete and sign the report. For PUBLIC accidents the USACE Project Manager/Area Engineer responsible for the USACE property where the accident happened shall complete and sign the report. For CONTRACTOR accidents the Contractor's project manager shall complete and sign the report and provide to the USACE supervisor responsible for oversight of that contractor activity. This USACE supervisor shall also sign the report. Upon entering the information required in 15c., 15d., 15e., 15f. and 15g. below, the responsible USACE supervisor shall forward the report for management review as indicated in section 16.

f. **ORGANIZATION NAME** - For GOVERNMENT employee accidents enter the USACE organization name (*Division, Branch, Section, etc.*) of the injured employee. For PUBLIC accidents enter the USACE organization name for the person identified in block 15d. For CONTRACTOR accidents enter the USACE organization name for the USACE office responsible for providing contract administration oversight.

g. **OFFICE SYMBOL** - Enter the latest complete USACE Office Symbol for the USACE organization identified in block 15f.

INSTRUCTIONS FOR SECTION 16 - MANAGEMENT REVIEW (1st)

1ST REVIEW - Each USACE FOA shall determine who will provide 1st management review. The responsible USACE supervisor in section 15d. shall forward the completed report to the USACE office designated as the 1st Reviewer by the FOA. Upon receipt, the Chief of the Office shall review the completed report, mark the appropriate box, provide substantive comments, sign, date, and forward to the FOA Staff Chief (*2nd review*) for review and comment.

INSTRUCTIONS FOR SECTION 17 - MANAGEMENT REVIEW (2nd)

2ND REVIEW - The FOA Staff Chief (*i .e., FOA Chief of Construction, Operations, Engineering, Planning, etc.*) shall mark the appropriate box, review the completed report, provide substantive comments, sign, date, and return to the FOA Safety and Occupational Health Office.

INSTRUCTIONS FOR SECTION 18 - SAFETY AND OCCUPATIONAL HEALTH REVIEW

3RD REVIEW - The FOA Safety and Occupational Health Office shall review the completed report, mark the appropriate box, ensure that any inadequacies, discrepancies, etc. are rectified by the responsible supervisor and management reviewers, provide substantive comments, sign, date and forward to the FOA Commander for review, comment, and signature.

INSTRUCTION FOR SECTION 19 - COMMAND APPROVAL

4TH REVIEW - The FOA Commander shall (*to include the person designated Acting Commander in his absence*) review the completed report, comment if required, sign, date, and forward the report to the FOA Safety and Occupational Health Office. Signature authority shall not be delegated.

Summary of Work-Related Injuries and Illnesses



All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . .
(M)

(1) Injuries	_____	(4) Poisonings	_____
(2) Skin disorders	_____	(5) Hearing loss	_____
(3) Respiratory conditions	_____	(6) All other illnesses	_____

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (e.g., *Manufacture of motor truck trailers*)

Standard Industrial Classification (SIC), if known (e.g., 3715)

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

Employment information (If you don't have these figures, see the Worksheet on the back of this page to estimate.)

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Company executive _____ Title _____

() - / /
Phone Date

OSHA's Form 301

Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.



U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone (____) _____ -- _____ Date ____/____/____

Information about the employee

1) Full name _____

2) Street _____

City _____ State _____ ZIP _____

3) Date of birth ____/____/____

4) Date hired ____/____/____

5) Male

Female

Information about the physician or other health care professional

6) Name of physician or other health care professional _____

7) If treatment was given away from the worksite, where was it given?

Facility _____

Street _____

City _____ State _____ ZIP _____

8) Was employee treated in an emergency room?

Yes

No

9) Was employee hospitalized overnight as an in-patient?

Yes

No

Information about the case

10) Case number from the Log _____ (Transfer the case number from the Log after you record the case.)

11) Date of injury or illness ____/____/____

12) Time employee began work _____ AM / PM

13) Time of event _____ AM / PM Check if time cannot be determined

14) **What was the employee doing just before the incident occurred?** Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) **What happened?** Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) **What was the injury or illness?** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or "sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) **What object or substance directly harmed the employee?** *Examples:* "concrete floor"; "chlorine"; "radial arm saw." *If this question does not apply to the incident, leave it blank.*

18) **If the employee died, when did death occur?** Date of death ____/____/____



**LOST, DAMAGED & DESTROYED REPORT
CORRECTIVE MEASURES IMPLEMENTATION AT
MULTIPLE (9) SITES (RSA-313-R-01) AT THE REDSTONE ARSENAL**

Contract No.: _____	Project No.: _____
Item Description: _____	Date of Loss: _____
Vendor: _____	Condition at Time of LDD: _____
PO Number: _____	Date of Last Inventory: _____
Order Date: _____	Est. Cost of Repair/Replacement: _____
Property ID: _____	Cost of Item: _____
Manufacturer: _____	Serial No.: _____

Report of Incident

Corrective Action

Investigation Performed By: _____

Signature	Title
-----------	-------

Review/Approval By: _____

Signature	Title
-----------	-------

Vehicle Safety Inspection Checklist

Site name/location:					
Inspection date:		Supervisor:		Rental company:	
Mileage:		Vehicle make:		Vehicle license number:	
1. DOCUMENTATION:		Pass	Fail	5. BRAKES:	
Registration and License Plate				Hand/Emergency	
Insurance				Service	
Emergency Route Map & Phone #s					
2. TIRES:		Pass	Fail	6. BELTS:	
Pressure				Proper tension	
Condition				Condition	
3. EQUIPMENT:		Pass	Fail	7. GENERAL:	
Fire extinguishers * <input type="checkbox"/>				Windshield	
First Aid/CPR/Burn Kits				Windshield Wipers	
Emergency Route Directions/Map				Windows (Condition/Operation)	
Vehicle Registration/Rental Contract				Seat Belts	
HGL Insurance Coverage Card				Steering	
Eyewash Kits				Horn	
Spare Tire				Gas Cap	
Tire Changing Equipment				Mirrors	
Tie downs * <input type="checkbox"/>				Door/Window Handles/Latches	
Chocks * <input type="checkbox"/>				Cleanliness	
Placards * <input type="checkbox"/>				Exhaust System * <input type="checkbox"/>	
4. FLUID LEVELS:		Pass	Fail	8. LIGHTS:	
Oil				Headlights (high & low)	
Coolant				Brake Lights	
Brake				Parking	
Steering				Back-up	
Transmission				Turn Signals	
Windshield Wiper				Emergency Flashers	
Fluid Leaks				Interior Lights	
5. Oil Change (mileage):					
Notes:					
1. To be used weekly for all vehicles EXCEPT explosive carriers that must be inspected prior to each explosives transport.					
2. Items marked with an * are required for explosive carriers and must be inspected prior to each use IAW HGL MR SOP 15.00 Section 4.6.					
3. All forms with failures must note the deficiencies and forward a copy of this form within two working days to the Site Safety and Health Officer					
Description of deficiencies:					
Corrective actions to be taken:					
Inspection conducted by:		Printed name:		Signature:	
Deficiencies corrected by		Printed name:		Signature:	

Site Safety Inspection Log

Date:	Time:	Project location (site name, city and state): RSA-313-R-01, Redstone Arsenal, Madison County, AL	Project number: AP5001
Lost time accidents (hours):	Days since last reported injury:	Last reportable injury:	
Type of Inspection: <input type="checkbox"/> Daily: <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Special <input type="checkbox"/> Re-inspection			
I. ACTIVITY INSPECTED (indicate results by an "X")	SATISFACTORY	UNSATISFACTORY	NOT APPLICABLE
a. Site Mobilization/Demobilization			
b. Surface Sweep Operations			
c. Subsurface Operations			
d. Geophysical Operations			
e. Survey/Vegetation Removal Operations			
f. Heavy Equipment/Earth Moving Machinery			
g. Personal Protection Equipment			
h. Safe Work Practices			
i. Site Controls			
j. First Aid/Medical Equipment			
k. Fire Extinguisher/Fire Fighting Equipment			
l. Demolition Operations			
m. Explosive Storage			
n. Explosive Transportation Procedures			
o. Emergency Procedures			
II. OVERALL INSPECTION RESULTS			
III. COMMENTS:			
IV. ACTIONS (indicate results by an "X")	YES	NO	COMMENTS
Work stopped due to safety violations:			
Safety violation noted:			
Personnel involved:			
Corrective measures:			
Re-inspection required:			
Demolitions Operations Conducted:			
V. SITE VISITORS (Name, organization and purpose of visit)			
VI. SIGNATURE. I acknowledge that I have been briefed on the results of this inspection and will take corrective actions as necessary.			
Site Safety & Health Officer (print name/signature)			

Explosive Storage and Security Survey Checklist

Project Site (name, city and state):				
Inspection conducted by/position:	Signature			Date
UXOQCS or UXOSO:	Signature			Date
Reviewed by SUXOS:	Signature			Date
1. Publications	YES	NO	NA	COMMENTS
a. ATF Federal Explosive Law & Regulations, ATF P 5400.7,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b. HGL SOP 15.00 Explosive Accountability & Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c. HGL SOP 15.02 Explosive Storage, Inspection & Security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Explosive Storage	YES	NO	NA	COMMENTS
a. Proper explosive storage magazines, Type 2 conforming to BATF standard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b. Placards. Each magazine properly placarded with DOT Haz Class/Division symbol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c. Explosive compatibility groups. Separated into the appropriate Haz Class/Division	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. Physical Security survey conducted and documented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. Locks met BATF standards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f. Key control system established and functional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g. Lightning Protection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1) Magazine constructed of minimum 3/16 inch metal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2) Magazine grounded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3) Magazine located 6 feet from nearest fence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4) Installation/Client/Property Owner standards met	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
h. Fire Protection. Minimum size/type fire extinguisher located within 30 feet of storage magazine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1) Proper fire division symbol at entrance to storage site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5) Fire fighting control plan established in APP/SSHP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6) Area surrounding magazine free of rubbish, brush, dry grass, trees for a minimum of 25 foot.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
i. Magazine location site meets IBD/PTR distances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
j. Commercial explosives being stored in DoD facilities require DoD HC/SCG approval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
k. Adequate earth cover used to meet IBD & PTR distances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Explosive Storage and Security Survey Checklist

3. Explosive Accountability & Management	YES	NO	NA	COMMENTS
a. Explosive accountability and management responsibilities and organization established	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b. Explosive material purchase/receipt signature authority on-hand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c. Accountability records & tracking established	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. MEC final disposition accountability tracking records established	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. Lost, missing and stolen procedures in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f. Disaster preparedness plan in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g. Receipt procedures accounting for each item of explosives properly documented on-site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
h. Individuals authorized to receive issue and transport Identified and granted explosive access by the BATF FELC.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Explosive Transportation	YES	NO	NA	COMMENTS
a. Hazardous waste manifest on-hand and maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b. Explosive Transport Vehicle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1) Vehicle inspection checklist on hand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2) Proper DOT placards, lettering, and/numbering on hand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3) Operators licensed (CDL/HazMat endorsement)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4) First aid kit on board vehicle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5) Communication protocols established	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6) Day boxes on hand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

SAFETY/QUALITY COMPLIANCE CHECK LIST

LOCATION:

DATE:

1. Review Scope of Work & WP	Yes	No	N/A	COMMENTS
a. Check for Modifications/Changes & Up to Date				
b. Proper Depth of Clearance Identified				
c. Corrective Action Standards Established				
d. Proper Target Ordnance Identified/Test Sources/Test Plot Established				
e. Most Probable Munitions (MPM) Identified				
f. MSD/MFGD Established				
g. Standards for Turn-In of Recovered MPPEH and Range-Related Debris				
h. Exclusion Zone (EZ) identified				
2. Documentation Requirements/Publications	Yes	No	N/A	COMMENTS
a. Notice to Proceed from KO				
b. Approval Letter for UFP-QAPP				
c. Contractor Qualifications, Approval Letter for All UXO Personnel Identified by Name & Position				
d. Certificate of Grounding, Lightning Protection (if Required)				
e. Approval Letter, MSD 1/600				
f. Explosive Safety Submission (ESS) (if Required)				
g. Delivery Order & All Modifications & Change Orders				
h. Explosives Permits/License (If Required)				
i. GFE Inventory/Transfer Documentation (If Required)				
j. Dig Permits for Utilities (If Required)				
k. Rites of Entry (ROE) (If Required)				
l. OE Sector SOPs				
m. Other Reference Publications/Materials				

3. QC Files Established	Yes	No	N/A	COMMENTS
a. Daily/Weekly QC Reports/Audits				
b. Approval Letter's, NTP, for Operations				
c. Weekly/Monthly Reports (If Provided)				
d. CEHNC Form 948 (Copies)				
4. Accident Prevention Plan (APP)/Site-Specific Safety & Health Plan (SSHP)	Yes	No	N/A	COMMENTS
a. Hazard Analysis & Risk Assessment for All Task & Equipment				
b. Training, General Site Workers HAZWOPER Qualified & Current 8-Hour Refresher				
c. Personnel Protective Equipment (PPE)				
d. First Aid Equipment Shall be Immediately Available				
e. Emergency Eye-washes/Showers Comply with ANSI Standards				
f. Fire Extinguishers (Specify Type, Size, and Location)				
g. Visitor Safety Briefing				
h. Emergency Notification List Posted & Available				
i. Emergency Routes/Maps Available & Issued to Each Team				
j. Work Task Identified in Hazard Analysis (APP)				
k. MSDS(s) On-Site. APP				
k. Hazard Analysis for Each Piece of Equipment/Operations				
l. Minimum of Two Personnel On-Site 1 st Aid/CPR Trained, EM 385-1-1, Section 3, Page 19, Para 03.A.02				
m. 1 st Aid Kits Approved by a competent 1st Aid person in the Ratio of 1 for every 25 personnel or less. EM 385-1-1, Section 3, Page 19, Para 03.B.03.a				
n. Site Emergency Procedures (Wild Fires/Severe Weather)				
o. Adequate Means of Reporting Accidents/Near Misses to Parsons, & Clients				
5. Facilities. Reference EM 385-1-1	Yes	No	N/A	COMMENTS
a. Adequate Work Space & Facilities (Restrooms, etc.)				

b. Good Housekeeping (No Fire Hazards, Tripping Hazards, etc.)				
c. Approved and Suitable Containers for Flammable, Toxic, or Explosive Materials				
d. Approved/Adequate Explosive Storage Facilities				
e. Fire/Emergency Exits Clear & Unbarred. Fire extinguisher location(s), and route of escape posted as appropriate in facility				
f. Personnel Limits Maintained				
g. Site Security Adequate				
h. Toilets IAW EM 385-1-1, Section 2, Page 21, Para 02.B				
i. Washing Facilities IAW EM 385-1-1, Section 2, Page 23, Para 02.D				
6. Equipment. Reference Approved WP/Manufacturers Operators Manual	Yes	No	N/A	COMMENTS
a. Tools Appropriate and Serviceable				
b. Personnel Protective Equipment (PPE) Present, Serviceable & Utilized				
c. Equipment Calibrated (Last Cal. Date _____ Next Cal Date _____)				
d. Survey Equipment Inspected & Serviceable				
g. Two Separate Means of Communications, Radio(s)/Cell Phone, Land Line(s)				
h. Geophysical Equipment on-Hand & Serviceable				
i. Site Vehicles Are Equipped With 1sd Aid Kits & 5-BC Fire Extinguisher IAW EM 385-1-1, Section 18A.02(10)				
7. Location Survey & Mapping Plan	Yes	No	N/A	COMMENTS
a. Registered Land Surveyor				
b. Surveyors Received Site Specific Training				
c. UXO Escort Provided				
d. Grid Stake, Locations Swept With Geophysical Equipment Prior to Driving Stakes				
e. Survey Notes Being Recorded				
8. Quality Control Plan	Yes	No	N/A	COMMENTS
a. QC Operational/Checks Being Conducted IAW WP				

b. QC Grid Sweep Pattern Adequate				
c. Results of QC Checks Being Recorded				
d. Nonconformance reports issued if QC checks show discrepancies, or for QA failures				
e. Intrusive Results/Data Base/PDA Entries Are QC'd				
9. Vegetation Removal	Yes	No	N/A	COMMENTS
a. Equipment Operated To Prevent Impact With Possible Surface MEC				
b. Cutting Does Not Present Implement Hazard				
c. UXO Personnel Monitoring Cutting Operation				
d. MEC Discovered Marked/Handled Appropriately				
e. Equipment Being Operated Safely & IAW Operators Manual				

SIGNATURE: _____

COMMENTS: See attached audit memorandum.

**Quality Control
Preparatory Phase Checklist**

Contract No.: _____

Date: _____

Definable Feature of Work: _____ Spec. Section: _____

I. Personnel Present:

Government Rep Notified: (circle) Y/N

Hours in advance: _____

<u>Name</u>	<u>Position</u>	<u>Company/Government</u>
-------------	-----------------	---------------------------

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

(List additional personnel on reverse side)

II. Submittals

1. Review submittals and/or submittal log. Have all submittals been approved?

Yes _____ No _____

If No, what items have not been submitted?

a. _____

b. _____

c. _____

2. Are all materials on hand? Yes _____ No _____

If No, what items are missing?

a. _____

b. _____

c. _____

3. Check approved submittals against delivered material. (This should be done as material arrives.)

Comments: _____

III. Material Storage

Are materials stored properly? Yes _____ No _____

If No, what action is taken? _____

IV. Specifications

1. Review each paragraph of specifications.

2. Discuss procedures for accomplishing the work.

3. Clarify any differences.

V. Preliminary Work and Permits

Ensure preliminary work is correct and permits are on file.

If not, what action is taken: _____

VI. Testing

1. Identify test to be performed, frequency, and whom.

2. When is it required? _____

3. Where is it required? _____

4. Review Testing Plan: _____

**Quality Control
Preparatory Phase Checklist**

5. Has the test facility been approved: Yes _____ No _____

If not, what action has been taken?: _____

VII. Safety

1. Review applicable portion of EM 385-1-1. _____

2. Activity Hazard Analysis approved? Yes _____ No _____

VIII. USACE Representative comments during meeting.

_____.

QC Manager / Date

Quality Control Initial Phase Checklist

Contract No.: W912DY-17-D-0003

Date: _____

Title and No. of Technical Section: _____

Reference Contract Drawings: _____

A: Planned attendants:

	<u>NAME</u>	<u>POSITION</u>	<u>COMPANY</u>
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

B. Materials being used are in strict compliance with the contract plans and specifications:

Yes No If not explain:

C. Procedures and/or work methods witness are in strict compliance with the contract specifications:

Yes No If not explain:

D. Workmanship is acceptable: Yes

No

State areas where improvement is needed:

E. Safety violation noted: Yes

No

If yes, corrective action taken:

Quality Control Representative

Date

Vegetation Removal Checklist

	Contract No: W912DY-17-D-0003 EPA No.: Site _____ Work Phase _____	Reference Documents: 1) RSA-313-R-01 Accident Prevention Plan 2) Quality Assurance Project Plan 3) DDESB TP-18 4) Equipment Operations Manuals
Installation: Redstone Arsenal, Madison County, AL Subcontractor: _____	Reference No.(s): _____	
Inspection Type (Circle one): Preparatory/Initial/Follow Up Definable Feature of Work (DFOW): Vegetation Removal	Inspection Date: _____ Location: _____	

Quality Control Inspection Checklist

This checklist provides a method whereby the inspector can evaluate the performance of contractor or subcontractor personnel as they perform the specified Definable Feature of Work (DFOW). The inspector should refer to the controlling documents as well as documentation provided by the contractor or subcontractor personnel.

	Pass	Fail	N/A	Comments
Are the required minimum personnel and equipment present?				
Are there no more than the maximum permitted personnel present?				
Are the required personnel familiar with their required duties?				
Do the required personnel meet the minimum qualifications?				
Is the anomaly avoidance equipment suitable for the job, and has it been subjected to the specified operational checks?				
Is the vegetation removal equipment suitable for the job, and has it been subjected to the specified operational checks?				

Vegetation Removal Checklist

Is the required documentation present in the specified location?				
Vegetation Clearance Coverage: Vegetation is cleared from the proper location. Acreage cleared matches the proposed acreage identified in the work plan. Vegetation is cleared from all accessible portions of the specified area. No vegetation remains that would interfere with the follow-on work plan actions.				
Cleared Vegetation Disposition: Vegetation is spread on the site and does not interfere with operations.				
Height of Remaining Vegetation: Height of remaining vegetation will not exceed 6 inches as visually estimated.				
Diameter of Remaining Trees: Diameter of remaining trees will be no less than 3 inches as estimated at chest height.				

Inspection Results:

 Pass

 Fail

 Pending (Explain Below)

Note: A failure in any portion of this inspection that cannot be corrected on the spot or that may require a portion of the work to be performed again will result in a failing mark for the entire inspection.

Comments: _____

Inspector Signature: _____ **Date:** _____

UXOQCS Signature: _____ **Date:** _____

Attachments:

Civil Survey Checklist

	Contract No: W912DY-17-D-0003 EPA No.: Site _____ Work Phase _____	Reference Documents: 1) RSA-313-R-01 Accident Prevention Plan 2) Quality Assurance Project Plan (QAPP) 3) DDESB TP-18 4) Equipment Operations Manuals
Installation: Redstone Arsenal, Madison County, AL Subcontractor: _____	Reference No.(s): _____	
Inspection Type (Circle one): Preparatory/Initial/Follow Up Definable Feature of Work (DFOW): Civil Survey	Inspection Date: _____ Location: _____	

Quality Control Inspection Checklist

This checklist provides a method whereby the inspector can evaluate the performance of contractor or subcontractor personnel as they perform the specified Definable Feature of Work (DFOW). The inspector should refer to the controlling documents as well as documentation provided by the contractor or subcontractor personnel.

	Pass	Fail	N/A	Comments
Are the required minimum personnel and equipment present?				
Are there no more than the maximum permitted personnel present?				
Are the required personnel familiar with their required duties?				
Do the required personnel meet the minimum qualifications?				
Is the survey equipment suitable for the job, and has it been subjected to the specified operational checks?				
Is the anomaly avoidance equipment suitable for the job, and has it been subjected to the specified operational checks?				

Civil Survey Checklist

Is the required documentation present in the specified location?				
Civil Survey Certified Documentation: A signed and stamped statement by the surveyor that all control points meet + / - .5 foot accuracy A signed and stamped statement by the surveyor that all boundary points meet + / - .5 foot accuracy				

Inspection Results:

 Pass

 Fail

 Pending (Explain Below)

Note: A failure in any portion of this inspection that cannot be corrected on the spot or that may require a portion of the work to be performed again will result in a failing mark for the entire inspection.

Comments: _____

Inspector Signature: _____ **Date:** _____

UXOQCS Signature: _____ **Date:** _____

Attachments:

Geophysical Survey Checklist

Contract No: W912DY-17-D-0003 EPA No.: Site _____ Work Phase _____	Reference Documents: 1) Corrective Measures Implementation Plan for RSA-313-R-01 2) Installation-Wide Quality Assurance Program Plan (IW QAPP) 3) DDESB TP-18 4) Equipment Operations Manuals
Installation: Redstone Arsenal, Madison County, AL Subcontractor: _____	Reference No.(s): _____
Inspection Type (Circle one): Preparatory/Initial/Follow Up Definable Feature of Work (DFOW): Advanced Geophysical Classification (AGC) Survey	Inspection Date: _____ Location: _____

Quality Control Inspection Checklist

This checklist provides a method whereby the inspector can evaluate the performance of contractor or subcontractor personnel as they perform the specified Definable Feature of Work (DFOW). The inspector should refer to the controlling documents as well as documentation provided by the contractor or subcontractor personnel.

	Pass	Fail	N/A	Comments
Are the required minimum personnel and equipment present?				
Are there no more than the maximum permitted personnel present?				
Are the required personnel familiar with their required duties?				
Do the required personnel meet the minimum qualifications?				
Is the anomaly avoidance equipment suitable for the job, and has it been subjected to the specified operational checks?				

Geophysical Survey Checklist

Is the AGC equipment suitable for the planned task, and has it been subjected to the specified operational checks?				
If required, is the Anomaly Avoidance equipment suitable for the planned task, and has it been subjected to the specified operational checks?				
Is the required documentation present in the specified location?				
Geophysical Survey Coverage: AGC is collected within the proper location. Daily Logs indicate that 100% of the accessible area(s) are surveyed.				
Geophysical Along Track Sampling: measurements.				
Geophysical Coverage:				
MEC Records: Any MEC encountered is recorded per instructions in the work plan.				
Geophysical Sensor Configuration: All instruments are configured in accordance with the site-specific work plan (sensor type, sensor height, number of sensors, etc.).				
Geophysical Noise Minimization:				
Geophysical Site Preparation:				
Geophysical Grid Coverage Setup (line and fiducial ground markers for lane spacing (ropes, pin flags, etc.):				
Geophysical Equipment QC Tests:				
Geophysical Blind QC Seeds:				

Geophysical Survey Checklist

Inspection Results: **Pass** **Fail** **Pending (Explain Below)**

Note: A failure in any portion of this inspection that cannot be corrected on the spot or that may require a portion of the work to be performed again will result in a failing mark for the entire inspection.

Comments: _____

Inspector Signature: _____ **Date:** _____

UXOQCS Signature: _____ **Date:** _____

Attachments:

Single Point Anomaly Excavation Checklist

Contract No: W912DY-17-D-0003 EPA No.: _____ Site _____ Work Phase _____	Reference Documents: 1) Corrective Measures Implementation Plan for RSA-313-R-01 2) Installation-Wide Quality Assurance Program Plan (IW QAPP) 3) DDESB TP-18 4) Equipment Operations Manuals
Installation: Redstone Arsenal, Madison County, AL Subcontractor: _____	Reference No.(s): _____
Inspection Type (Circle one): Preparatory/Initial/Follow Up Definable Feature of Work (DFOW): Single Point Anomaly Excavation	Inspection Date: _____ Location: _____

Quality Control Inspection Checklist

This checklist provides a method whereby the inspector can evaluate the performance of contractor or subcontractor personnel as they perform the specified Definable Feature of Work (DFOW). The inspector should refer to the controlling documents as well as documentation provided by the contractor or subcontractor personnel.

	Pass	Fail	N/A	Comments
Are the required minimum personnel and equipment present?				
Are there no more than the maximum permitted personnel present?				
Are the required personnel familiar with their required duties?				
Do the required personnel meet the minimum qualifications?				
Is the equipment suitable for the planned task, and has it been subjected to the specified operational checks?				
Is the required documentation present in the specified location?				

Single Point Anomaly Excavation Checklist

<p>Single Point Anomaly Excavation Locations: The interpreted locations must be marked by an Alabama PLS or an experienced GPS operator.</p>				
<p>Single Point Anomaly Excavation Reacquisition: Reacquire EM61-MK2 value reasonably close in value to dig list. Typically reacquire is higher than dig list, however small deviations lower is also acceptable.</p>				
<p>Single Point Anomaly Excavation: 100% of all anomalies have been excavated.</p>				
<p>Single Point Anomaly Excavation Source Removal: 100% of all anomalies have anomaly source item excavated (post-excavation check indicates signal is less than that agreed to in the Instrument Verification Strip Report).</p>				
<p>Single Point Anomaly Excavation Documentation: The anomaly excavation must be documented per the data logger requirements.</p>				
<p>Single Point Anomaly Excavation Discrete Soil Sampling: One discrete soil sample is taken from the soil immediately below all anomalies identified as MEC or unknown liquid filled.</p>				
<p>Single Point Anomaly Excavation Backfill: Excavations must be backfilled to grade with either excavated soil (if it is not contaminated with CA) or known clean fill. If excavation site was previously vegetated, backfill will have excavated sod replaced or be seeded with grass</p>				

Inspection Results:

Pass

Fail

Pending (Explain Below)

Note: A failure in any portion of this inspection that cannot be corrected on the spot or that may require a portion of the work to be performed again will result in a failing mark for the entire inspection.

Single Point Anomaly Excavation Checklist

Comments: _____

Inspector Signature: _____ Date: _____

UXOQCS Signature: _____ Date: _____

Attachments:

Forklifts and Earthmoving Equipment Inspection Checklist

H&S Procedure No.: 30.1
 Publication Date: December 2012
 Revision No.: 02
 Revision Date: November 2017
 Review Date: November 2018

HGL EQUIPMENT SAFETY INSPECTION CHECKLIST

The purpose of the operator’s inspection is to ensure that the equipment and its attachments are in safe operating order prior to use. The inspection must be conducted prior to each shift. While the regulations do not require documentation of operator inspections, such documentation is strongly encouraged as a means of verifying an adequate and complete inspection. The form on the next page (or an equivalent form) may be used to guide the operator in conducting a pre-use inspection. Inspection items are further described below.

Inspection Goals

Overhead and hand guard	<ul style="list-style-type: none"> No broken welds, missing bolts, or other damage
Hydraulic cylinders	<ul style="list-style-type: none"> No leaks or damage
Mast or boom assembly	<ul style="list-style-type: none"> No broken welds, cracked or bent areas, or worn or missing stops
Lifting bars, straps, cables, chains and rollers	<ul style="list-style-type: none"> No excessive wear, damage, fraying, kinks, rust, etc. Adequately sized anchor shackles Adequate lubrication
Tow hook	<ul style="list-style-type: none"> Engage and release smoothly Safety catch works properly
Forks, shovel, other	<ul style="list-style-type: none"> No cracks, gouges, holes, excessive wear No mismatching
Tires	<ul style="list-style-type: none"> No gouges, chunking, or bond failure Adequate tread Proper inflation No missing lugs
Battery	<ul style="list-style-type: none"> Properly installed and secured Adequately charged No leakage Covers and caps in place Cables in good condition
Hydraulic fluid	<ul style="list-style-type: none"> Proper level
Gauges	<ul style="list-style-type: none"> Working properly
Steering	<ul style="list-style-type: none"> Smooth, without binding or excess play Power steering operates properly
Brakes	<ul style="list-style-type: none"> Pedal moves freely without binding and does not go all the way to the floor Parking brake works correctly (vehicle does not move when engaged)
Lights	<ul style="list-style-type: none"> All warning and working lights function properly
Horn	<ul style="list-style-type: none"> Sounds
Backup alarm	<ul style="list-style-type: none"> Operates as intended
Control levers	<ul style="list-style-type: none"> Moves smoothly
Safety seat, belt, switch, doors, and/or interlocks	<ul style="list-style-type: none"> Operate as intended
Propane/fuel tank/hose	<ul style="list-style-type: none"> No apparent cracks, checking, kinking, fraying of the hoses Connector properly seated Tank secured
Engine oil	<ul style="list-style-type: none"> Proper level
Engine coolant	<ul style="list-style-type: none"> Proper level
Transmission fluid	<ul style="list-style-type: none"> Proper level
Windshield wipers	<ul style="list-style-type: none"> Work properly
Attachments	<ul style="list-style-type: none"> Operate smoothly with no hesitation

Forklifts and Earthmoving Equipment Inspection Checklist

H&S Procedure No.: 30.1
 Publication Date: December 2012
 Revision No.: 02
 Revision Date: November 2017
 Review Date: November 2018

FACILITY OR LOCATION _____ DATE/SHIFT _____

OPERATOR _____ VEHICLE NUMBER _____

Instructions: Check (3) each item below as "Satisfactory" (S) or "Unsatisfactory" (U) or "Not Applicable" (NA). Add any pertinent comments in the space provided for each item checked "Unsatisfactory." Include additional pages of explanation as necessary.

Date																								
Time																								
Operator Initials																								
Inspection Item	S	U	NA	S	U	NA	S	U	NA	S	U	NA	S	U	NA	S	U	NA	S	U	NA	S	U	NA
Overhead and hand guard																								
Hydraulic cylinders																								
Mast or boom assembly																								
Lifting bars, straps, cables, chains and rollers																								
Tow hook																								
Forks, shovel																								
Tires																								
Battery																								
Hydraulic fluid																								
Gauges																								
Steering																								
Brakes																								
Lights																								
Horn																								
Backup alarm																								
Control levers																								
Safety seat, belt, switch, doors, and/or interlocks																								
Load handling attachments																								
Fuel tanks/hose																								
Engine oil																								
Engine coolant																								
Transmission fluid																								
Windshield wipers																								
Attachments																								

Date	Item of Concern	Corrective Action Taken

Inspection must be done before each shift or before equipment is used for that day.
 Operator Signature _____ Date: _____

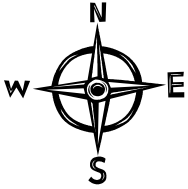
Grid Drawing Sheet

Site Name:	Site Location (city/state):	
Grid Number:	Team Number:	Date:

Grid X and Y Dimensions (check the appropriate box):

30m x 30m
 90ft x 90ft
 100ft x 100ft
 200ft x 200ft
 Other ___ ft x ___ ft

Draw in the Grid Box the areas not cleared or "Exception Areas" due to obstacles, terrain, standing or running water, or archeological, cultural, environmental or paleontological sites. Describe the reason the area was not cleared in the comment section below.



Comments:

Team Leader Grid Sheet

Project Site Location (name, city and state):		Team Number:	Date:
Grid Number:	Total Anomalies Dug:	Grid Completed Yes No <input type="checkbox"/> <input type="checkbox"/>	Percent Complete:

I. MEC items located.

Item	Grid	Classification			Comments
		DMM	MPPEH	UXO	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

II. Non-MEC items located.

Type	Daily Total (pounds)	Comments
Non-munitions related debris (NMRD)		
Munitions Debris (MD)		
Range-related Debris (RD)		

III. Comments:

Team Leader (print name):	Signature:
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DEMOLITION/BURN NOTIFICATION CHECKLIST
CORRECTIVE MEASURES IMPLMENTATION AT RSA-312-R-01

Function	Phone	Date/Time	Initials
USACE PM	Landline: Cell:		
USACE OESS	Landline: Cell:		
Contractor PM	Landline: Cell:		
Contractor UXOQCS	Landline: Cell:		
Contractor UXOSO	Landline: Cell:		
Security	Landline: Cell:		
Range Control	Landline: Cell:		
Medical	Landline: Cell:		
Fire Department	Landline: Cell:		
ADEM	Landline: Cell:		
	Landline: Cell:		
	Landline: Cell:		
	Landline: Cell:		
	Landline: Cell:		
	Landline: Cell:		
	Landline: Cell:		
	Landline: Cell:		
	Landline: Cell:		
SUXOS Signature:		Date:	



GENERAL DEMOLITION SAFETY PRECAUTIONS CORRECTIVE MEASURES IMPLEMENTATION AT RSA-313-R-01

1. Carry blasting caps in approved containers and keep them out of the direct rays of the sun. Keep the caps located at least 25 feet from other explosives until they are needed for priming.
2. Do not work with electric blasting caps or other electro-explosive devices while wearing clothing prone to producing static electricity such as nylon, silk, synthetic hair, etc.
3. Do not use explosives or accessory equipment that are obviously deteriorated or damaged. They may cause premature detonation or fail completely.
4. Always point the explosive end of blasting caps, detonators, and explosive devices away from the body during handling.
5. Use only standard blasting caps of at least the equivalent of a commercial No. 8 blasting cap.
6. Use electric blasting caps of the same manufacturer for each demolition shot involving more than one cap.
7. Do not use improvised methods for initiating blasting caps.
8. Do not bury blasting caps. Use detonating cord to transmit the explosive wave from the blasting caps, on the surface, to a buried/tamped explosive charge. Buried blasting caps are subject to unobserved pressures and movement, which could lead to premature firing or misfires.
9. Test electric-blasting caps for continuity at least 50 feet from any other explosives prior to connecting them to the firing circuit. Upon completion of testing, the lead wires will be shunted by twisting the bare ends of the wires together. The wires will remain shunted until ready to be connected to the firing circuit.
10. In the event of a misfire when disposing of explosives by detonation, do not approach the disposal site for at least 60 minutes after the expected detonation time, when firing electrically. When conducting non-electric procedures, the wait time will be at least one hour from the expected time of detonation.
11. Items with lugs, strong backs, tail-booms, base plates, etc., should be oriented away from personnel locations.
12. Consideration should be given to tamping the UXO to control fragments, if the situation warrants. Fragments will be minimized not only to protect personnel but also property, such as buildings, trees, etc.
13. Avoid inhaling the smoke, dust or fumes of burning pyrotechnic or incendiary materials. The smoke, dust and fumes from many of these materials are irritating and/or toxic if inhaled.
14. Do not use water on incendiary fires. Water may induce a violent reaction or be completely ineffective, depending on the mixture.
15. Anticipate a high order detonation when burning pyrotechnic or incendiary-loaded MEC. Safety measures for personnel and property must be based upon this possibility.
16. Inert ordnance 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 ordnance material.
17. 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.
18. 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.
19. Exercise extreme care when handling and preparing high explosives for detonation. They are subject to detonation by heat, shock or friction.
20. Do not pack bomb fuze wells with explosives unless it can be positively confirmed that the fuze well does not contain any fuze components.
21. Photo flash bombs must be handled with the same care as black powder filled munitions.
22. MEC containing white phosphorous will not be detonated into the ground. White phosphorous munitions will be counter-charged on the bottom centerline (CCBC) when possible.

23. A search of the detonation site, after the demo operation, will be conducted to assure complete disposal was accomplished.
24. Do not abandon any explosives.
25. 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.
26. 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.
27. Do not fight fires involving explosive material. Evacuate all personnel to a safe location and secure the area.
28. Know and observe federal, state, and local laws/regulations, which apply to the transportation, storage and use of explosives.
29. Do not permit metal, except approved metal truck bodies, to contact explosive containers.
30. Do not transport metal, flammable, or corrosive substances with explosives.
31. Do not allow smoking, or the presence of unauthorized personnel, in vehicles transporting explosives.
32. Carefully load and unload explosives from vehicles. Never throw or drop explosives from the vehicle.
33. Assure the load is blocked and braced to prevent it from movement and displacement.
34. Do not drive vehicles containing explosives over public highways until all permits and certifications have been obtained from the state enforcement agencies.
35. All routes must be approved in writing prior to transporting explosive materials over public highways.
36. 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.
37. Never leave vehicle loaded with explosives unattended.
38. Do not store blasting caps, detonators, or other items containing initiating explosives in the same box, container or magazine with other explosives.
39. Store explosive materials in military or ATF 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: OP-5, TM 9-1300-206, AMCR 385-100, ATF - Explosives Law and Regulation, ATF P 5400.7 and 49 CFR.
40. Do not store spark-producing metal/tools in an explosive magazine.
41. Do not permit smoking, matches or any source of fire or flame within 100 feet of an explosive magazine.
42. Do not allow leaves, grass, brush or debris to accumulate within 50 feet of an explosive magazine.
43. Do not permit the discharge of firearms within 300 feet of an explosive magazine.
44. 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.
45. Do not permit smoking, matches or other sources of fire or flame within 100 feet of an area in which explosives are being handled.
46. Do not expose explosives or devices containing explosive to prolonged exposure to direct sun light. Such exposure can increase sensitivity and deterioration.
47. Ensure all unused explosives are returned to their proper containers and the container closed after use.
48. Do not carry explosives or explosive components in pockets or on the body.
49. Do not insert anything but time fuse or detonating cord into the open end of a blasting cap.
50. 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.
51. Do not pull on the electrical lead wires of electric blasting caps, detonators or their electro-explosive devices. A detonation may occur.
52. 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.
53. Do not allow unauthorized or unnecessary personnel to be present when explosives are being handled.
54. Always point the explosive end of blasting caps, detonators and other explosive devices away from the body.
55. Do not use pull rings or safety pins to lift or handle explosive devices.
56. Work involving priming devices and explosives shall be planned and organized so as to prevent injury or damage to personnel and surroundings. The main responsibility for such a task shall devolve upon one person. Among other things, this person shall ensure that all participants receive necessary information concerning the preconditions for the task and that explosives are handled and stored in a correct and safe manner.
57. If the main person responsible does not herself/himself participate in the work task (s)he shall appoint a deputy who thus also bears responsibility for the practical performance of the task.

58. Never handle damaged detonators. Undamaged detonators can be repacked in packages similar to original boxes.
59. Never use damaged products or partially damaged products (that have been shocked or submitted to excessive temperatures, etc.) During handling and transport of explosives only those personnel who are essential for the performance of the work involved shall be present.
60. Any explosive temporarily stored at a work site shall be protected against mechanical influences, heat, etc. that could conceivably cause unintentional detonation.
61. Different classes and types of dangerous goods shall be stored and transported separately.
62. To avoid the risk of unintentional injury and/or damage to surroundings a triggering method that enables full control over the instant of detonation is recommended. The firing system shall initiate the charge reliably and immediately upon triggering.
63. When triggering exposed firing systems (detonators and surface connectors) ensure that they cannot cause injury or damage to property. As a guideline there should be a safety distance of at least 20 meters.
64. Damaged, undetonated detonators are safety hazards and shall be handled with the utmost care. If possible, they should be neutralized *in situ* by being blasted to destruction by an explosive charge. Damaged, undetonated detonators shall under no circumstances be put together with other explosive goods in any way.
65. Handle with care, avoid all forms of commotion, impact and friction on products and their packages, keep products and packages away from heat, flames and sparks.
66. Keep far from children.
67. The control and implementation of pyrotechnic articles must be done by authorized staff.
68. For shock tube only, consider initial isolation of at least 15 meters (50 feet) in all directions.
69. Fight fire with normal precautions and methods used for plastic fires from a reasonable distance.

IF DETONATORS OR OTHER EXPLOSIVES ARE PRESENT, DO NOT FIGHT FIRE.

DEMOLITION SHOT RECORD

Site Name/Location:			Date:				
Shot Location (Anomaly ID No./GPS Coord.)		Demolition Supervisor:		State License # (if applicable):			
Type of UXO/MEC Destroyed, Vented, or Burned:		Firing Method:		Time of Shot:			
Direction and Distance to Nearest Building, Road, Utility Line, etc.:		Temp: _____ Wind Dir./Speed: _____ Ceiling: _____ Clouds/Sun: _____					
Type and Amount of Tamping Used:			Mat or Other Protection Used (list):				
Seismographic/Sound Level Meter Used: Yes <input type="checkbox"/> No <input type="checkbox"/>			Readings/Results:				
Demolition Materials Used							
Description		Amount		Description		Amount	
Perforator				Time Fuze			
Det Cord				Squibs			
Electric Detonator				Black/Smokeless Powder			
Non-Electric Detonator				Two Component			
Non-EI Detonator				Other (list)			
Certification							
I certify that the explosives listed were used for their intended purpose, and that the UXO/MEC listed were rendered inert/destroyed.							
Signature of Demolition supervisor: _____ Date: _____							

DEMOLITION SHOT RECORD

Site Name/Location:			Date:				
Shot Location (Anomaly ID No./GPS Coord.)		Demolition Supervisor:		State License # (if applicable):			
Type of UXO/MEC Destroyed, Vented, or Burned:		Firing Method:		Time of Shot:			
Direction and Distance to Nearest Building, Road, Utility Line, etc.:		Temp: _____ Wind Dir./Speed: _____ Ceiling: _____ Clouds/Sun: _____					
Type and Amount of Tamping Used:			Mat or Other Protection Used (list):				
Seismographic/Sound Level Meter Used: Yes <input type="checkbox"/> No <input type="checkbox"/>			Readings/Results:				
Demolition Materials Used							
Description		Amount		Description		Amount	
Perforator				Time Fuze			
Det Cord				Squibs			
Electric Detonator				Black/Smokeless Powder			
Non-Electric Detonator				Two Component			
Non-EI Detonator				Other (list)			
Certification							
I certify that the explosives listed were used for their intended purpose, and that the UXO/MEC listed were rendered inert/destroyed.							
Signature of Demolition supervisor: _____ Date: _____							

Explosive Material Disposition Record – Bill of Lading

Date:	Site Name/Location:	Grid #/Area or GPS coordinate:	Distributee Explosive License #: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
-------	---------------------	--------------------------------	---

This form will be used as a Bill of Lading anytime explosives are transported in a HGL vehicle under DOT regulations and kept with the explosive driver in the vehicle until the explosives are issued, expended or returned to storage.

SECTION I. Explosive Material Issued for Demilitarization/Demolition Operations:

Lot Number/Manufacturer's Marks of Identification	Brand Name, Nomenclature or Description	Quantity	Hazard/Class	Receipt Initials

Print Explosive Driver Name:	Explosive Driver Signature:
------------------------------	-----------------------------

SECTION II. Explosive Material Expended by Detonation:

Lot Number/Manufacturer's Marks of Identification	Brand Name, Nomenclature or Description	Quantity	Hazard/Class	Receipt Initials

SECTION III. Explosive Material Returned to Storage:

Lot Number/Manufacturer's Marks of Identification	Brand Name, Nomenclature or Description	Quantity	Hazard/Class	Receipt Initials

Demolition Supervisor Signature:	SUXOS Signature:
----------------------------------	------------------

Report of Theft or Loss-Explosive Materials**For ATF Use Only**

Date Received	Date E-Mailed to JSOC & Field Division	BATS ID
		Case Number

To Be Completed By Person Making Report

Upon discovery of any theft or loss of any of your explosive materials:

- First, contact ATF toll free at 1-800-461-8841 between 8:00 a.m. - 5:00 p.m. EST or after hours and weekends contact ATF at 1-800-800-3855 to report the theft or loss;
- Second, contact your local law enforcement office to report the theft or loss to obtain a police report; and
- Third, complete this form and attach any additional reports, sheets or invoices necessary to provide the required information, and fax the form with additional material(s) to the ATF U.S. Bomb Data Center (USBDC) at 866-927-4570 or email to USBDC@atf.gov.

1. Date	2. Type of Report (<i>Check one</i>): <input type="checkbox"/> Theft <input type="checkbox"/> Loss <input type="checkbox"/> Attempted Theft/Suspicious Activity <input type="checkbox"/> Supplement		
3. Full Name of Person Making the Report (<i>Last, First, Middle</i>)		4a. Licensee or Permittee Name	
4b. Federal Explosives License or Permit Number			
5a. Office Address (<i>Street Address, City, State, and Zip Code</i>)		5b. Telephone Number	
		5c. E-mail Address	
6. Actual Location of Theft or Loss (<i>If different from item 5a</i>)			

7. Theft or Loss	Date	Time	8. Name of Local Law Enforcement Officer to Whom Reported
a. Discovered			9. Name and Address of Local Authority to Whom Reported
b. When Was the Magazine Last Checked			
c. Occurred (<i>Show approximate if exact not known</i>)			
d. Reported to ATF by Telephone			10. Telephone Number
e. Reported to Local Authorities			11. Police Report Number

12. Explosive Materials Lost or Stolen (*Attach invoices or additional sheets, if necessary*)

a. Manufacturer and/or Importer	b. Brand Name	c. Date Shift Code	d. Size (Length & Diameter)	e. Quantity (Pounds of Explosives, Number of Dets)	f. Type and Description (Dynamite, Blasting Agents, Detonators, etc. Include for each type, size, MS delay or length of legwire, as applicable)

Reporting Instructions

Email or fax this completed form to the ATF address listed below or call if no fax is available:

Bureau of Alcohol, Tobacco, Firearms and Explosives
U.S. Bomb Data Center
99 New York Ave., N.E. 8.S-295
Washington, DC 20226
Toll Free Fax: 1-866-927-4570
Email Address: USBDC@atf.gov

Questions regarding the completion of this form should be referred to the U.S. Bomb Data Center toll free at 1-800-461-8841.

Privacy Act Information

The following information is provided pursuant to section 3 of the Privacy Act of 1974 (5 U.S.C. § 522a(e)(3)).

1. **Authority.** Solicitation of this information is made pursuant to Title XI of the Organized Crime Control Act of 1970 (18 U.S.C. Chapter 40). Disclosure of a theft or loss of explosive materials is mandatory pursuant to 18 U.S.C. § 842(k) for any person who has knowledge of such theft or loss from his stock.
2. **Purpose.** The purpose for the collection of this information is to give ATF notice of the theft or loss of explosive materials, and to furnish ATF with the pertinent facts surrounding such theft or loss. In addition, the information is used to confirm and verify prior notification of this theft or loss of explosive materials.
3. **Routine Uses.** The information will be used by ATF to aid in the administration of laws within its jurisdiction concerning the regulation of explosive materials and other related areas. In addition, the information may be disclosed to other Federal, State, foreign, and local law enforcement of laws within their jurisdiction. System of records notice Justice/ATF-008 Regulatory Enforcement Record System FR Vol.68 No.16 Page 3558 dated January 24, 2003.
4. **Effects of not supplying information requested.** 18 U.S.C. § 842(k) makes it unlawful for any person, who has knowledge of the theft or loss of explosive materials from his stock, to fail to report such theft or loss within twenty-four hours of discovery thereof, to the Secretary and to appropriate local authorities. The penalty for violation of this section is a fine of not more than \$1,000 or imprisonment for not more than one year, or both. 18 U.S.C. § 844(b).

Paperwork Reduction Act Notice

This request in accordance with the Paperwork Reduction Act of 1995. The purpose of this information collection is to report the theft or loss of explosive materials. The information is used for investigative purposes by ATF officials. This information is mandatory by statute. (18 U.S.C. § 842)

The estimated average burden associated with this collection of information is 1 hour and 48 minutes per respondent or recordkeeper, depending on individual circumstances. Comments concerning the accuracy of this burden estimate and suggestions for reducing this burden should be addressed to Reports Management Officer, Document Services, Bureau of Alcohol, Tobacco, Firearms and Explosives, Washington, DC 20226.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

DD FORM 1348-1A, JUL 91 (EG) ISSUE RELEASE/RECEIPT DOCUMENT

1	2	3	4	5	6	7	23	24	25	26	27	28	29	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	1. TOTAL PRICE		2. SHIP FROM		3. SHIP TO	
DOCUMENT	FROM	M & S	UNITS	QUANTITY	SUPPLIER ADDRESS	SHIPMENT NO	DISTRIBUTION	PROJECT	PRI	REQ	D	A	D	V	R	I	O	C	M	/	O	G	P	N	T	D	UNIT PRICE	DOLLARS	CTS	DOLLARS	CTS	4. MARK FOR																							
24. DOCUMENT NUMBER & SUFFIX	25. NATIONAL STOCK NO. & ADD (8-22)	26. RIC (4-6) UI (23-24) QTY (25-29) CON CODE (7) L-56 DIST (65-66)	5. DOC DATE	6. NMFC	7. FRT RATE	8. TYPE CARGO	9. PS	10. QTY. REC'D	11. UP	12. UNIT WEIGHT	13. UNIT CUBE	14. UFC	15. SL	16. FREIGHT CLASSIFICATION NOMENCLATURE	17. ITEM NOMENCLATURE	18. TY CONT	19. NO CONT	20. TOTAL WEIGHT	21. TOTAL CUBE	22. RECEIVED BY	23. DATE RECEIVED																																		

PREVIOUS EDITION MAY BE USED

Reset

MATERIEL COURIER RECEIPT			SHIPPER'S CONTROL/DOCUMENT NO.	
SHIPPER			SUPPLY ACCOUNT NUMBER	
DESTINATION			SUPPLY ACCOUNT NUMBER	
I certify by my signature that I have received the materiel listed on this form and am aware of the applicable safety and security requirements.			SHIPMENT DESCRIPTION	
			LINE NUMBER	QUANTITY
SHIPMENT TRANSFERS				
FIRST	LOCATION OF TRANSFER	DATE (YYYYMMDD)		
RECIPIENT'S PRINTED NAME <i>(Last, First, Middle Initial)</i>		ORGANIZATION OR ACCOUNT NO.		
SIGNATURE				
SECOND	LOCATION OF TRANSFER	DATE (YYYYMMDD)		
RECIPIENT'S PRINTED NAME <i>(Last, First, Middle Initial)</i>		ORGANIZATION OR ACCOUNT NO.		
SIGNATURE				
THIRD	LOCATION OF TRANSFER	DATE (YYYYMMDD)		
RECIPIENT'S PRINTED NAME <i>(Last, First, Middle Initial)</i>		ORGANIZATION OR ACCOUNT NO.		
SIGNATURE				
FOURTH	LOCATION OF TRANSFER	DATE (YYYYMMDD)		
RECIPIENT'S PRINTED NAME <i>(Last, First, Middle Initial)</i>		ORGANIZATION OR ACCOUNT NO.		
SIGNATURE				
FIFTH	LOCATION OF TRANSFER	DATE (YYYYMMDD)		
RECIPIENT'S PRINTED NAME <i>(Last, First, Middle Initial)</i>		ORGANIZATION OR ACCOUNT NO.		
SIGNATURE				



Well Development Log

Page of

Project Number: _____
 Project Name: _____
 Form Completed by: _____
 Well Developed by/firm: _____

Site ID: _____
 Location ID: _____
 Date Started: _____

Monitoring Well Information

Development Method: _____
 Development Equipment: _____

Screen Height (ft): _____
 Filter pack length (ft): _____
 Casing Diameter (in): _____

Beginning Measurements (BTOC)
 Depth to Water (ft): _____
 Total depth of Well (ft): _____

Monitoring Well Purge Calculations

Volume of Water in Casing: Gallons/foot = $0.041 \times d^2$, where casing diameter in inches = $(0.041 \times (\text{_____})^2) = \text{_____ gal/ft.}$
 Well Volume (gallons) = Water Column (ft) x Gal/ft = _____ ft x _____ gal/ft = _____ gallons

Volume of Water in Filter Pack:
 Gallons/foot = $0.041 \times (D^2 - d^2)$, where D is total borehole diameter in inches & d is casing diameter in inches = $0.041 \times ((\text{_____})^2 - (\text{_____})^2) = \text{_____ gal/ft.}$
 Filter Pack Volume (gal) = (the less of the filter pack length or water column) x gal/ft x porosity (0.3) = _____ ft x _____ gal/ft x 0.3 = _____ gal

Purge Well Volume: Purge well Volume = Filter pack volume + Well Volume = _____ gal + _____ gal = _____ gal.

1 x Purge Well Volume	2 x Purge Well Volume	3 x Purge Well Volume	4 x Purge Well Volume	5 x Purge Well Volume
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Development Record

Time (24 hrs)	Volume Removed (gal)	Water Level (ft) (TOC)	Turbidity (NTU)	Clarity (color)	Temp. (C)	pH (Std Units)	Conductivity (mS/cm)	D.O. (mg/L)	Redox (mV)	Comments

GROUNDWATER FIELD SAMPLING DATA SHEET

Well No.:		Location:			
Sampler(s):		Project Name:			
Well Depth (ft BTOC):		Project No.:		Date:	Time:
DTW (ft BTOC):	DTP (ft BTOC):	Courier: FedEx UPS		Hand Other:	
MP Ht. Above/Below Ground Surface:		Sample Collection Method:			
Condition of Bottom of Well:		Weather (sun/clear, overcast/rain, wind direction, ambient temperature):			
Screen Interval (ft bgs):					
Well Diameter:					
Placement of Pump Inlet (ft bgs):					

Field Parameters

Time	Depth to Water (ft)	Flow Rate (L/m)	Total Volume (L)	pH	Temp (°C)	Cond. (ms/cm)	ORP (mv)	DO (mg/L)	Turb. (NTU)	Type, Size, and Amount of Sediment Discharged

Observations

Color (clear, other [describe]):							
Odor:	None	Low	Medium	High	Very Strong	H2S	Fuel-like
Notes:							
Signed/Sampler(s):							

FIELD SAMPLING REPORT

LOCATION:	PROJECT:
MRS:	PROJECT NUMBER:

SAMPLE INFORMATION

SAMPLE ID:	TIME:	DATE:
QC SAMPLE: YES () NO ()	MATRIX:	
PARENT SAMPLE ID:	FIELD FILTERED: YES () NO ()	
TYPE OF QC SAMPLE:	BEGINNING DEPTH:	
GRAB () COMPOSITE ()	END DEPTH:	
QC SAMPLE TYPE CODES: DUPLICATE (DUP) MATRIX SPIKE DUPLICATE (MSD) TRIPLICATE (TRP) TRIP BLANK (TB) MATRIX SPIKE (MS) FIELD BLANK (FB)	SAMPLING METHOD:	
	SAMPLING EQUIP:	

CONTAINER	#	PRESERVATIVE/ PREPARATION	ANALYTICAL METHOD	ANALYSIS	NOTES
SIZE/TYPE					

NOTABLE OBSERVATIONS

SAMPLE CHARACTERISTICS	MISCELLANEOUS
pH:	Turbidity (NTU):
Temp (°C):	Color:
DO (mg/L):	Specific Cond. (mS/cm):
ORP (mV):	Odor:
	Ferrous Iron (mg/L):
	PID:
	Other:

Comments: _____

GENERAL INFORMATION

WEATHER: SUN/CLEAR ___ OVERCAST/RAIN ___ WIND DIRECTION ___ AMBIENT TEMP ___

SHIPMENT VIA: FedEx ___ HAND DELIVER ___ COURIER ___ UPS ___

SHIPPED TO: _____

TRACKING NUMBER: _____ COC NUMBER: _____

COMMENTS: _____

SAMPLER: _____ OBSERVER: _____

MATRIX TYPE CODES	SAMPLING METHOD/EQUIPMENT CODES
DC = DRILL CUTTINGS	B = BAILER
GW = GROUNDWATER	BP = BLADDER PUMP
LH = HAZARDOUS LIQUID WASTE	DPT = DIRECT PUSH
SH = HAZARDOUS SOLID WASTE	LF = LOW FLOW
SE = SEDIMENT	MC = MARCO CORE
SL = SLUDGE	PDB = PASSIVE DIFFUSION BAG
SO = SOIL	PP = PERISTALTIC PUMP
GS = SOIL GAS	HYD = HYDRASLEEVE
SW = SURFACE WATER	HA = HAND AUGER
	HAS = HOLLOW-STEM AUGER
	HP = HYDRO PUNCH
	ISM = INCREMENTAL SAMPLING METHOD
	ST = SHELBY TUBE
	SS = SPLIT SPOON
	SP = SUBMERSIBLE PUMP

APPENDIX M

GROUNDWATER MONITORING PLAN

APPENDIX M
REVISION 2
GROUNDWATER MONITORING PLAN

**CORRECTIVE MEASURES IMPLEMENTATION PLAN AT
RSA-313-R-01, WESTERN SIDE OF FORMER HIGH
EXPLOSIVE DROP AREA A, OPERABLE UNIT 15**

**U.S. ARMY GARRISON-REDSTONE
MADISON COUNTY, ALABAMA
EPA ID No. AL7 210 020 742**

Prepared for:



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

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

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

June 2025

TABLE OF CONTENTS

Page

1.0	INTRODUCTION	M-1
2.0	RSA-313-R-01 SITE DESCRIPTION.....	M-1
2.1	SITE BACKGROUND.....	M-1
2.2	RSA-313-R-01 GEOLOGY/HYDROGEOLOGY	M-2
2.2.1	Topography and Surface Water Hydrology	M-2
2.2.2	Geology.....	M-3
2.2.2.1	Soil	M-3
2.2.2.2	Bedrock	M-4
2.2.3	Groundwater Hydrogeology	M-4
3.0	PROPOSED GROUNDWATER MONITORING PLAN.....	M-4
3.1	OBJECTIVES.....	M-5
3.2	SAMPLING FREQUENCY	M-6
3.3	PROPOSED MONITORING WELLS	M-6
3.3.1	Constituent List.....	M-7
3.3.2	Sampling and Analytical Protocol	M-8
3.3.3	Quality Assurance/Quality Control.....	M-9
4.0	DATA EVALUATION AND REPORTING	M-10
4.1	DATA EVALUATION AND INTERPRETATION.....	M-10
4.2	REPORTING	M-10
5.0	MONITORING WELL MAINTENANCE PLAN.....	M-11
5.1	WELL REDEVELOPMENT.....	M-11
5.2	WELL REPLACEMENT OR CLOSURE.....	M-12
5.3	WELL INSPECTIONS.....	M-12
6.0	INFORMATION REQUIRED FOR ADEM HAZARDOUS WASTE FACILITY PERMIT	M-12
7.0	REFERENCES	M-12

LIST OF TABLES

Table M-1	Sample Locations, Analytical, and SOP Requirements
Table M-2	Field Quality Control Sample Summary
Table M-3	Monitoring Well Designations
Table M-4	Groundwater Quality Monitoring Constituents
Table M-5	Groundwater Protection Standards

LIST OF FIGURES

Figure M-1	RSA-313-R-01 Site Location
Figure M-2	Site Map and Nearby Sites
Figure M-3	Site Features Map
Figure M-4	Potentiometric Surface Map, February 2017
Figure M-5	Potentiometric Surface Map, April 2018
Figure M-6	RSA-150/153 Potentiometric Surface Map, January 2012
Figure M-7	Proposed Groundwater Wells for MNA Sampling

LIST OF ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
ADEM	Alabama Department of Environmental Management
APTIM	Aptim Federal Services, LLC
bgs	below ground surface
CMI	Corrective Measures Implementation
CMIP	Corrective Measures Implementation Plan
COC	chemical of concern
EPA	U.S. Environmental Protection Agency
FM	titanium tetrachloride
GWM	groundwater monitoring
HE	high explosive
HGL	HydroGeoLogic, Inc.
IM-AE	isobutyl methacrylate polymer
IW	installation-wide
LUC	land-use control
MAG	monitoring acceptance goal
MCL	maximum contaminant level
mm	millimeter
MNA	monitored natural attenuation
MRS	Munitions Response Site
Permit	ADEM Hazardous Waste Facility Permit No. AL7 210 020 742
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RSA	Redstone Arsenal
RSL	regional screening level
SOPP	standard operating project procedure
SVOC	semivolatile organic compound
TA	Test Area

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

VOC volatile organic compound

WP white phosphorus

1.0 INTRODUCTION

This groundwater monitoring (GWM) plan has been developed in support of the RSA-313-R-01 Corrective Measures Implementation Plan (CMIP). This document provides the details necessary to implement GWM. This GWM plan is designed to evaluate the effectiveness of the selected corrective measures: removal of geophysical anomalies using advanced geophysical classification at Munitions Response Site (MRS)-2, land-use controls (LUCs), and monitored natural attenuation (MNA) for chemicals of concern (COC) in groundwater beneath RSA-313-R-01. This plan includes a listing of wells proposed for monitoring, a monitoring schedule, monitoring parameters and sampling and analytical methods, reporting, and records maintenance.

OBJECTIVE AND SCOPE

Groundwater COCs requiring action for RSA-313-R-01 include 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-nitrotoluene, bis(2-ethylhexyl)phthalate, and trichloroethene. The primary objective of this GWM plan is to track the progress of the selected corrective measures towards reducing these COCs to levels below the cleanup goals. In addition, the following chemicals were detected in groundwater at concentrations exceeding regional screening levels (RSL) but do not require calculation of a risk-based threshold level: 1,3-dinitrobenzene, 2-amino-4,6-dinitrotoluene, benzo(a)anthracene, dibenz(a,h)anthracene, naphthalene, nitrobenzene, and nitroglycerin. These compounds will be included in groundwater monitoring during the corrective measures for RSA-313-R-01.

This plan is designed to be easily modified, if necessary, in response to new hydrologic or geochemical data or changes in remedial, hydrologic, technical, or land-use conditions. Recommendations for changes to the GWM program will be documented in annual corrective measures implementation (CMI) effectiveness reports produced by the Army.

2.0 RSA-313-R-01 SITE DESCRIPTION

2.1 SITE BACKGROUND

Redstone Arsenal (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 44,000 government employees and contractors work at the facility.

RSA-313-R-01 occupies approximately 96.46 acres in the northwestern portion of RSA, west of Anderson Road along the western RSA boundary, and extends from I-565 to approximately 4,100 feet south of Martin Road (Figures M-1 and M-2). The site is underlain by the RSA-150 and RSA-153 groundwater units, which occupy the western portion of RSA, extending from the northern RSA boundaries to (RSA-153)/near (RSA-150) the Tennessee River. As shown on Figure M-2, RSA-313-R-01 is split between two MRSs: MRS-1 and MRS-2. MRS-1 consists of approximately

77.8 acres along the northern and western boundaries of the site, and MRS-2 consists of approximately 18.67 along the northern boundary of the site.

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 or explosives testing areas. The western boundaries of Test Area (TA)-3 and TA-6 are included in RSA-313-R-01 (Figure M-2). 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.

Part of the RSA-313-R-01 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, and 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.

As shown on Figure M-2, a small portion of RSA-071 is within the RSA-313-R-01 boundary (eastern portion of MRS-2). 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.

A more detailed site description and history can be found in the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) report (Aptim Federal Services, LLC [APTIM], 2019).

2.2 RSA-313-R-01 GEOLOGY/HYDROGEOLOGY

Detailed descriptions of the physical setting (geology/hydrogeology/surface hydrology) for the RSA-313-R-01 site are included in the RFI report (APTIM, 2019). A summary is included here.

2.2.1 Topography and Surface Water Hydrology

The topography of 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 (Figure M-3).

RSA-313-R-01 is predominantly located within the 500-year floodplain. An 11.6-acre area of the site around Martin Road is present within the 100-year floodplain. There are no delineated surface

water channels within the site boundaries; however, stormwater runoff flows through drainage ditches and culverts, where most of the water filters into the ground before reaching perennial streams (Malcolm Pirnie, Inc., 2008). A portion of Lady Ann Lake is present within the site boundary. The lake is fed primarily by surface water runoff from Betts Spring Branch and a number of perennial springs. Thermal infrared surveys document significant contributions from springs located at the northern end of the lake. The portion of Lady Ann Lake west of Zierdt Road and outside the RSA boundary is currently surrounded by residential properties and serves as a recreational lake (APTIM, 2018).

2.2.2 Geology

General installation-wide geologic information is presented in Chapter 2.0 of the Installation-Wide Work Plan (IT Corporation, 2002) and includes discussions of regional stratigraphic and structural geology, surface and subsurface hydrology, and other physiographic and geographic topics. Site-specific geology, which broadly consists of unconsolidated soil overlying limestone bedrock, was interpreted from the logs of soil borings advanced at the site. This section provides a description of soil, bedrock, and hydrogeologic conditions at RSA-313-R-01.

2.2.2.1 Soil

The shallow unconsolidated soil material above bedrock is referred to as the overburden soil. The overburden or unconsolidated soil layer across most of RSA is called residuum because it formed from in situ chemical weathering of the underlying karstic limestone bedrock. This overburden layer consists mainly of clay and silty clay but also includes varying amounts of residual chert fragments which were present within the parent limestone and have resisted chemical weathering because of their siliceous composition. The chert can be found scattered within the clay matrix as nodules or concentrated locally as near-horizontal layers within the soil. Although there is little compositional variation within the overburden, the residuum does not transmit groundwater uniformly. Groundwater infiltration follows preferred pathways because zones of higher hydraulic conductivity developed during soil-forming processes. Preferred pathways within the overburden directly affect contaminant migration and distribution within the soil column.

Residual clay generally has low horizontal and vertical hydraulic conductivities. At a given location, a layer of chert within the clay may decrease vertical hydraulic conductivity and increase horizontal conductivity, while isolated nodules of chert may increase the vertical conductivity. Preferred groundwater flow pathways in the overburden also include macropores caused by rotting tree roots and burrowing animals.

Additionally, microfractures may be created within the clay during raveling, a process in which the clay slowly subsides as it is eroded and carried away by groundwater in bedrock fractures and conduits. Vertical movement of the soil caused by raveling or sloughing into fractures and conduits results in the development of microfractures in the overlying material. The microfractured clay soils have higher hydraulic conductivities than undisturbed clay and also act as preferred groundwater flow pathways.

The subsurface geologic setting beneath RSA-313-R-01 and adjacent sites includes overburden consisting of low-permeability, residual red, strong brown, and yellowish-red clay. Intervals of

chert and chert fragments increase with depth and represent residual deposits formed by in situ chemical weathering of chert nodules and layers within the limestone bedrock.

2.2.2.2 Bedrock

Based on refusal depth from soil boring and monitoring well boreholes, depth to bedrock in the area ranges from 14 to 89 feet below ground surface (bgs). Lithologic data from bedrock wells installed across this portion of RSA indicate that the shallow bedrock first encountered correlates with middle upper Tuscumba Limestone or the Fort Payne Formation and exhibits well-developed karst features. The upper Fort Payne is characterized by intervals of impermeable chert with interbedded limestone or dolomite. Bedding in the Fort Payne Formation is typically nondistinct or not preserved, replaced by abundant, variably weathered stylolites. Within the upper Fort Payne, voids ranging up to several tenths of a foot in height are seen, often isolated by impermeable chert-carbonate rock both above and below. Neither individual stylolites nor solutionally enlarged stylolites are correlatable for any distance from well to well. The lower Fort Payne is similar to the upper Fort Payne but with an increase in stylolites at the base. Lacking bedding planes, stylolites appear to be either weathered or slightly solutionally enlarged and serve as primary water-bearing features where developed. A thin greenish-gray shaley zone is often encountered in the basal Fort Payne just above the Chattanooga Shale. The Fort Payne is underlain by the Chattanooga Shale, a dark gray to black, fissile shale.

2.2.3 Groundwater Hydrogeology

RSA-313-R-01 is located within the industrialized area of groundwater unit RSA-153. Groundwater units RSA-153 and RSA-150 are investigated as one consolidated groundwater unit. Groundwater beneath the site occurs in the unconsolidated interface and the upper portion of the carbonate bedrock. The interface and upper bedrock comprise a single interconnected, unconfined water table aquifer. At depth, groundwater occurs under semiconfined conditions, flowing along discrete joints and bedding-plane partings. As shown on Figures M-4 through M-6 (adopted from APTIM [2018]), groundwater flows beneath the site toward Indian Creek and streams to the west of Indian Creek. The depth to groundwater measured in new and existing monitoring wells in the vicinity of the site in February 2017 varied across the site from 4.56 feet bgs (Z-RS1121) to 73.13 feet bgs (PW-RS061). In April 2018, the depth to water varied across the site from 0.55 feet bgs (Z-RS1121) to 65.26 feet bgs (PW-RS061). The average depth to groundwater across all synoptic water level measurements in the area wells measured is 31.11 feet bgs. Overall, the depth to groundwater across RSA-313-R-01 and underlying groundwater unit RSA-153 decreases near the streams, and groundwater discharges either to springs and seeps or directly to the streams and adjacent wetlands, where the creeks are not losing reaches (APTIM, 2018).

3.0 PROPOSED GROUNDWATER MONITORING PLAN

This groundwater monitoring program for RSA-313-R-01 identifies the wells proposed for monitoring, their sampling frequency and sampling parameters, sampling and analytical protocols, and quality assurance (QA)/quality control (QC) requirements.

Seasonal and storm-related trends in temperature and rainfall influence surface water and groundwater flow conditions. Precipitation is the principal source of groundwater recharge, either

directly through infiltration and percolation through the vadose zone (unsaturated overburden) or as runoff to streams, which may also recharge groundwater. Rainfall contributes to groundwater recharge primarily during the winter when deciduous trees are leafless, reducing overall transpiration (APTIM, 2019). As determined by an evaluation of previous monitoring results, annual groundwater sampling will be performed in the late winter or early spring season, providing the most representative picture of groundwater quality for the site.

The Army may propose to perform groundwater sampling during the dry season if the evaluation of the RSA-313-R-01 groundwater monitoring data determines this may be useful to observe notable differences between the wet and dry season. For example, the Army has taken this approach at the open burn/open detonation units where annual groundwater monitoring alternates between the wet and dry season. The Army review of the monitoring data collected during the previous years of effectiveness monitoring will be completed in consultation with ADEM in order to develop a technically sound approach that is agreeable to both ADEM and the Army.

Changes to the groundwater monitoring program approved by ADEM will require a permit modification. The laboratory-specific reference limits and evaluation tables are presented in Worksheet No. 15 of the installation-wide (IW) quality assurance program plan (QAPP) (HydroGeoLogic, Inc. [HGL], 2019 or most recent submission to ADEM), including updates resulting from changes in U.S. Environmental Protection Agency (EPA) and ADEM guidance documents.

Site-specific information listing the analyses to be performed and other analytical requirements is presented in Tables M-1 and M-2 of this groundwater monitoring program. The duration of monitoring is estimated at 5 years for the RSA-313-R-01 site. Should COCs remain above their respective cleanup goals following Year 5, it is anticipated that corrective actions for groundwater beneath the site will be addressed as part of the corrective measures for the underlying RSA-150/153 groundwater units following Permit modification approval. Changes in the groundwater monitoring program can be adjusted in the recommendations section of each annual groundwater monitoring report. However, changes to the groundwater monitoring program will require a permit modification.

3.1 OBJECTIVES

Groundwater sampling and analysis will be performed to evaluate the effectiveness of the natural attenuation of COCs across the remainder of the site. The monitoring program is designed to increase cost-effectiveness without compromising program and data quality using the following general strategies:

- Select and maintain a sufficient number of sampling points and an appropriate analytical suite to evaluate the progress of MNA in groundwater.
- Choose wells that act as location triggers to plume movement and are located to assess progress in achieving the groundwater cleanup goals.
- Maintain surveillance for contaminant migration away from RSA-313-R-01.
- Reduce frequency of conventional and/or mainstream sampling programs.

- Utilize less expensive analytical programs instead of conventional and/or mainstream sampling programs.
- Initiate a streamlined data management and reporting information system.

3.2 SAMPLING FREQUENCY

Groundwater monitoring will include a baseline sampling event. Following the baseline sampling event, semiannual groundwater monitoring will be performed for three years, followed by annual groundwater monitoring thereafter until groundwater analytical results indicate the cleanup goals have been attained for the groundwater COCs at RSA-313-R-01 for three consecutive years. It is anticipated that corrective measures for groundwater beneath RSA-313-R-01 will be addressed as part of corrective measures for the underlying RSA-150/153 groundwater units after year 5, following Permit modification approval.

Seasonal and storm-related trends in temperature and rainfall influence surface water and groundwater flow conditions. Precipitation is the principal source of groundwater recharge, either directly through infiltration and percolation through the vadose zone (unsaturated overburden) or as runoff to streams, which may also recharge groundwater. Rainfall contributes to groundwater recharge primarily during the winter when deciduous trees are leafless, reducing overall transpiration (APTIM, 2019). As determined by an evaluation of previous monitoring results, annual groundwater sampling will be performed in the late winter or early spring season, providing the most representative picture of groundwater quality for the site.

The Army may propose to perform groundwater sampling during the dry season if the evaluation of the RSA-313-R-01 groundwater monitoring data determines this may be useful to observe notable differences between the wet and dry season. For example, the Army has taken this approach at the open burn/open detonation units where annual groundwater monitoring alternates between the wet and dry season. The Army review of the monitoring data collected during the previous years of effectiveness monitoring will be completed in consultation with ADEM in order to develop a technically sound approach that is agreeable to both ADEM and the Army. In addition to the semiannual and annual sampling events, supplementary sampling events may be conducted as needed to provide additional data needed by the Army and the CMI contractor to evaluate the effectiveness of MNA. These supplementary sampling events could occur as frequently as quarterly.

3.3 PROPOSED MONITORING WELLS

The following existing wells at and near RSA-313-R-01 are scheduled for GWM (Figure M-7):

No.	Monitoring Well	Zone	Rationale for Inclusion	Sampling Event Schedule
1	PW-RS061	Interface	Upgradient/cross-gradient uncontaminated well	Baseline, Semiannual, Annual
2	313-RS2285	Interface	On-site contaminated well (MRS-2)	Baseline, Semiannual, Annual

No.	Monitoring Well	Zone	Rationale for Inclusion	Sampling Event Schedule
3	313-RS2286	Interface	Contaminated well downgradient of MRS-2	Baseline, Semiannual, Annual
4	313-RS2287	Interface	On-site contaminated well (MRS-1)	Baseline, Semiannual, Annual
5	313-RS2288	Interface	On-site contaminated well (MRS-1)	Baseline, Semiannual, Annual
6	PW-RS057	Interface	Downgradient effectiveness monitoring well	Baseline, Semiannual, Annual
7 ^a	312-RS2325	Interface	Downgradient effectiveness monitoring well	Baseline, Semiannual, Annual
8 ^a	312-RS2326	Interface	Downgradient effectiveness monitoring well	Baseline, Semiannual, Annual

Notes:

^a Monitoring wells 312-RS2325 and 312-RS2326 are located on adjacent site RSA-312-R-01.

Well locations included in the GWM program were selected based on their proximity to the areas of elevated COCs, upgradient locations for comparison to contaminated wells, and suitability as compliance monitoring locations downgradient of the RSA-313-R-01 site. The proposed monitoring wells will be reviewed as part of each annual monitoring report. If data from any of the proposed monitoring wells do not prove useful for evaluating the success in meeting cleanup goals of the COCs at RSA-313-R-01, the Army will request a permit modification to remove or replace that well from the GWM program.

3.3.1 Constituent List

Based on the human health risk assessment, COCs consisting of one volatile organic compound (VOC) (trichloroethene), one semivolatile organic compound (SVOC) (bis[2-ethylhexyl]phthalate), and three explosives (2,4-dinitrotoluene, 2,6-dinitrotoluene, and 2-nitrotoluene) are to be monitored as part of the corrective measures. The following table summarizes the groundwater cleanup goals for COCs.

COC	Cleanup Goal (µg/L)
2,4-Dinitrotoluene	0.48
2,6-Dinitrotoluene	0.29
2-Nitrotoluene	0.62
Bis(2-ethylhexyl)phthalate	6.0
Trichloroethene	5.0

µg/L – Micrograms per liter.

For individual wells, additional analytes are added based on other factors such as the need to monitor historical RSL exceedances. Current guidance from the ADEM indicates that a site’s groundwater corrective action must consider all of the COCs that were detected at concentrations greater than the RSL. While they do not have maximum contaminant level (MCL)- or risk-based cleanup goals, four additional explosive compounds (1,3-dinitrobenzene, 2-amino-4,6-

dinitrotoluene, nitrobenzene and nitroglycerin) and three additional SVOCs (benzo[a]anthracene, dibenz[a,h]anthracene, and naphthalene) will be included in the site’s groundwater monitoring program and monitoring results compared to the monitoring acceptance goals (MAG). The following table summarizes the groundwater MAGs for COCs and constituents present at concentrations greater than associated RSLs:

Monitoring Parameter	MAG (µg/L)	MAG Basis ¹
Benzo(a)anthracene	0.030	RSL
Dibenz(a,h)anthracene	0.025	RSL
1,3-Dinitrobenzene	0.20	RSL
2-amino-4,6-dinitrotoluene	0.19	RSL
Naphthalene	0.12	RSL
Nitrobenzene	0.14	RSL
Nitroglycerin	0.20	RSL

Notes:

¹ The most recent RSL for tap water (hazard quotient of 0.1) was selected as the MAG for chemicals with no MCL.

Each COC for monitoring only will be monitored on the same schedule as COCs for action until it attains its MAG for three consecutive years or monitoring is no longer necessary for any COC for action, whichever comes first.

All wells included in the monitoring program will be analyzed for:

- VOCs, SVOCs, and explosives. Note that only COCs will be reported for each analytical suite.

In addition to the laboratory analytical parameters, some water quality parameters will be measured in the field during groundwater sampling events, including pH, temperature, conductivity, oxidation-reduction potential, dissolved oxygen, ferrous iron, and turbidity. Water levels will also be measured during each sampling event. This monitoring program will be used to evaluate progress toward meeting the corrective measure objective for groundwater and the cleanup goals.

In order to meet the objectives of this GWM plan, GWM groundwater sampling will be conducted semiannually for three years following baseline sampling, and annually thereafter. As determined by an evaluation of previous monitoring results, groundwater sampling will be performed in the season providing the most representative picture of groundwater quality for the site. The Army review of these data during this selection process will be completed in consultation with ADEM. Based on the effectiveness of MNA, additional sampling events may be proposed to gather additional data to evaluate groundwater conditions. Annual groundwater sampling and analysis for COCs will continue until cleanup goals are met for three consecutive years.

3.3.2 Sampling and Analytical Protocol

All data will be collected, stored, and managed in accordance with the requirements defined by the Uniform Federal Policy QAPP (CMIP Appendix D), Accident Prevention Plan (CMIP Appendix

E), and the IW QAPP (HGL, 2019 or most recent submission to ADEM). Sampling will be completed following Standard Operating Project Procedure (SOPP) No. 7.0, *Groundwater Sampling Revision 4* (HGL, 2019). Groundwater sampling will be completed following methods described in the IW QAPP (HGL, 2019 or most recent submission to ADEM). Prior to sampling the wells, static water levels will be measured in all wells. Water level measurements will be performed in accordance with SOPP No. 16.0, *Groundwater Level Measurements Revision 4*.

Groundwater sampling will be performed using a submersible pump for purging and low-flow sampling techniques in accordance with SOPP No. 7.0, *Groundwater Sampling Revision 4*. Additional guidance on sampling for VOCs and dissolved gases described on pages 7 and 8 of the EPA Region 1 *Standard Operating Procedure for Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (EPA, 2017) will also be followed when sampling for these parameters.

The sampling technician will measure and record physical parameters of the groundwater during well purging to help determine when the well is ready to be sampled. Complete and accurate records in the groundwater well development/purge log are necessary in order to ensure accurate groundwater samples are being collected. Sample locations and analytical and SOPP requirements are provided in Table M-1.

Samples will be analyzed using EPA SW-846 methods as presented in the IW QAPP (HGL, 2019 or most recent submission to ADEM), including updates resulting from changes in EPA and ADEM guidance documents. Sample containers, provided by the laboratory, are purchased precleaned and treated according to EPA specifications for the methods. The required sample containers for the analysis of constituents in groundwater at RSA-313-R-01 are provided in Table M-2. Sample volumes, preservation requirements, and holding times for the analytical methods performed on groundwater samples are also listed in Table M-2.

Sample preservation, packaging, and shipping will follow the procedures as specified in SOPP No. 15, *Non-Hazardous Sampling Handling, Packaging, and Shipping Revision 4*, in the IW QAPP (HGL, 2019 or most recent submission to ADEM).

Completed analysis request/chain-of-custody records will be secured and included with each shipment of coolers to the contracted laboratory.

3.3.3 Quality Assurance/Quality Control

Groundwater media will be sampled and analyzed to meet the objectives of the performance monitoring plan. QA/QC samples will be collected for all sampling events in accordance with requirements established in the IW QAPP (HGL, 2019 or most recent submission to ADEM) to assure long-term comparability of data. Samples will be analyzed by EPA-approved SW-846 methods of analysis where applicable, will comply with EPA definitive data requirements, and will be reported using both hard copy and electronic data packages. The sample collection/analytical matrix for the baseline and initial 5 years of performance sampling and analysis is presented in Table M-1 and includes the schedule for field QA sampling. All sample preparation and analysis shall be completed within the method-required holding times specified in Table M-2.

4.0 DATA EVALUATION AND REPORTING

4.1 DATA EVALUATION AND INTERPRETATION

Groundwater samples will be collected from the GWM wells specified in Section 3.3 of this GWM plan on a semiannual (years 1-3) and annual (years 4-5) basis.

The primary objective of the GWM program for RSA-313-R-01 is to determine whether the corrective measures reduce concentrations of COCs in groundwater beneath the site to levels below the cleanup goals. This will be determined based on the results of a statistical test or other methods. Statistical analysis will follow ADEM Administrative Code 335-14-5-.06(8)(h) and EPA guidance for GWM at RCRA facilities (EPA, 1989; 1992; 2009).

The following non-statistical methods may also be used to characterize RSA-313-R-01 groundwater conditions:

- **Hydrographs.** Graphs of water levels versus time may be constructed to determine increases, decreases, seasonal, or man-made fluctuations in groundwater levels.
- **Potentiometric Surface Maps.** Depths to groundwater from multiple wells may be used to construct potentiometric surface contour maps to estimate flow directions.
- **Concentration-versus-Time Plots.** Graphs of COC concentration versus time at each well will be constructed for each data set subjected to trend analysis. This supports the identification of trends and helps determine if concentration changes are related to changes in water level, changes in groundwater flow directions, or natural attenuation.
- **Plume Maps.** Map depicting the physical distribution of chemical constituents will aid in determining movement of plumes.

GWM will continue until the groundwater analytical results indicate the cleanup goals have been attained for the groundwater COCs at RSA-313-R-01 for three consecutive years. Once a groundwater COC has attained cleanup goals or a monitoring parameter has attained the MAG for three consecutive years, the Army will request a permit modification to cease GWM for that COC or, if applicable, to terminate all GWM for RSA-313-R-01.

4.2 REPORTING

The corrective action program as described in this work plan will treat constituents that exceed their cleanup goals using MNA. The groundwater monitoring program establishes a monitoring well network capable of providing data that will be used to assess changes in the rate and extent of groundwater contamination. The corrective action will begin in accordance with the date established by the Permit modification. The annual groundwater monitoring reports will provide sufficient data to demonstrate the effectiveness of the Army's groundwater monitoring program

as well as show that the corrective action program satisfies the requirements of ADEM Administrative Code Rule 335-14-5-.06(11).

RSA will require its contractors to submit a report following each sampling event. These reports will be used by the Army to generate the CMI progress report for corrective measures that require more than 180 days to complete. RSA will provide reports (e.g., CMI progress reports and CMI effectiveness reports) on an annual basis. The progress reports will contain a description of the portion of the CMI plan completed, summaries of deviations from the approved CMI plan during the reporting period, summaries of current and potential problems with recommended solutions and any corrective actions undertaken, monitoring data collected during the construction period, and projected work for the next period and impacts to the approved schedule. These reports will document the sampling results and the status of the LUCs.

Following the CMI report, CMI effectiveness reports will be completed annually and submitted within 60 days of each annual anniversary of the Permit. The initial CMI effectiveness report will include all groundwater monitoring data collected during the first year of the long-term monitoring. Subsequent reports will include the results of the annual groundwater monitoring events along with the results from any other groundwater monitoring conducted as part of the RSA-313-R-01 CMI during that period. Recommendations for changes to the sampling frequency, wells sampled, and parameters for analysis, if appropriate, will be included in the reports. Any changes to the approved monitoring program would require a permit modification.

At a minimum, the groundwater monitoring report will include a discussion of sampling activities, tables and maps to document contaminant concentrations in groundwater, and an evaluation of the groundwater contaminant data. Other recommendations may include installation of additional monitoring wells and resampling for verification of sampling results. Installation of any new wells will be communicated to the Directorate of Public Works for addition to the well inventory. Record keeping for data and reports is described in the IW QAPP (HGL, 2019 or most recent submission to ADEM).

5.0 MONITORING WELL MAINTENANCE PLAN

In order to maintain consistent data quality and track contaminant concentrations and migration, the GWM wells at RSA-313-R-01 will be maintained and replaced, as necessary. This chapter presents the well maintenance plan for these monitoring wells. Further details are presented in the IW QAPP (HGL, 2019).

5.1 WELL REDEVELOPMENT

Wells may be redeveloped prior to sampling if any of the following conditions are exhibited at the well:

- Sediment accumulation in the well covers more than 5 percent of the total length of the well screen.
- Turbidity of groundwater is greater than 20 nephelometric turbidity units after the well has been purged prior to sampling.

- Recharge rate to the well has declined through time (e.g., recharge rates have declined to less than 60 percent of the recharge rate recorded in the initial development).

5.2 WELL REPLACEMENT OR CLOSURE

If, after two episodes of redevelopment, the well still does not meet the requirements set forth in Section 5.1, the well may be deemed nonfunctional and scheduled for replacement or closure. RSA personnel and ADEM staff will be consulted to determine whether closure or replacement is necessary. The procedures for well replacement or closure are outlined in the IW QAPP (HGL, 2019 or most recent submission to ADEM).

5.3 WELL INSPECTIONS

Inspections will be performed to help ascertain the condition of monitoring wells within the GWM program and confirm the integrity of the monitoring wells has not been compromised. Wells will be inspected during each sampling event for the following:

- Well identification is legible
- Locks
- Locking cap
- Protective casing
- Bollards (stick-up wells only)
- Concrete pad.

Deficiencies will be corrected as soon as practical. If a well cannot be properly repaired, it will be closed and replaced.

6.0 INFORMATION REQUIRED FOR ADEM HAZARDOUS WASTE FACILITY PERMIT

To facilitate the modification to RSA's Alabama Hazardous Wastes Management and Minimization Act permit (ADEM, 2024), information to be included in Tables VII.1, VII.2 and VII.3 has been summarized in Tables M-3, M-4, and M-5, respectively.

Table M-3 summarizes the monitoring well designations for RSA-313-R-01. Table M-4 presents the listing of COCs for RSA-313-R-01, while Table M-5 presents the cleanup goals for these COCs.

7.0 REFERENCES

Alabama Department of Environmental Management (ADEM), 2024a, *Redstone Arsenal's Alabama Hazardous Wastes Management and Minimization Act Hazardous Waste Storage Facility, Thermal Treatment, Solid Waste Management Unit Corrective Action Permit, AL7 210 020 742, Modification No. 2, May 3.*

- APTIM, 2019, *Rev. 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.
- APTIM, 2018, *Revision 4, RCRA Facility Investigation Report, RSA-150/153 Groundwater Sites, Groundwater Units GW-06/GW-09, Operable Unit 19, U.S. Army Garrison-Redstone, Madison County, Alabama*, December.
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- IT Corporation, 2002, *Draft Final Installation-Wide Work Plan, Revision 2, Redstone Arsenal, Madison County, Alabama*, prepared for the U.S. Army Corps of Engineers, Savannah District, Savannah, Georgia, June.
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- EPA, 1992, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Guidance*, Office of Resource Conservation and Recovery, July.
- EPA, 1989, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance*, Office of Solid Waste, Waste Management Division, EPA/530/SW-89/026, July.

TABLES

Table M-1
Sample Locations, Analytical, and SOP Requirements
RSA-313-R-01
Redstone Arsenal, Madison County, Alabama

Sample Location	Sample Designation	Sample Depth (ft bgs)	QA/QC Sample Designation		Analytical Suite
			FD*	MS/MSD*	
RSA-313-R-01					
Groundwater Baseline Sampling Locations Year 0 (Baseline)					
PW-RS061	PW-RS061 -GW- AFK3011 -REG	TBD			VOCs, SVOCs, and Explosives
313-RS2285	313-RS2285 -GW- AFK3012 -REG	TBD	RSA313-RS2285-GW- AFK3013-FD		VOCs, SVOCs, and Explosives
313-RS2286	313-RS2286 -GW- AFK3014 -REG	TBD		RSA313-RS2286-GW-AFK3014- MS/MSD	VOCs, SVOCs, and Explosives
313-RS2287	313-RS2287 -GW- AFK3015 -REG	TBD			VOCs, SVOCs, and Explosives
313-RS-2288	313-RS2288 -GW- AFK3016 -REG	TBD			VOCs, SVOCs, and Explosives
PW-RS057	PW-RS057 -GW- AFK3017 -REG	TBD			VOCs, SVOCs, and Explosives
312-RS2325	312-RS2325 -GW- AFK3018 -REG	TBD			VOCs, SVOCs, and Explosives
312-RS2326	312-RS2326 -GW- AFK3019 -REG	TBD			VOCs, SVOCs, and Explosives
Equipment Rinsate Samples					
313-SITE	313-SITE -WA- AFK8004 -ER	NA			VOCs, SVOCs, and Explosives
IDW Water Samples					
313-SITE	313-SITE -WA- AFK8004 -REG	NA			TCL VOCs, TCL SVOCs, Explosives

Notes:

*The MS/MSD/FD locations are subject to change due to field conditions. Project chemist will be notified and data base updated accordingly.

Note - The same wells are proposed for sample collection Years 1 - 5 (per event).

VOCs Trichloroethene

SVOCs Benzo(a)anthracene, bis(2-ethylhexyl)phthalate, dibenz(a,h)anthracene, naphthalene

Explosives 1,3-Dinitrobenzene, 2-amino-4,6-dinitrotoluene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-nitrotoluene, nitrobenzene, nitroglycerin

bgs - below ground surface.

FD - Field duplicate.

IDW - Investigation-derived waste.

MS - Matrix spike.

MSD - Matrix spike duplicate.

NA - Not applicable.

SVOC - Semivolatile organic compound.

TBD - To be determined.

VOC - Volatile organic compound.

TCL - Target compound list.

Table M-2
Field Quality Control Sample Summary
RSA-313-R-01
Redstone Arsenal, Madison County, Alabama

Parameters	Analytical Method	Matrix	Total Number of Samples	FD	MS	MSD	Equip. Rinsate (1/event)	TAT Needed	Sample Container/Preservation Requirements ^a	Holding Time	Total Number of Containers
RSA-313-R-01 Sampling											
Groundwater Baseline Samples Year 0											
VOCs	8260C	Water	8	1	1	1	1	Normal	3 x 40-mL vials w/ Teflon septum; HCl to pH<2	14 days	36
SVOCs	8270D	Water	8	1	1	1	1	Normal	2 x 1L amber	7 days extraction; 40 days analysis	24
Explosives	8330B	Water	8	1	1	1	1	Normal	2 x 1L amber	7 days extraction; 40 days analysis	24
IDW Water Samples											
TCL VOCs	8260C	Water	1	0	0	0	0	Normal	3 x 40-mL vials w/ Teflon septum; HCl to pH<2	14 days	3
TCL SVOCs	8270D	Water	1	0	0	0	0	Normal	2 x 1L amber	7 days extraction; 40 days analysis	2
Explosives	8330B	Water	1	0	0	0	0	Normal	2 x 1L amber	7 days extraction; 40 days analysis	2

Notes:

^a All samples should be cooled to 4 degrees Celsius in conjunction with preservation requirements noted prior to shipment to the laboratory.

VOCs Trichloroethene

SVOCs Benzo(a)anthracene, bis(2-ethylhexyl)phthalate, dibenz(a,h)anthracene, naphthalene

Explosives 1,3-Dinitrobenzene, 2-amino-4,6-dinitrotoluene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-nitrotoluene, nitrobenzene, nitroglycerin

Note - The sample quantities apply to semi-annual sampling Years 1-3 and annual sampling Years 4-5 (per event).

FD - Field duplicate.

IDW - Investigation-derived waste.

L - Liter.

MS - Matrix spike.

MSD - Matrix spike duplicate.

SVOC - Semivolatile organic compound.

TAT - Turnaround time.

VOC - Volatile organic compound.

Table M-3

**Monitoring Well Designations
RSA-313-R-01
Redstone Arsenal, Madison County, Alabama**

Well Identifier	Type	Northing	Easting	Latitude			Longitude			Depth to Bedrock (ft bgs)	Depth (ft bgs)	Ground Elevation (ft amsl)	Top of Casing Elevation	Screened Interval (ft bgs)	Monitored Zone
				Deg	Min	Sec	Deg	Min	Sec						
PW-RS061	EFF	1526214.87	393506.99	N34	41	30.55	E273	17	34.50	89.0	99.0	666.69	668.17	84.0 - 99.0	INT
313-RS2285	EFF	1525853.48	391879.41	N34	41	26.84	E273	17	15.05	70.5	75.1	644.12	646.48	65.1 - 75.1	INT
313-RS2286	EFF	1523209.63	391203.02	N34	41	0.63	E273	17	7.23	72.0	77.3	601.17	603.48	66.9 - 76.9	INT
313-RS2287	EFF	1514594.38	390542.52	N34	39	35.36	E273	17	0.22	21.0	26.5	603.99	606.24	16.2 - 26.2	INT
313-RS2288	EFF	1507451.24	390228.78	N34	38	24.69	E273	16	57.22	53.0	56.8	598.53	601.21	46.5 - 56.5	INT
PW-RS057	EFF	1503448.50	391549.17	N34	37	45.21	E273	17	13.44	47.0	37.0	592.12	593.91	32.0 - 47.0	INT
312-RS2325	EFF	1510084.62	390514.70	N34	38	50.76	E273	17	0.36	42.0	46.5	569.23	571.58	36.1 - 46.1	INT
312-RS2326	EFF	1509664.65	390398.21	N34	38	46.59	E273	16	59.01	14.0	19.1	568.68	570.87	8.7 - 18.7	INT

Notes:

Deg - degrees

EFF - Effectiveness monitoring well.

ft amsl - Feet above mean sea level.

ft bgs - Feet below ground surface.

INT - Interface.

Min - minutes

Sec - seconds

Table M-4

**Groundwater Quality Monitoring Constituents
RSA-313-R-01
Redstone Arsenal, Madison County, Alabama**

Unit	Chemical of Concern
RSA-313-R-01	2,4-Dinitrotoluene
	2,6-Dinitrotoluene
	2-Nitrotoluene
	Bis(2-ethylhexyl)phthalate
	Trichloroethene

Table M-5

**Groundwater Protection Standards
RSA-313-R-01
Redstone Arsenal, Madison County, Alabama**

Unit	Chemical of Concern	Cleanup Goal (µg/L)
RSA-313-R-01	2,4-Dinitrotoluene	0.48
	2,6-Dinitrotoluene	0.29
	2-Nitrotoluene	0.62
	Bis(2-ethylhexyl)phthalate	6.0
	Trichloroethene	5.0

Unit	Monitoring Parameter	MAG (µg/L) ¹
RSA-313-R-01	Benzo(a)anthracene	0.030
	Dibenz(a,h)anthracene	0.025
	1,3-Dinitrobenzene	0.20
	2-amino-4,6-dinitrotoluene	0.19
	Naphthalene	0.12
	Nitrobenzene	0.14
	Nitroglycerin	0.20

Notes:

µg/L - Micrograms per liter.

MAG - Monitoring acceptance goal.

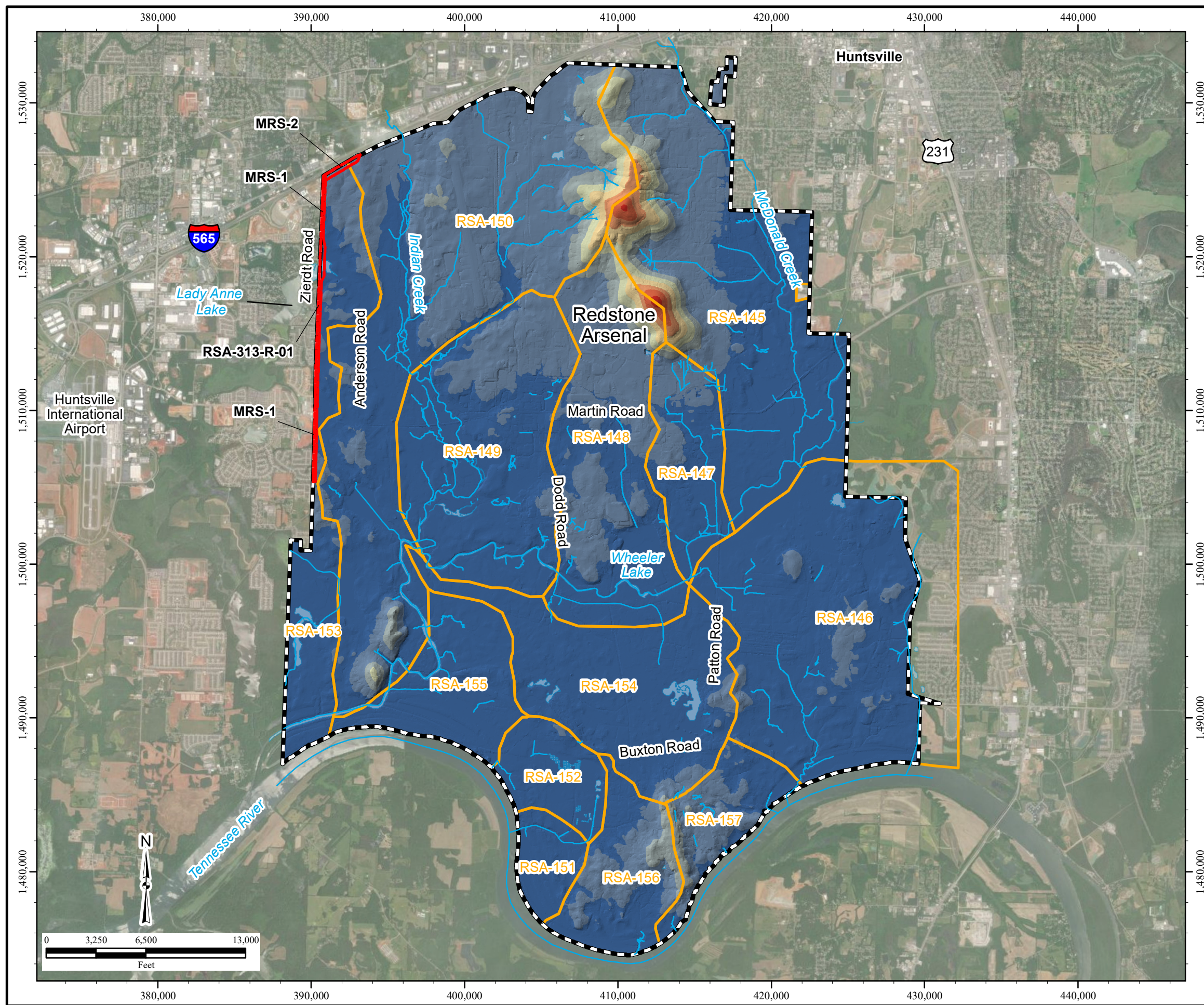
MCL - Maximum contaminant level.

RSL - Regional Screening Level.

¹ The most recent RSL for tap water (hazard quotient of 0.1) was selected as the MAG for chemicals with no MCL.

FIGURES

Figure M-1
RSA-313-R-01
Site Location
Redstone Arsenal
Huntsville, Alabama



Legend

- Site Location
- Surface Water Course
- Surface Water Body
- RSA-313-R-01
- Groundwater Unit
- Redstone Arsenal Boundary

Elevation (feet amsl):

	>548–600		>900–1,000
	>600–700		>1,000–1,100
	>700–800		>1,100–1,200
	>800–900		>1,200–1,239

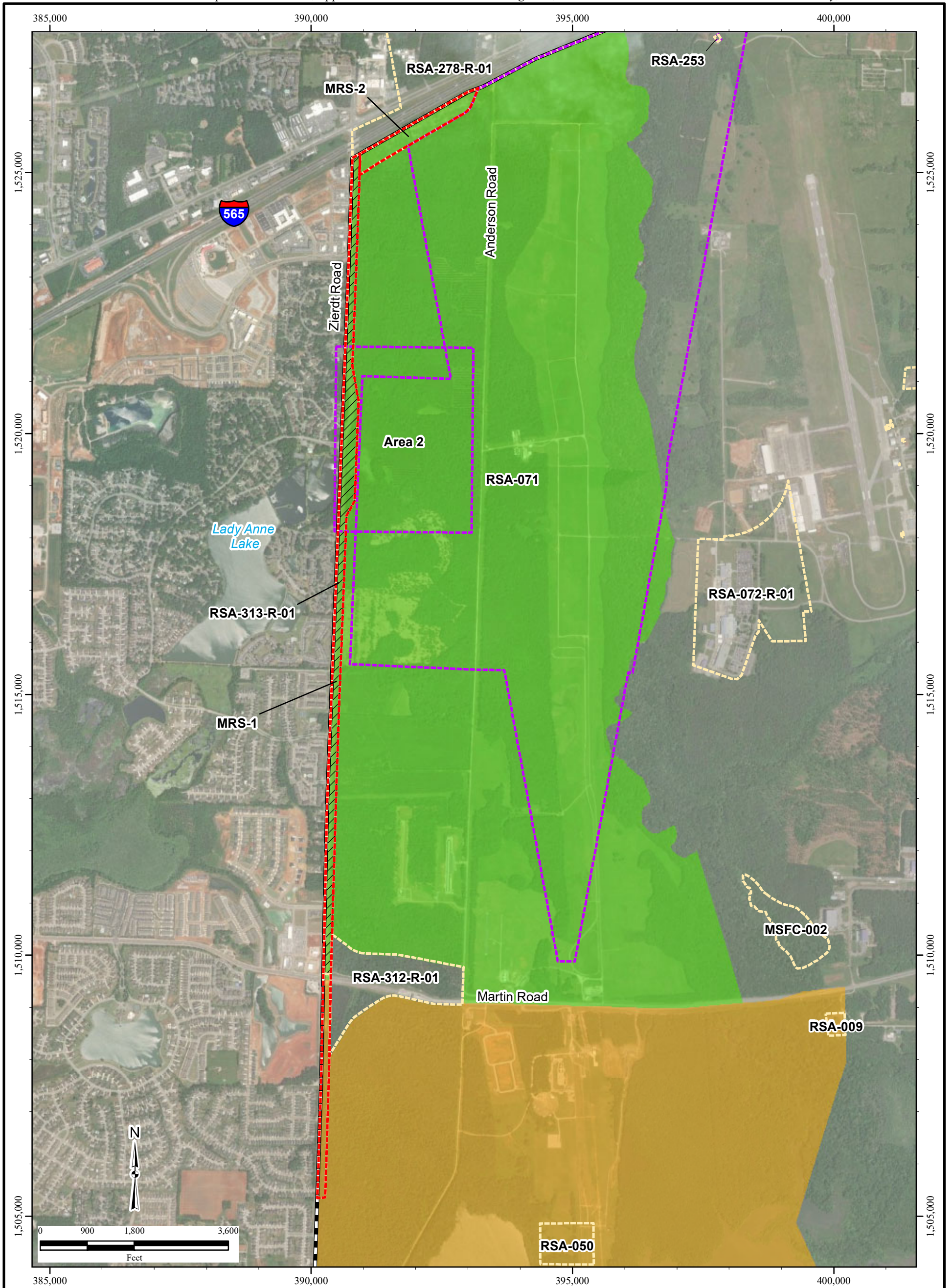
Statewide Location



Notes:
 Coordinates shown in Alabama State Plane East, NAD83, feet.
 ft amsl=feet above mean sea level
 MRS=Munitions Response Site







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 1/12/2024 RR
 Source: HGL, USACE, ArcGIS Online Imagery





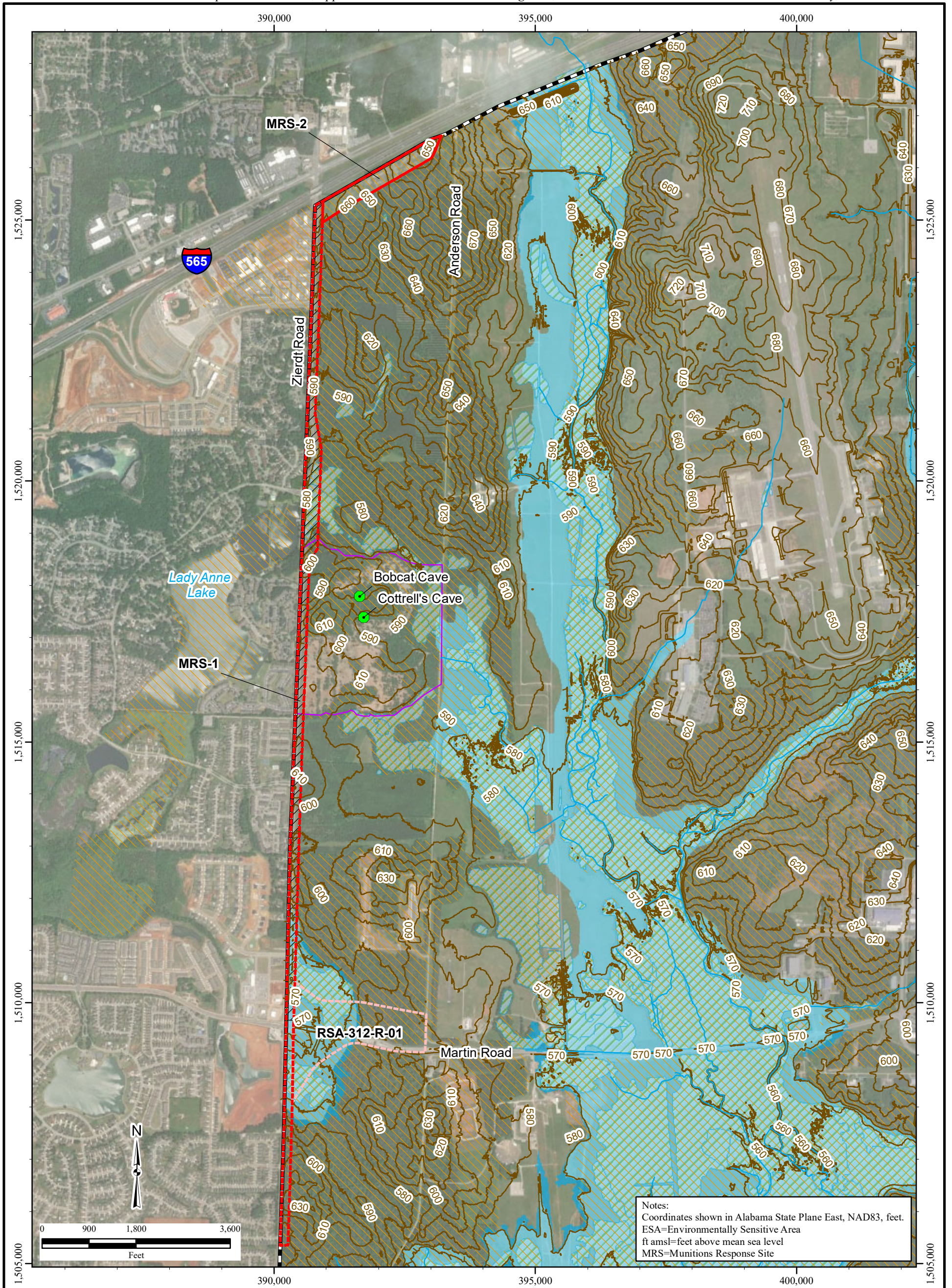
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(M-02)RSA_313_Nearby_Sites.mxd
2/12/2024 RR
Source: HGL, APTIM, USACE
ArcGIS Online Imagery



Legend	
	RSA-313-R-01
	Former Range
	SWMU
	TA-3 Range
	TA-6 Range
	Area of Expanded Zierdt Road

Notes:
Coordinates shown in Alabama State Plane East, NAD83, feet.
MRS=Munitions Response Site
SWMU=Solid Waste Management Unit
TA=training area

**Figure M-2
RSA-313-R-01
Site Map
and Nearby Sites**

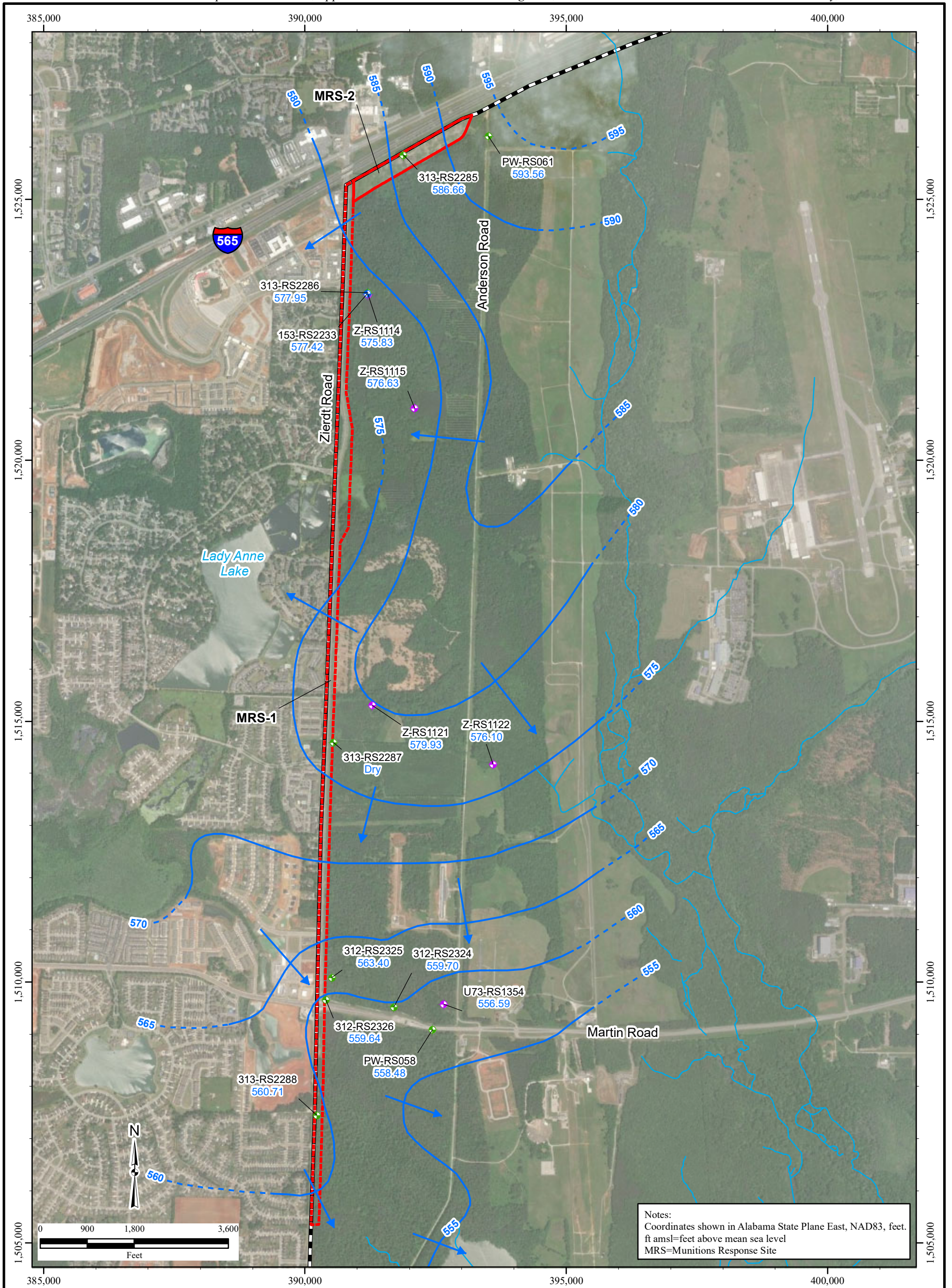


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 1/12/2024 RR
 Source: HGL, APTIM, USACE
 ArcGIS Online Imagery



Legend	
	Cave Entrance
	Surface Water Course
	Elevation Contour (10 ft contour interval, ft amsl)
	100-Year Floodplain
	500-Year Floodplain
	Wetland
	Bobcat Cave ESA
	Endangered Gray Bat Habitat
	RSA-313-R-01
	RSA-312-R-01
	Area of Expanded Zierdt Road
	Redstone Arsenal Boundary

Figure M-3
RSA-313-R-01
Site Features Map

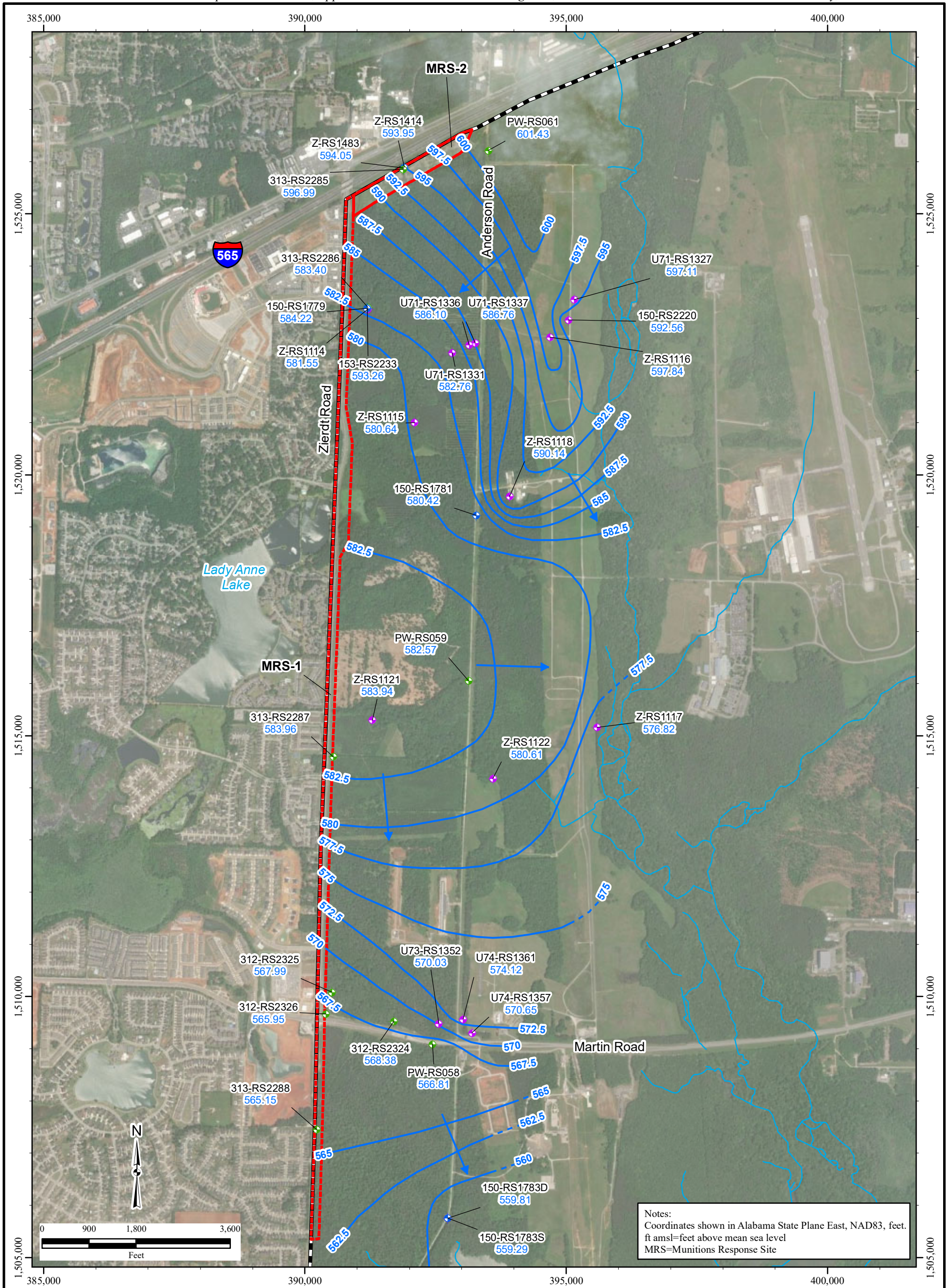


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1/12/2024 RR
Source: HGL, APTIM, USACE
ArcGIS Online Imagery



Legend	
	Overburden Monitoring Well
	Interface Monitoring Well
	Bedrock Monitoring Well
560.71	Groundwater Elevation (ft amsl)
- 555 -	Groundwater Elevation Contour (5 ft interval, dashed where inferred)
	Inferred Groundwater Flow Direction
	Surface Water Course
	RSA-313-R-01
	Redstone Arsenal Boundary

Figure M-4
RSA-313-R-01
Potentiometric Surface
Contour Map
February 2017



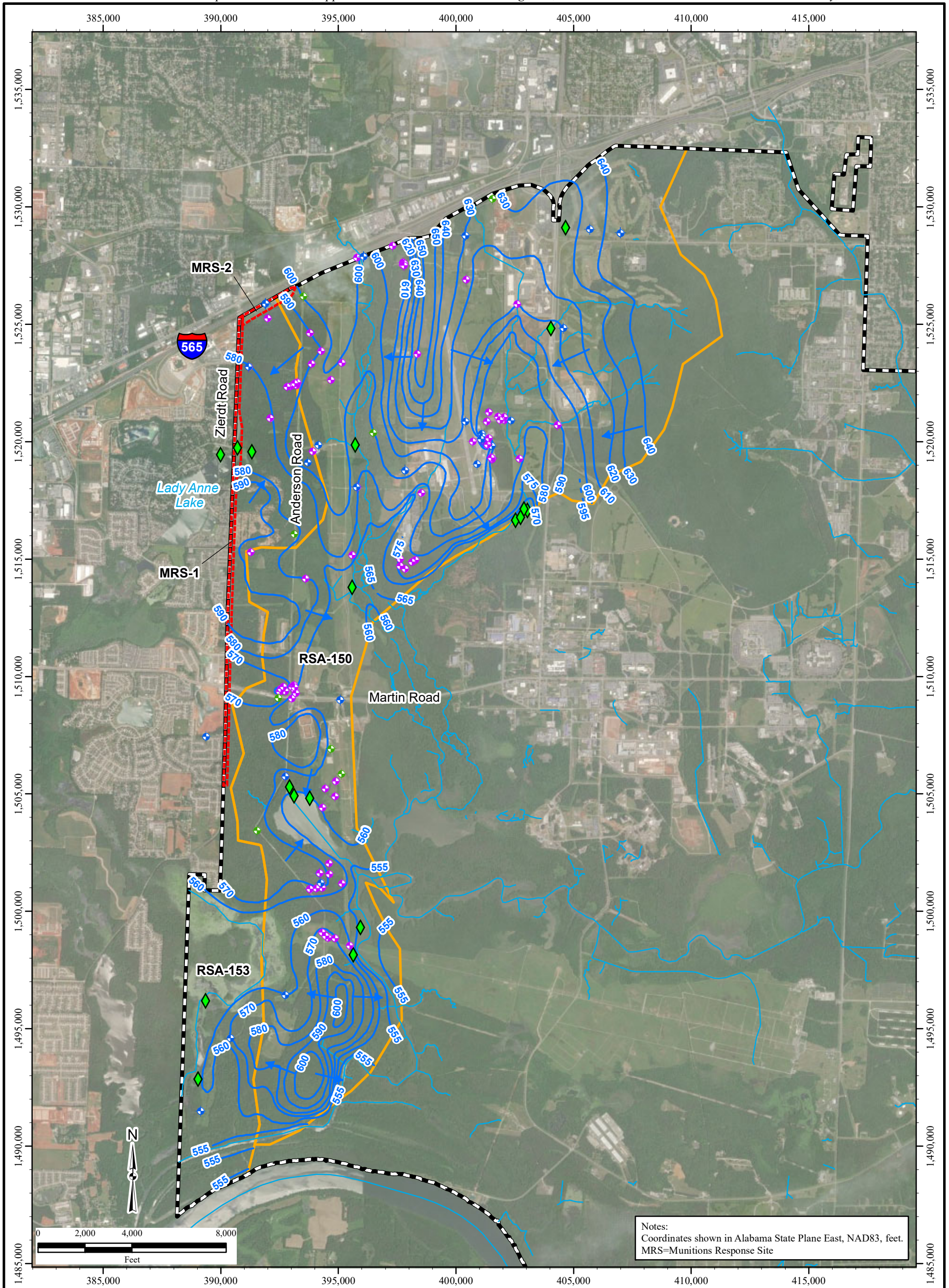
Notes:
 Coordinates shown in Alabama State Plane East, NAD83, feet.
 ft amsl=feet above mean sea level
 MRS=Munitions Response Site

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 1/12/2024 RR
 Source: HGL, APTIM, USACE
 ArcGIS Online Imagery



Legend	
	Overburden Monitoring Well
	Interface Monitoring Well
	Bedrock Monitoring Well
559.29	Groundwater Elevation (ft amsl)
- 560 -	Groundwater Elevation Contour (2.5 ft interval, dashed where inferred)
	Inferred Groundwater Flow Direction
	Surface Water Course
	RSA-313-R-01
	Redstone Arsenal Boundary

Figure M-5
RSA-313-R-01
Potentiometric Surface
Contour Map
April 2018



\\SRV-GST-01\hglgis\Redstone_Arsenal\RSA-313\CMIP\AppM
 (M-06)\RSA_150_153_Pot_Surf_201201.mxd
 1/12/2024 RR
 Source: HGL, APTIM, USACE
 ArcGIS Online Imagery



Legend	
	Overburden Monitoring Well
	Interface Monitoring Well
	Bedrock Monitoring Well
	Spring
	Groundwater Elevation Contour (5 or 10 ft interval, dashed where inferred)
	Inferred Groundwater Flow Direction
	Surface Water Course
	RSA-313-R-01
	Groundwater Unit
	Redstone Arsenal Boundary

Figure M-6
RSA-150/153
Potentiometric Surface
Contour Map
Shallow Zone
January 2012



\\SRV-GST-01\hglgis\Redstone_Arsenal\RSA-313\CMIP\AppM (M-07)\RSA_313_Proposed_MWs.mxd
 1/12/2024 RR
 Source: HGL, APTIM, USACE
 ArcGIS Online Imagery



Legend

- ◆ Well Proposed for MNA
- RSA-313-R-01
- Area of Expanded Zierdt Road
- Redstone Arsenal Boundary

Notes:
 Coordinates shown in Alabama State Plane East, NAD83, feet.
 MNA=monitored natural attenuation
 MRS=Munitions Response Site

Figure M-7
RSA-313-R-01
Proposed
Groundwater Wells
for MNA Sampling

APPENDIX N

SURFACE SWEEP AND AGC SURVEY MEMORANDA

- 01-Surface Sweep Technical Memorandum
- 02-UltraTEM Screener Instrument Verification Strip (IVS) Technical Memorandum
- 03-MetalMapper 2x2 Instrument Verification Strip (IVS) Technical Memorandum
- 04-UltraTEM Screen Data Usability Assessment
- 05-MetalMapper 2x2 Data Usability Assessment
- 06-MetalMapper 2x2 Cued Classification Report
- 07-UltraTEM Screener Target Selection Technical Memorandum

**SURFACE SWEEP TECHNICAL MEMORANDUM
CORRECTIVE MEASURES IMPLEMENTATION,
RSA-313-R-01, MRS-2
U.S. ARMY GARRISON-REDSTONE
MADISON COUNTY, ALABAMA**

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

The purpose of this Surface Sweep Technical Memorandum is to summarize the results of the surface sweep performed prior to implementing Advanced Geophysical Classification (AGC) survey activities at Munition Response Site (MRS)-2, located within the surface media site designated as RSA-313-R-01, Western Side of Former High Explosive Drop Area A (hereinafter referred to as RSA-313-R-01). This work is being conducted under subcontract to Aptim Federal Services, LLC, (APTIM) for the U.S. Army Corps of Engineers under Contract No. W912DY-17-D-0003, Task Order No. W912DY19F1116. Previous investigations indicated that munitions and explosives of concern may be present within the RSA-313-R-01, MRS-2, which consists of 18.67 acres in the northern most portions of RSA-313-R-01 (APTIM, 2019).

INTRODUCTION

The surface sweep was accomplished according to the procedures described in the Quality Assurance Project Plan (APTIM, 2021) and was conducted within the MRS-2 boundary of RSA-313-R-01. The surface sweep team removed all visible metallic items as necessary to reduce the interference with the AGC survey. The surface sweep was initiated on 8 August 2022 and completed on 10 August 2022.

OBJECTIVES

The primary objectives of the surface sweep included:

- Identify and remove metallic debris encountered on the ground surface that could potentially interfere with the AGC survey and data acquisition.
- Dispose of munitions and explosives of concern (MEC) or material potentially presenting an explosive hazard (MPPEH) encountered on the surface.

SURFACE SWEEP IMPLEMENTATION

All surface sweep operations were performed under the direct supervision of the Surface Sweep Team Leader. The surface sweep teams used basic sweep techniques by forming a

sweep line and marked lanes with pin flags to establish 5-foot lanes within each grid and sweeping the area using analog instrumentation. Surface sweep teams removed visible metallic items as necessary to reduce the potential for interference during data acquisition associated with the geophysical survey. The Surface Sweep Team Leader documented the surface sweep information on Team Leader Grid Sheets. The Surface Sweep Team Leader was required to document the following:

- General Grid Information
- Grid Identification (ID)
- Team number
- Date(s) of removal
- Sketch of grid conditions
- Comment
- MEC Information
- Grid ID
- Location ID
- Date found
- Item type
- MEC type (unexploded ordnance, discarded military munitions, or munition constituents)
- Photo ID
- Nomenclature
- Description
- Quantity
- Final disposition
- Number of MEC/MPPEH logged on MEC/MPPEH grid sheet
- Munitions debris (MD), range-related debris, and other debris information
- Grid ID
- Team number
- Team leader
- Date
- MD/munitions types found (frag, munitions component, debris description)
- Total weight of MD in grid
- Total weight of other debris in grid.

RESULTS

No MPPEH or MEC were recovered during the surface sweep. Non-Munition Related Debris encountered during the surface sweep consisted of aluminum cans, small wire, and fence debris. Photographs from surface sweep activities are provided below.



Surface Sweep at MRS-2



Non-Munition Related Debris - Surface Sweep at MRS-2

REFERENCES

Aptim Federal Services, LLC (APTIM), 2019, *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.

Aptim Federal Services, LLC (APTIM), 2021, *Final Revision 0, Uniform Federal Policy, Quality Assurance Plan, Corrective Measures Implementation at Multiple (9) Sites at Redstone Arsenal, Madison County, Alabama, RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Operable Unit 15*, July.

Team Leader Grid Sheet

Project Site Location (name, city and state): <div style="font-size: 1.2em; margin-left: 20px;">RSA-313</div> <div style="font-size: 1.2em; margin-left: 20px;">MRS-02</div>		Team Number: <div style="font-size: 1.5em; text-align: center;">1</div>	Date: <div style="font-size: 1.5em; text-align: center;">8/8/22</div>
		Team Leader: <div style="font-size: 1.2em; text-align: center;">J. SANDERS</div>	Signature:

Grid or Polygon ID	Other Debris lbs.	MD lbs	RRD lbs	Anomalies	Percent Complete
L1	0	0	0	0	100
L2	.25			1	100
K1	0			0	100
K2	0			0	100
K3	0			0	100
J2	1-16			2	100
J3	0			0	100
J4	0			0	100
I2	0			0	100
I3	0			0	100
I4	0			0	100
I5	0	0	0	0	100

MEC items located:

Item	Grid or Poly ID	Classification			Comments
		UXO	DMM	MC	

Comments:

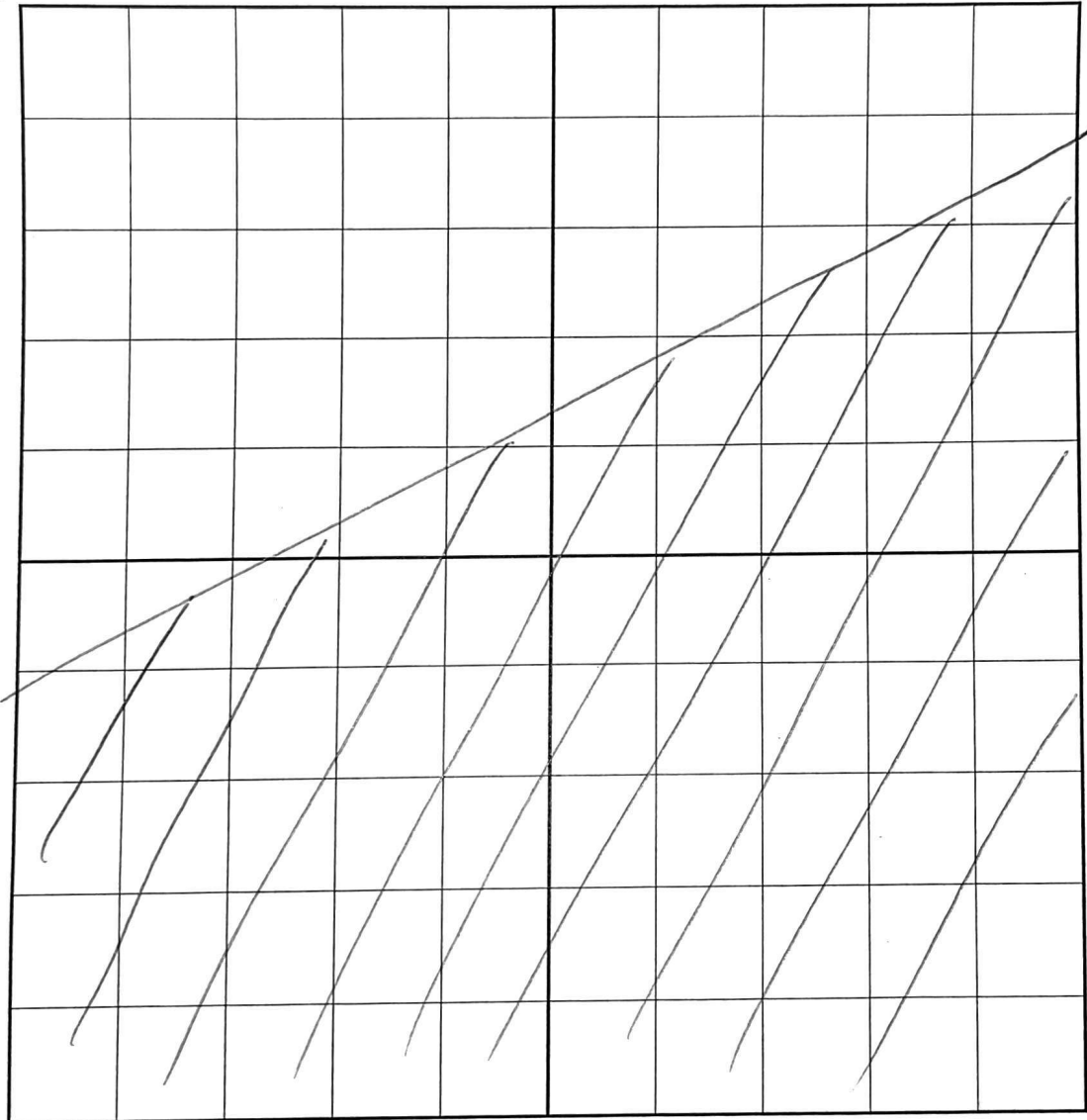
Grid Drawing Sheet

Site Name: <i>RSA-313 - MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>H3</i>	Team Number: <i>1</i>	Date: <i>8/8/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

wire

Grid Drawing Sheet

Site Name:

RSA-313 MRS-Ø2

Site Location (city/state):

HSV, AL

Grid or Polygon ID:

H4

Team Number:

1

Date:

8/8/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m

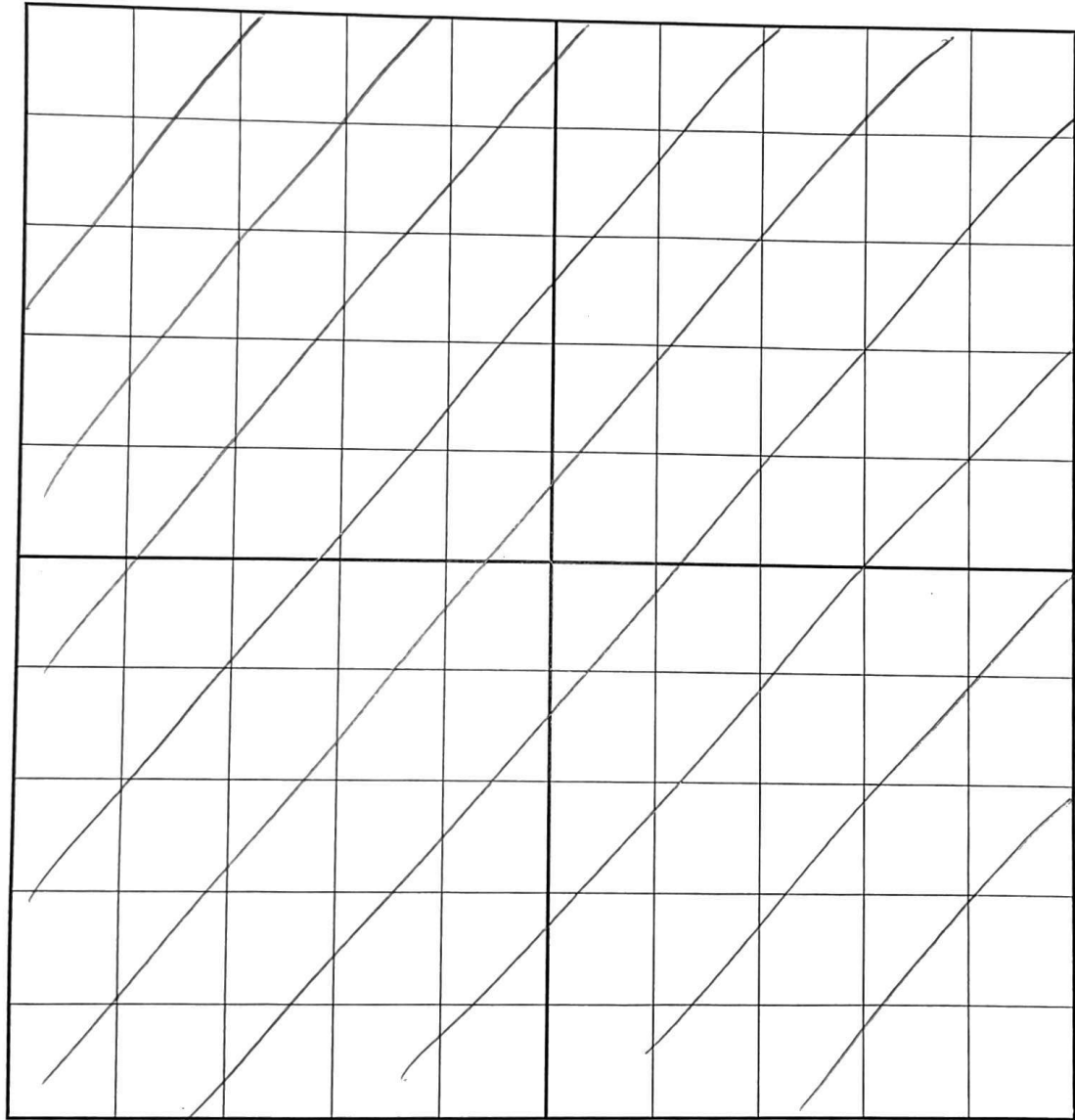
90ft x 90ft

100ft x 100ft

200ft x 200ft

Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

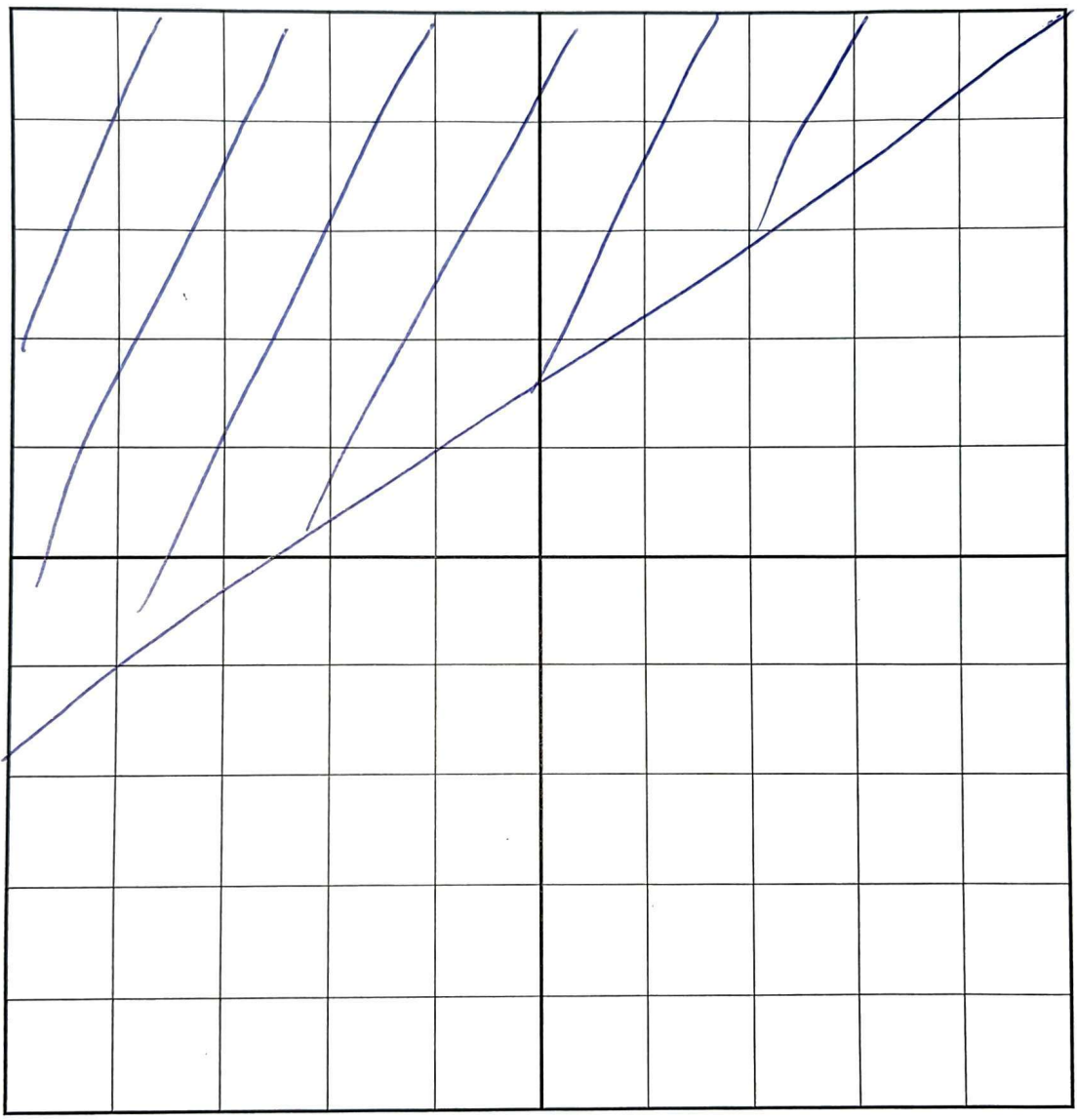
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>H5</i>	Team Number: <i>1</i>	Date: <i>8/8/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:
wire

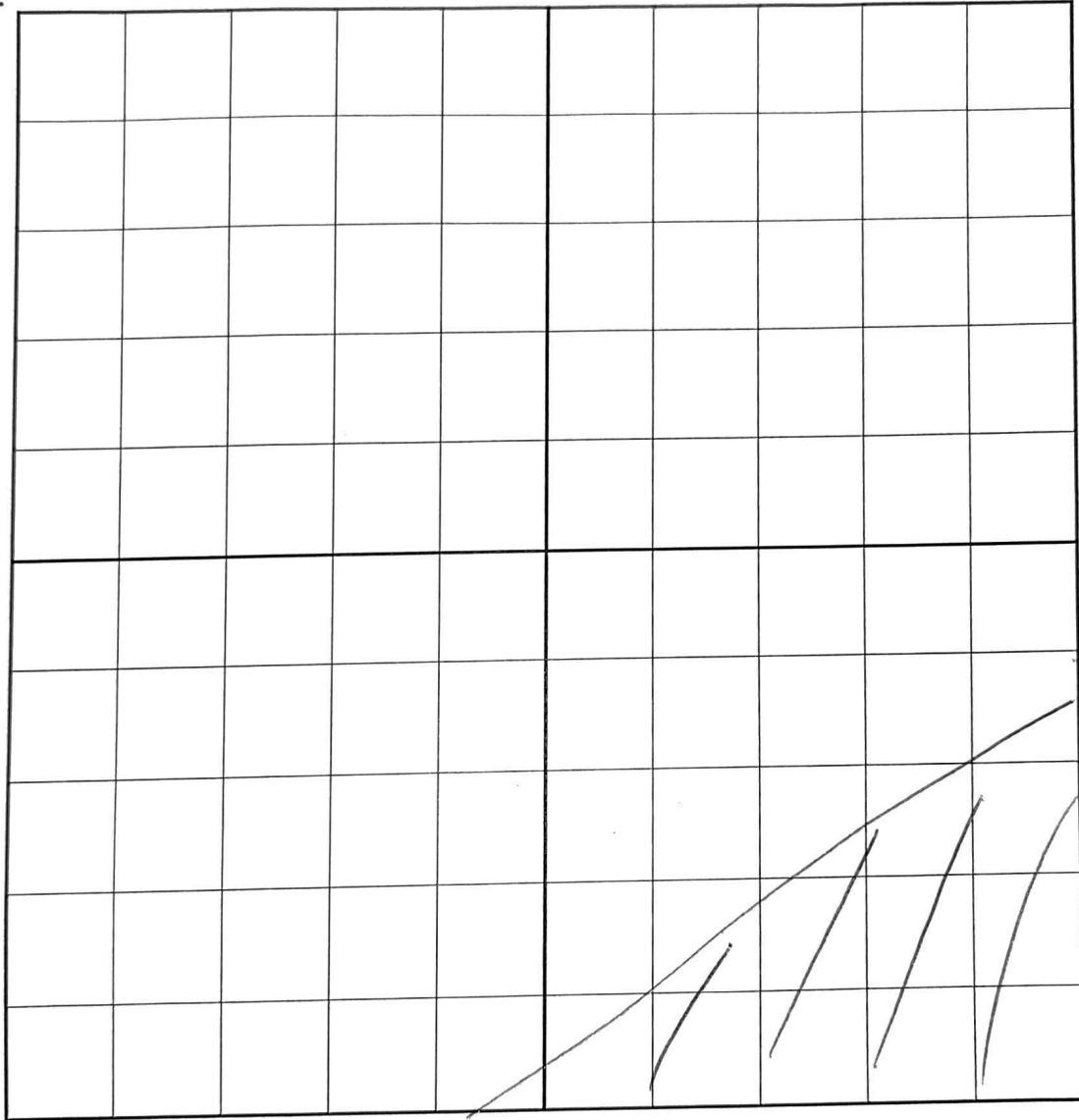
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-Ø2</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>I2</i>	Team Number: <i>1</i>	Date: <i>8/8/22</i>

Grid X and Y Dimensions (check the appropriate box):

- 30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name:

RSA-313 MRS-02

Site Location (city/state):

HSV, AL

Grid or Polygon ID:

I3

Team Number:

1

Date:

8/8/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m

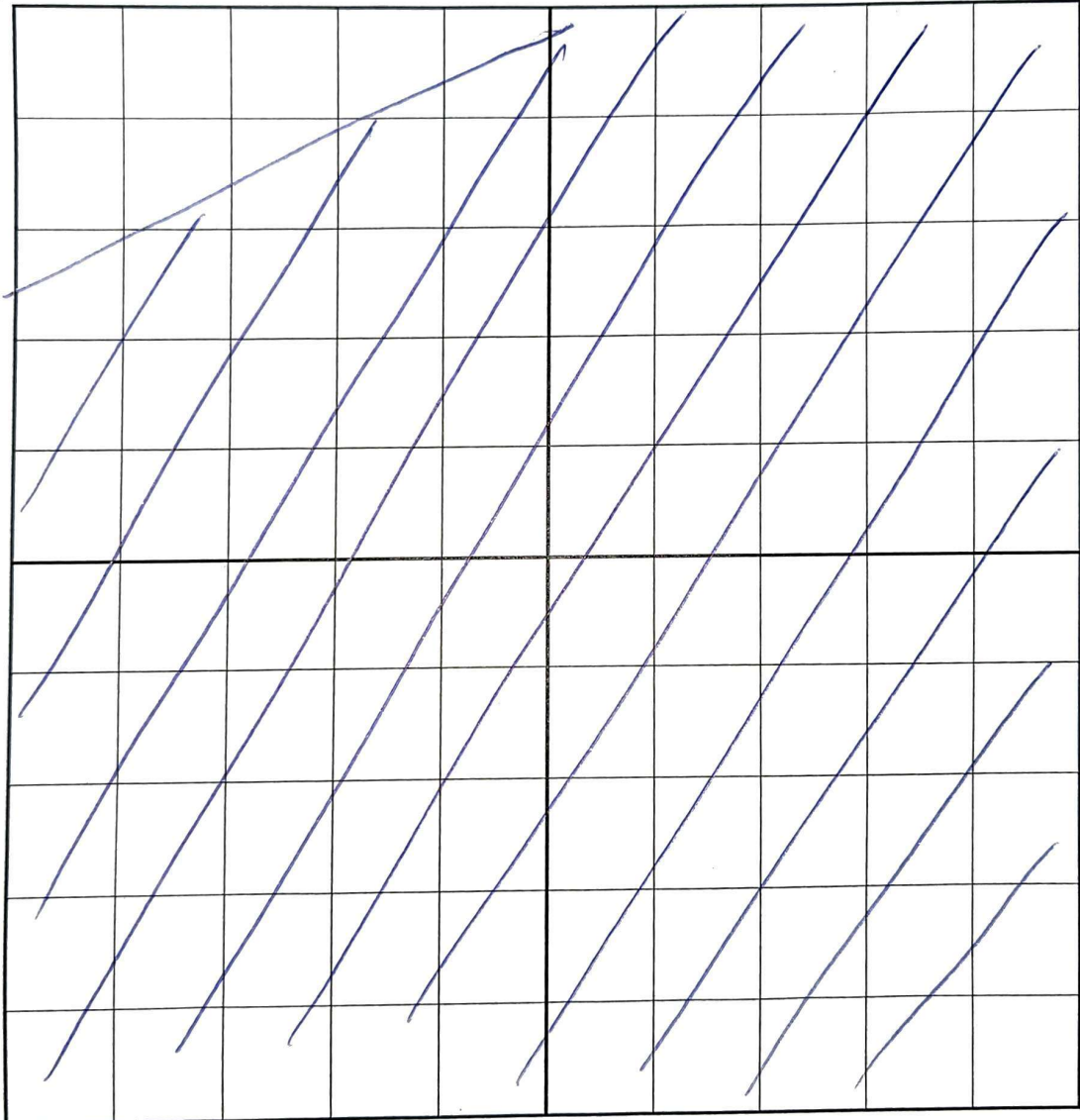
90ft x 90ft

100ft x 100ft

200ft x 200ft

Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

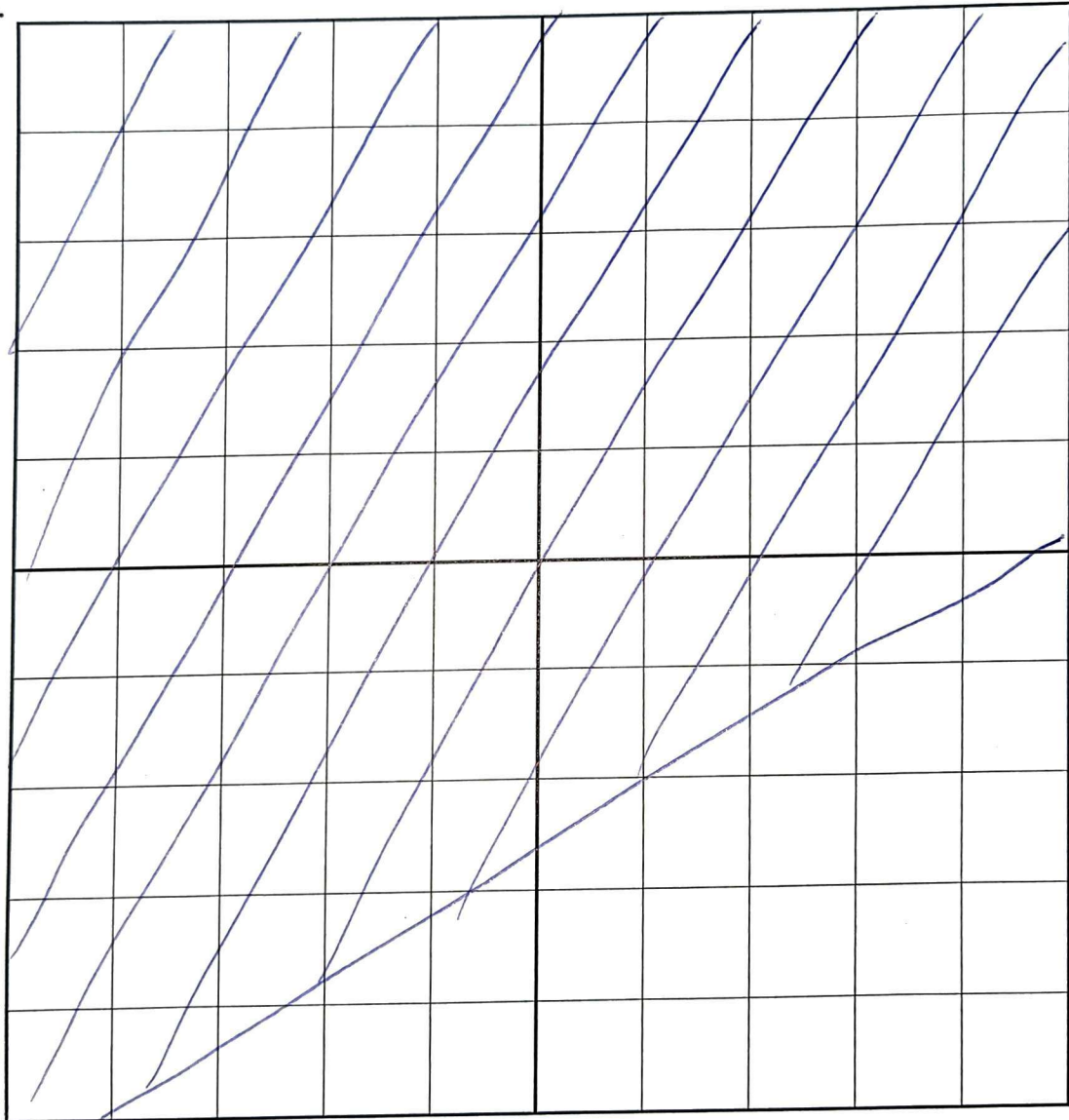
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>I4</i>	Team Number: <i>1</i>	Date: <i>8/8/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name: RSA-313 MRS-Ø2	Site Location (city/state): HSV, AL
Grid or Polygon ID: I5	Team Number: 1
Date: 8/8/22	

Grid X and Y Dimensions (check the appropriate box):

30m x 30m
 90ft x 90ft
 100ft x 100ft
 200ft x 200ft
 Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



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Comments:

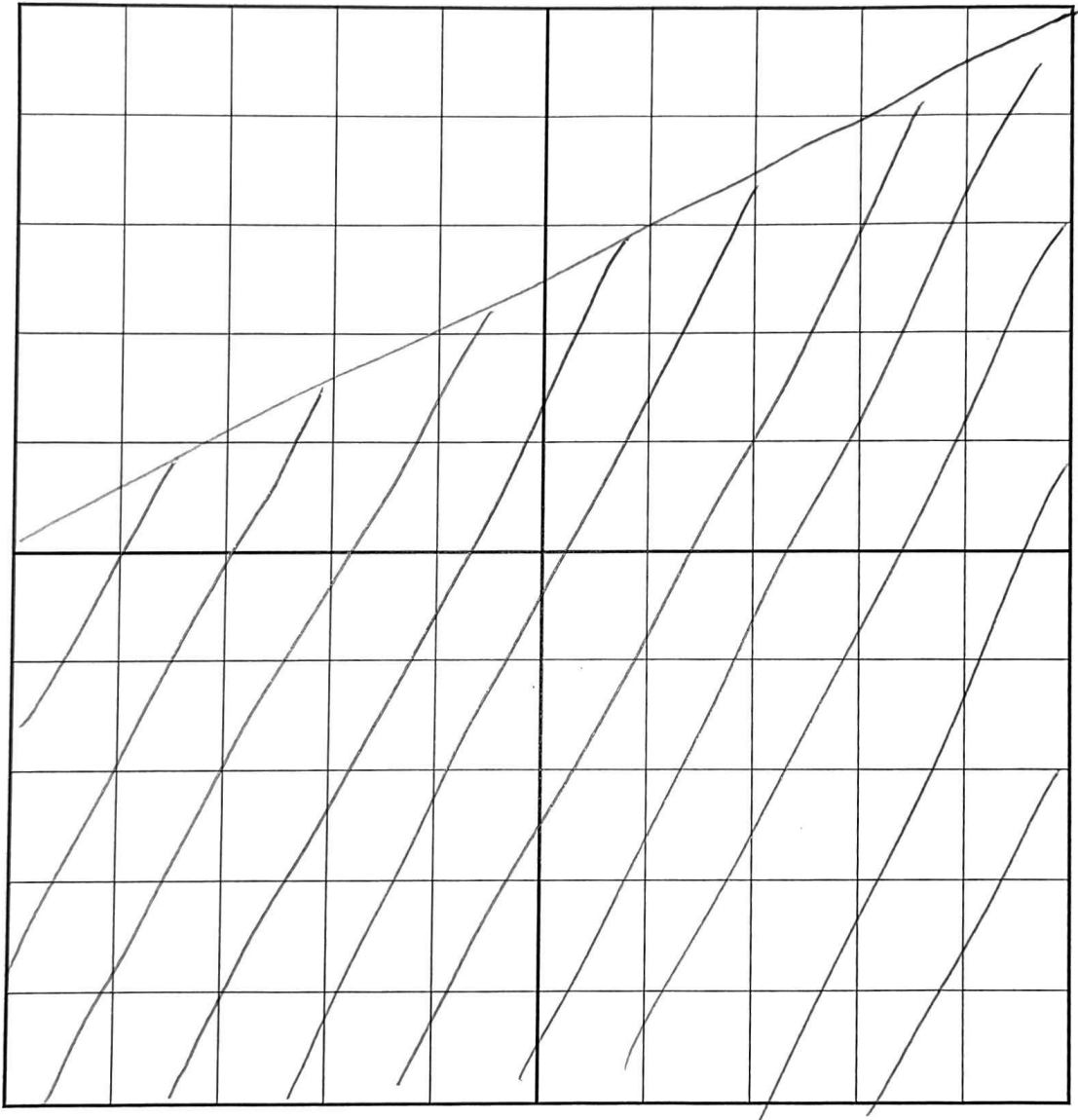
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>J2</i>	Team Number: <i>1</i>	Date: <i>8/8/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:
fence parts

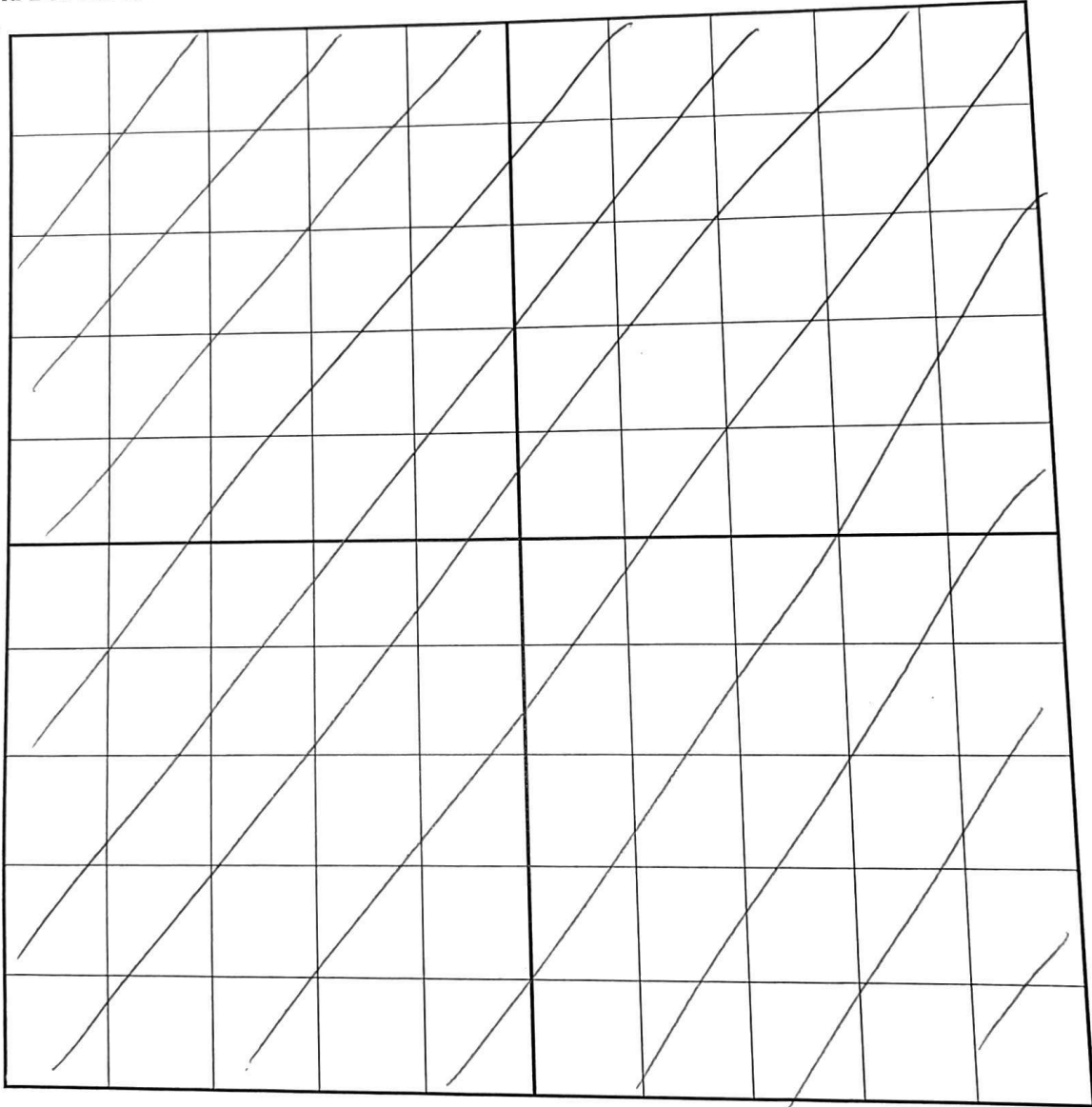
Grid Drawing Sheet

Site Name: RSA-313 MRS-Ø2	Site Location (city/state): HSU, AL	Date: 8/8/22
Grid or Polygon ID: J3	Team Number: 1	

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

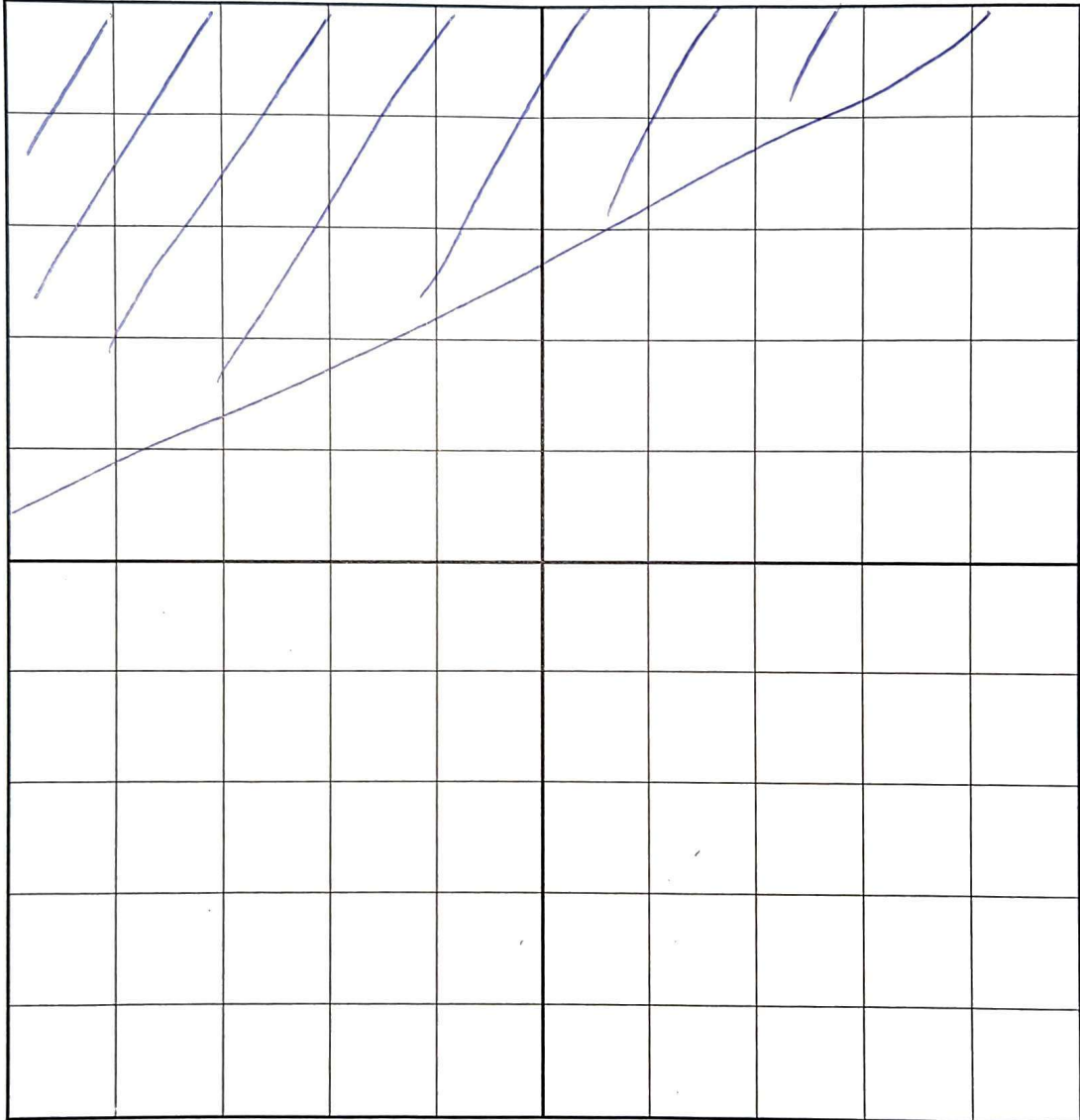
Grid Drawing Sheet

Site Name: RSA-313 MRS-Ø2	Site Location (city/state): HSV, AL	
Grid or Polygon ID: J4	Team Number: 1	Date: 8/8/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

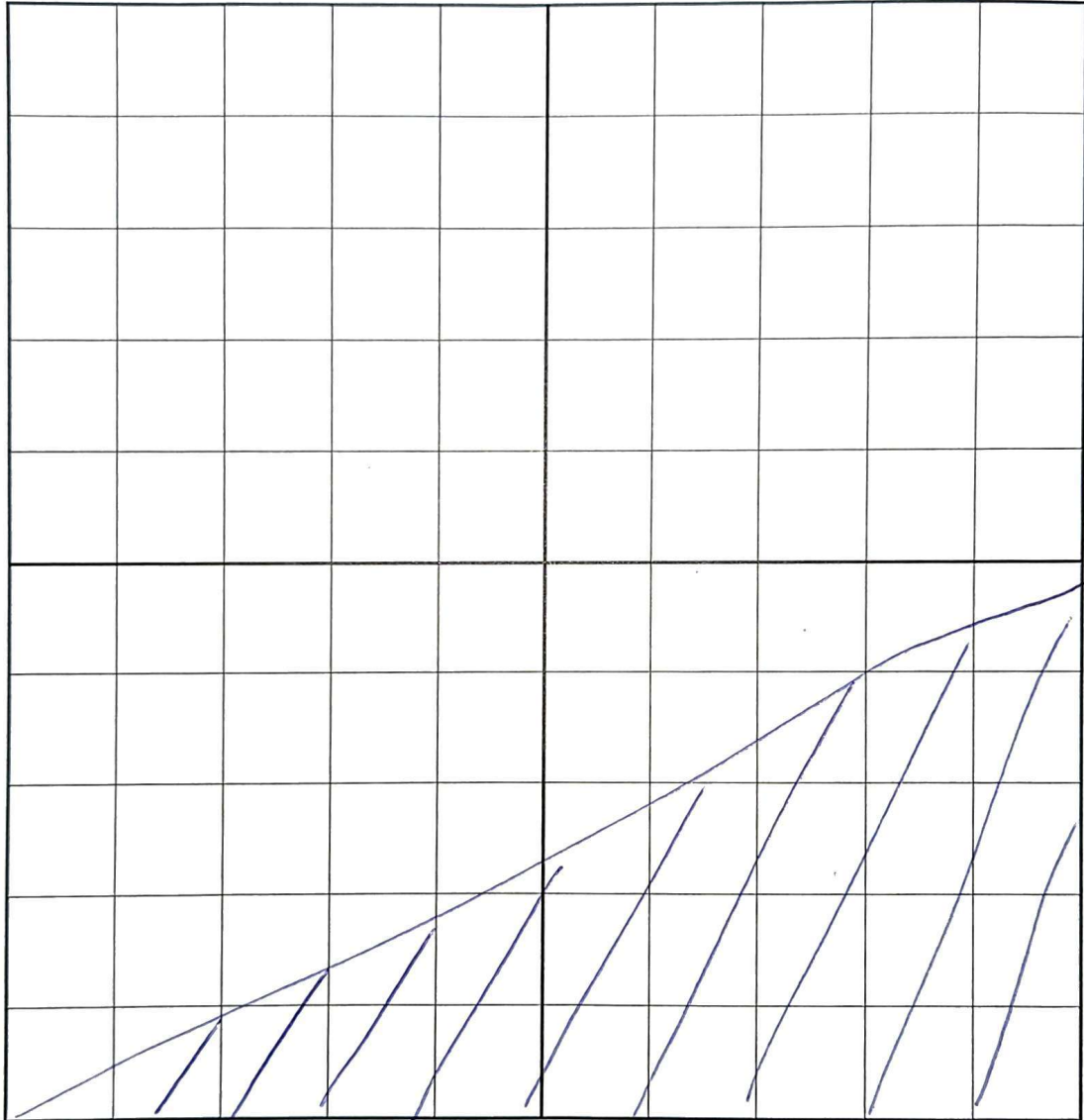
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-Ø2</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>K1</i>	Team Number: <i>1</i>	Date: <i>8/8/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name:

RSA-313- MRS-02

Site Location (city/state):

HSV, AL

Grid or Polygon ID:

K2

Team Number:

1

Date:

8/8/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m

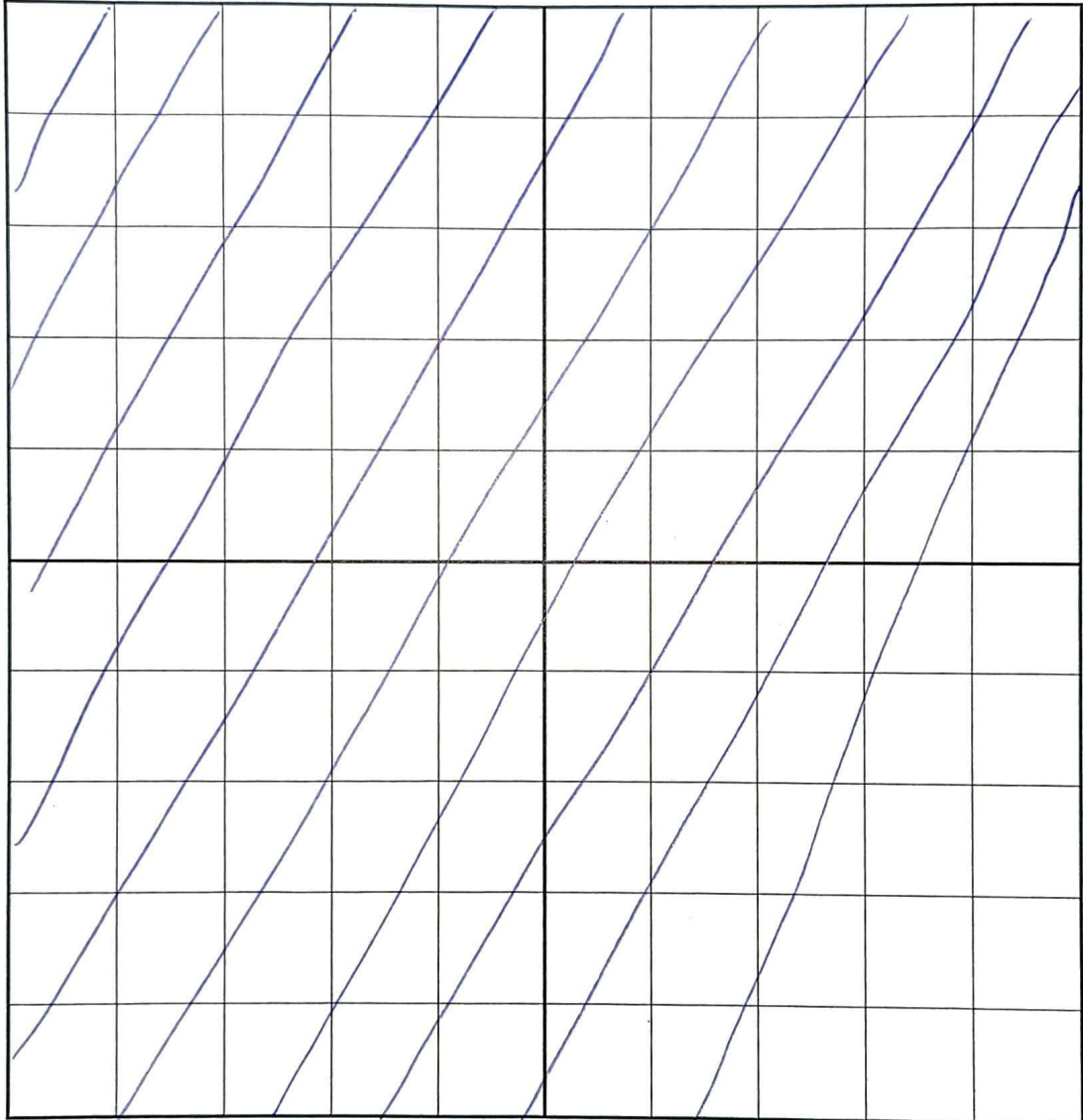
90ft x 90ft

100ft x 100ft

200ft x 200ft

Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

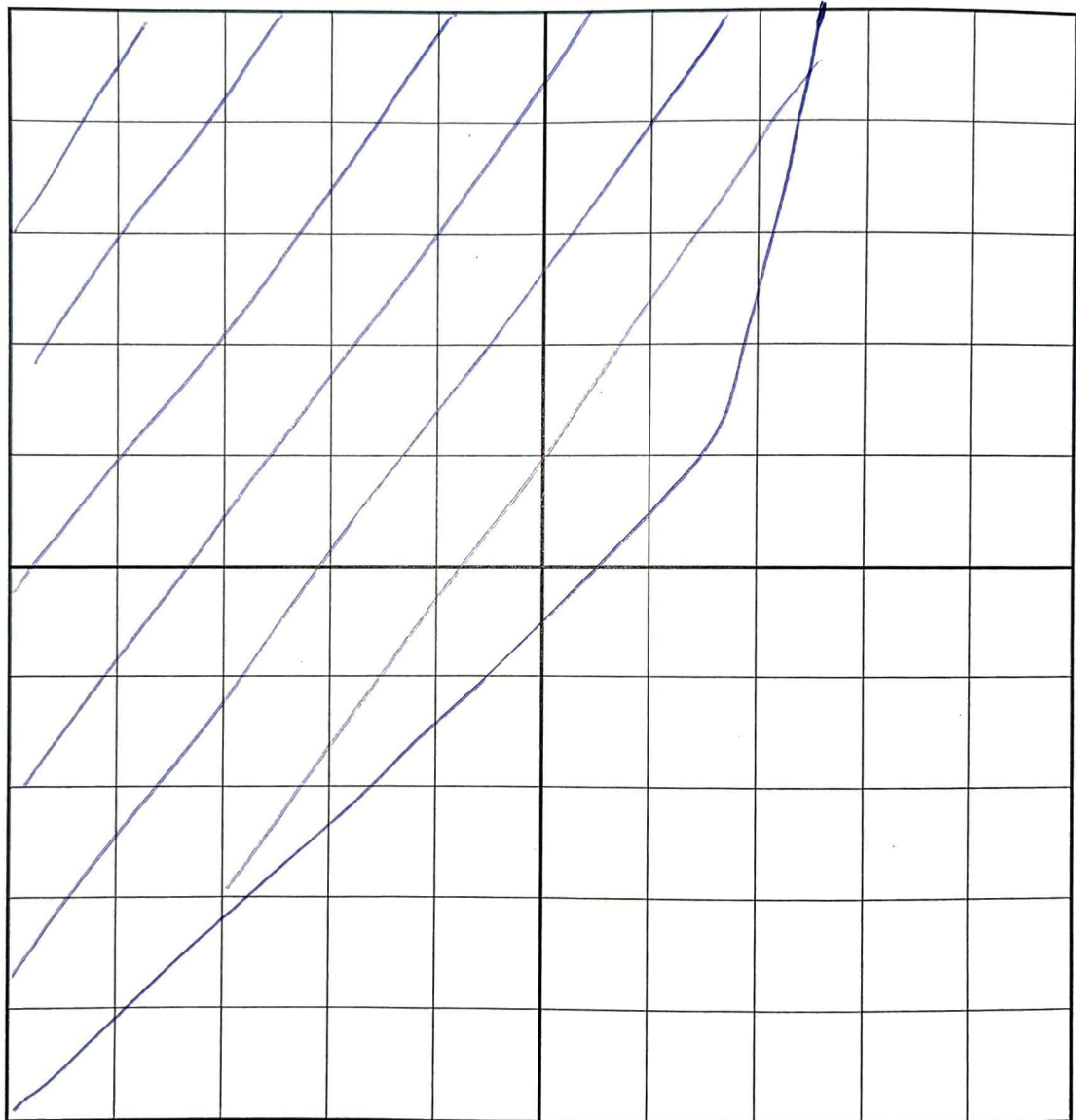
Grid Drawing Sheet

Site Name: <i>RSA 313 MRS-Ø2</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>K3</i>	Team Number: <i>1</i>	Date: <i>8/8/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

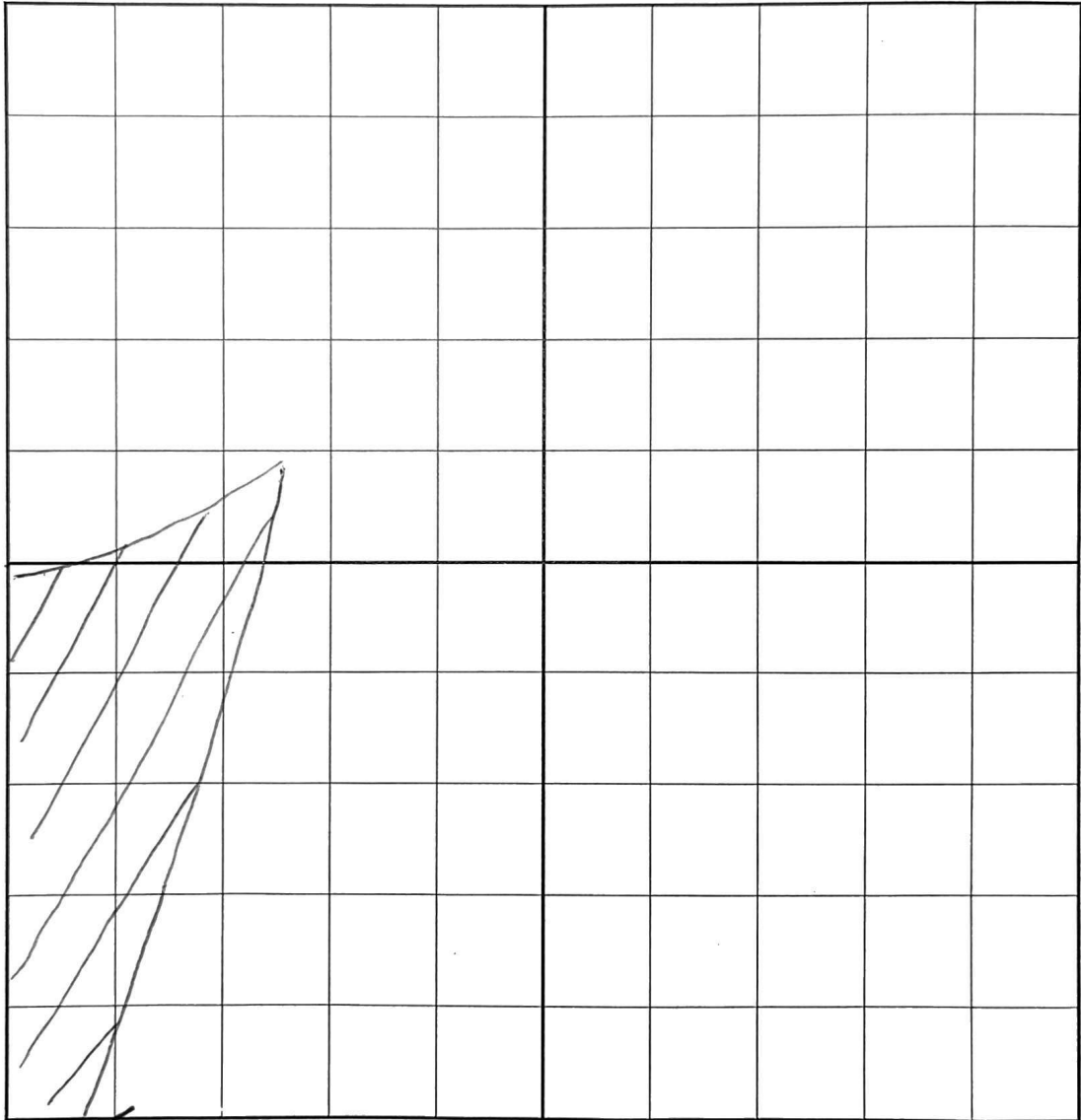
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>Huntsville, AL</i>	
Grid or Polygon ID: <i>L1</i>	Team Number: <i>1</i>	Date: <i>8/8/22</i>

Grid X and Y Dimensions (check the appropriate box):

- 30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-Ø2</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>L2</i>	Team Number: <i>1</i>	Date: <i>8/8/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

wire

Team Leader Grid Sheet

Project Site Location (name, city and state): RSA-313 MRS-Ø2	Team Number: 1	Date: 8/9/22
Team Leader: J. SANDERS		Signature:

Grid or Polygon ID	Other Debris lbs.	MD lbs	RRD lbs	Anomalies	Percent Complete
G3	0	Ø	Ø	0	100
G4	0			0	100
F4	0			0	100
F5	0			0	100
D5	.5			2	100
D6	0			0	100
C6	5			3	100
C7	0			0	100
B6	1			2	100
B7	0			0	100
A7	0			0	100
A8	0	Ø	Ø	6	100

MEC items located:

Item	Grid or Poly ID	Classification			Comments
		UXO	DMM	MC	

Comments:

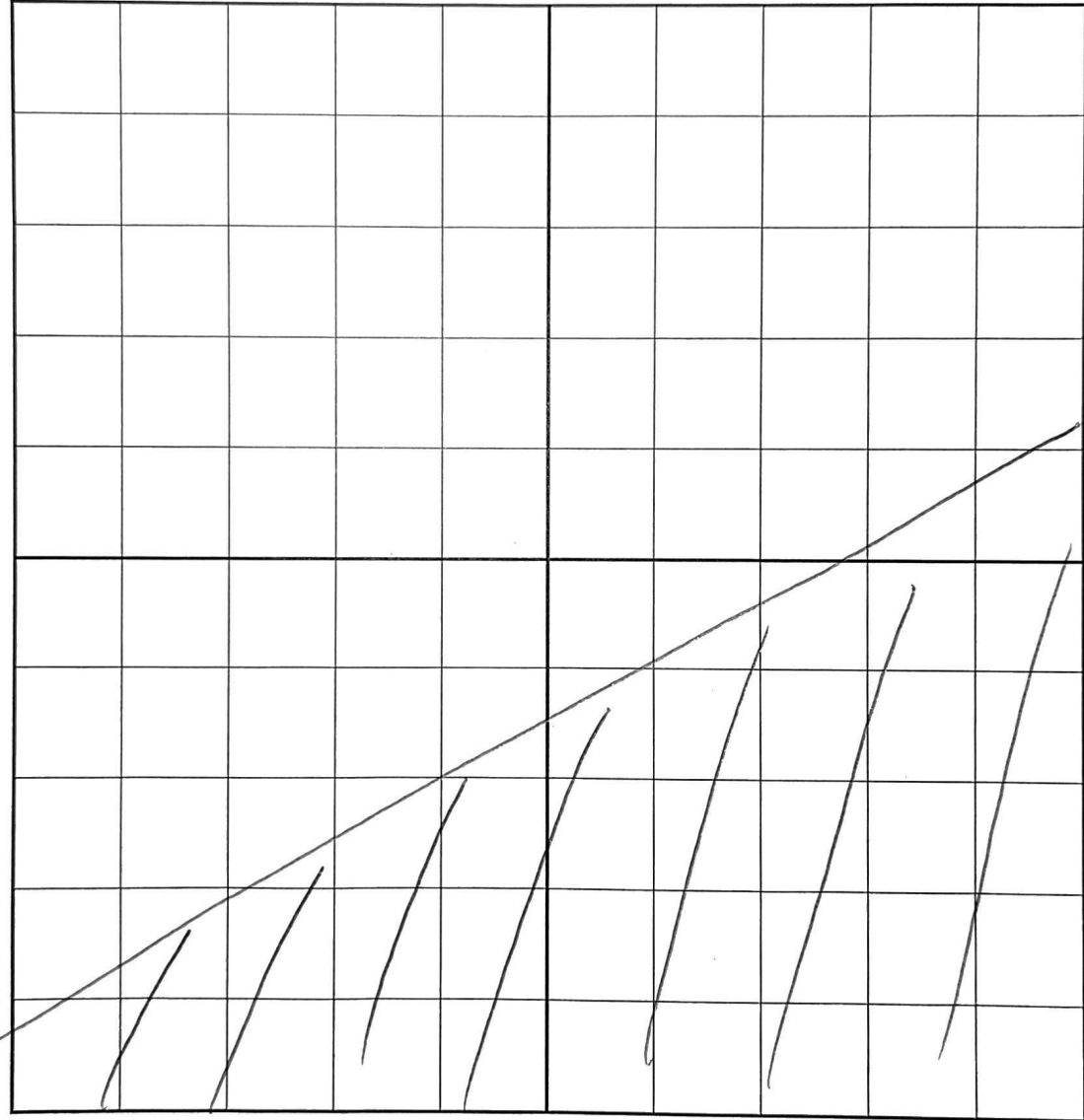
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>A7</i>	Team Number: <i>1</i>	Date: <i>8/9/22</i>

Grid X and Y Dimensions (check the appropriate box):

- 30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

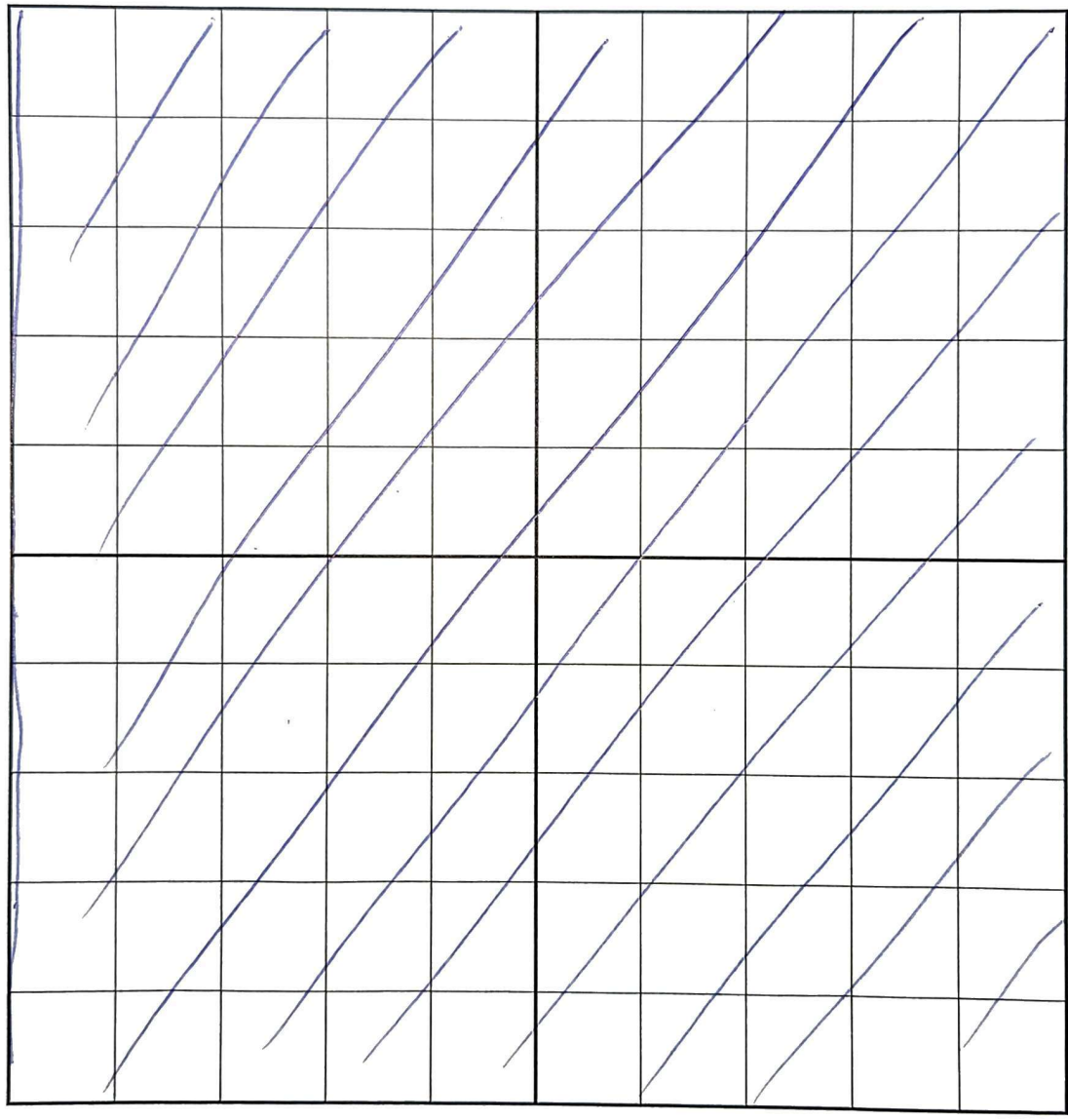
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>A8</i>	Team Number: <i>1</i>	Date: <i>8/9/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

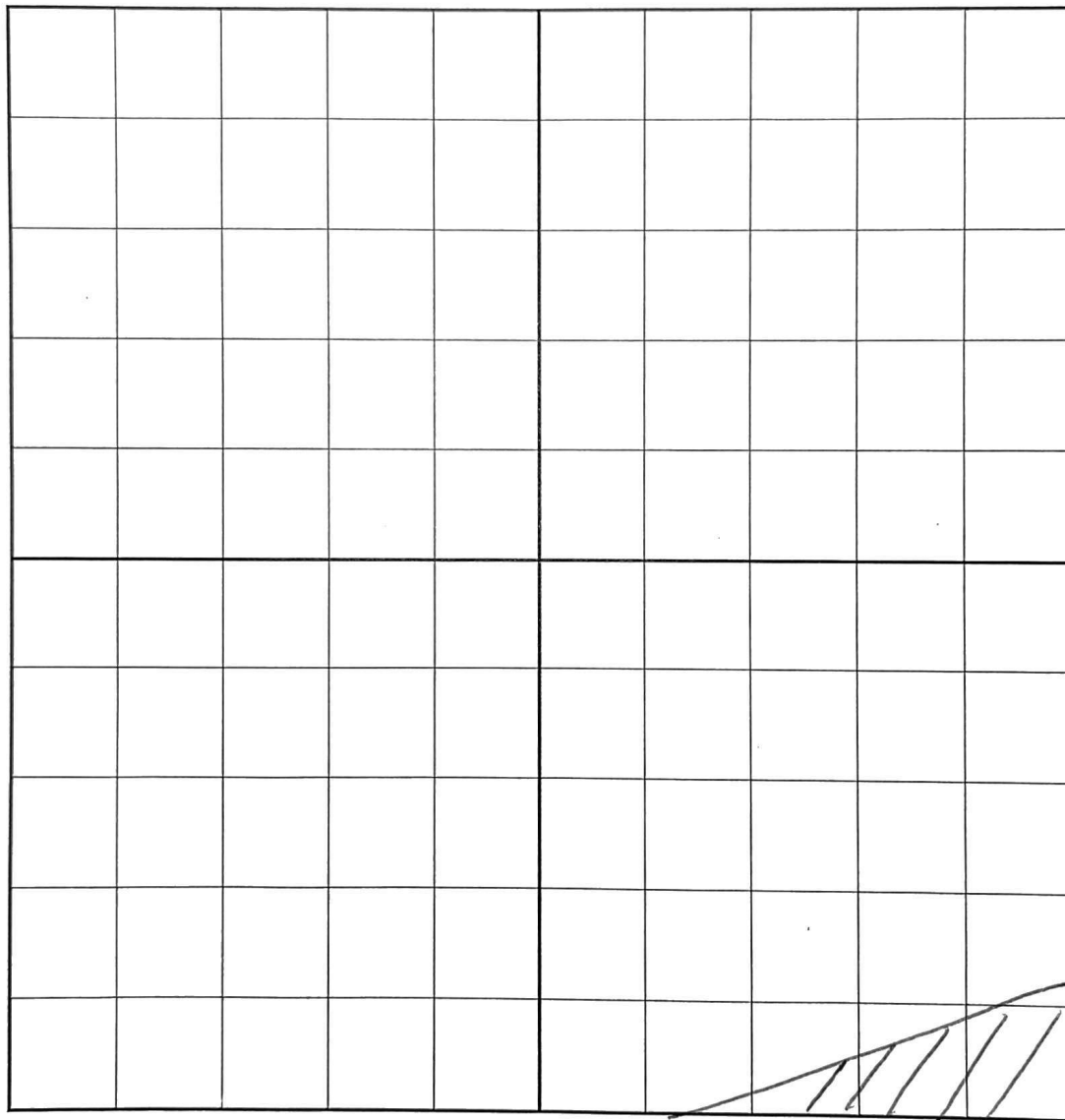
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>B6</i>	Team Number: <i>1</i>	Date: <i>8/9/22</i>

Grid X and Y Dimensions (check the appropriate box):

- 30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

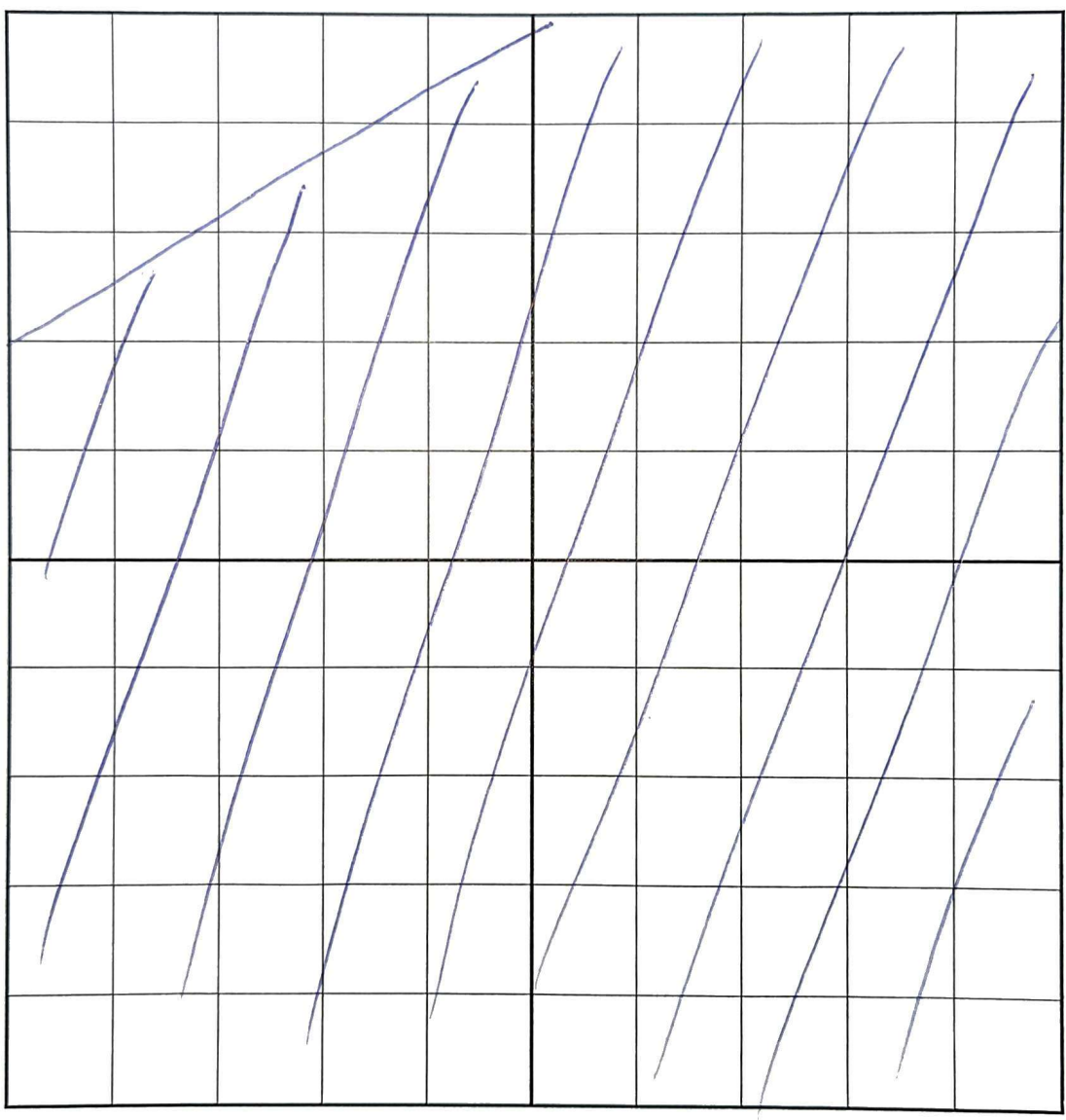
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>B7</i>	Team Number: <i>1</i>	Date: <i>8/9/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

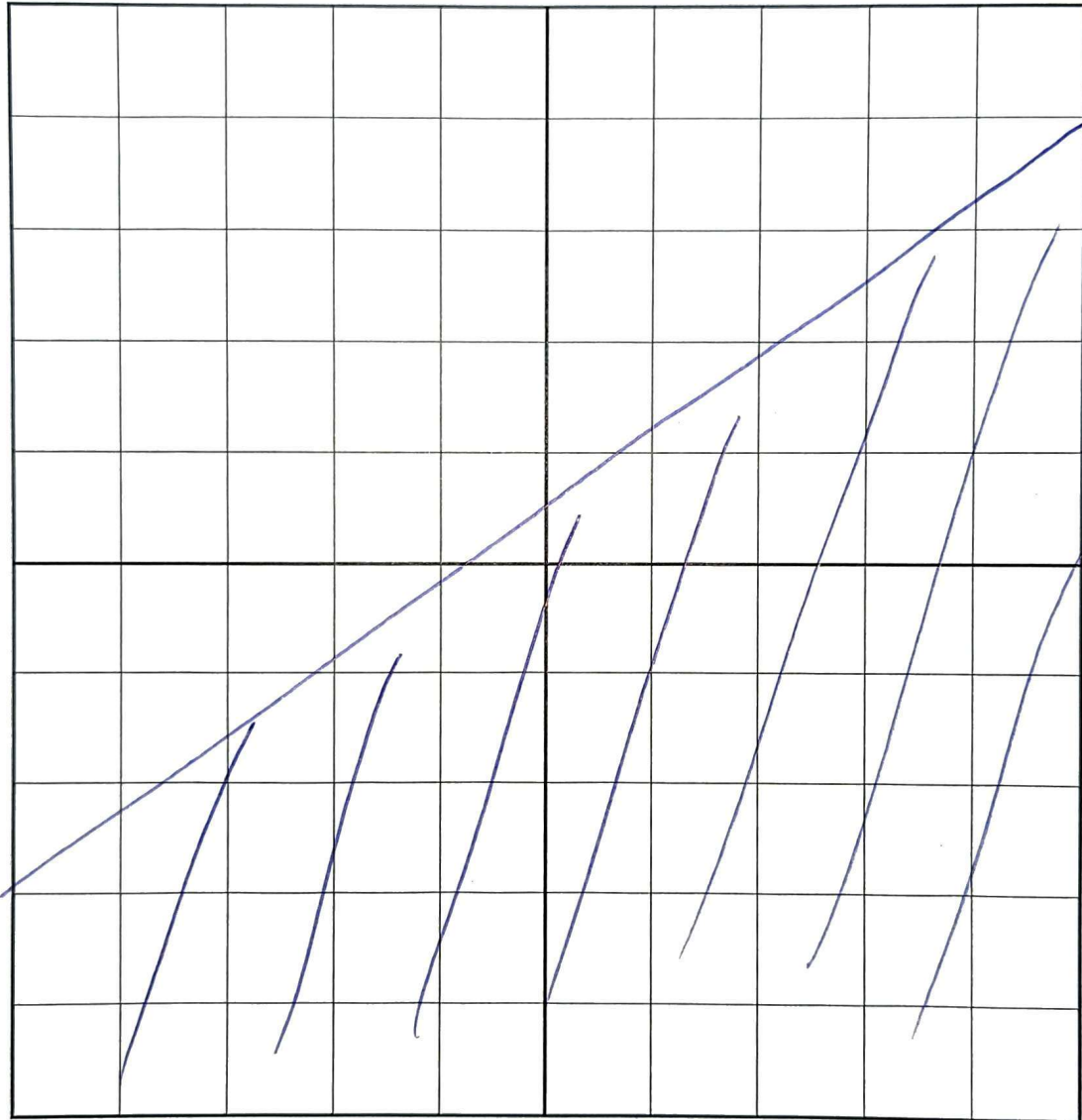
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>C6</i>	Team Number: <i>1</i>	Date: <i>8/9/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

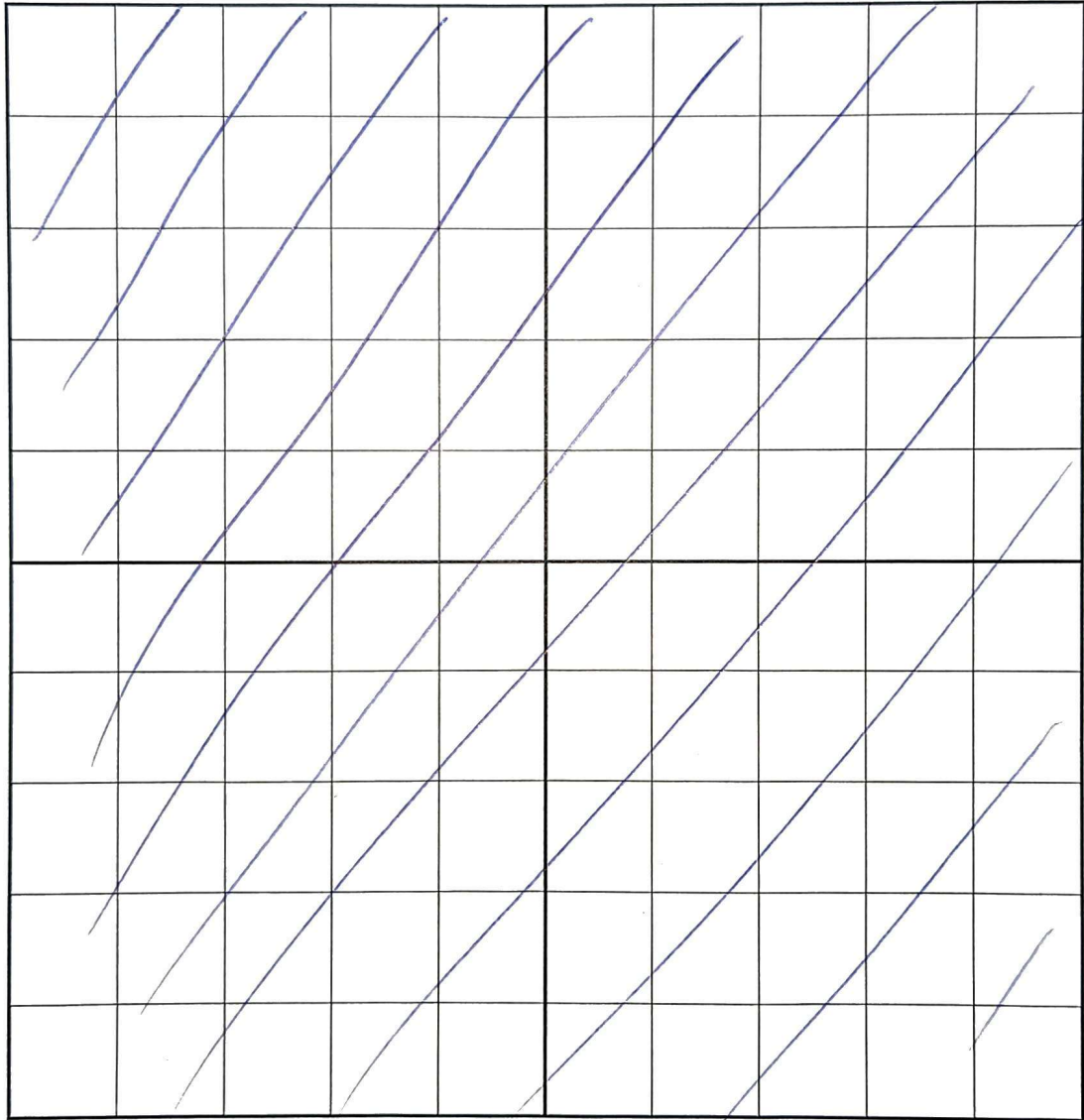
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-Q</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>C7</i>	Team Number: <i>1</i>	Date: <i>8/9/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name:

RSA-313 MRS-Ø2

Site Location (city/state):

HSV, AL

Grid or Polygon ID:

D5

Team Number:

1

Date:

8/9/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m

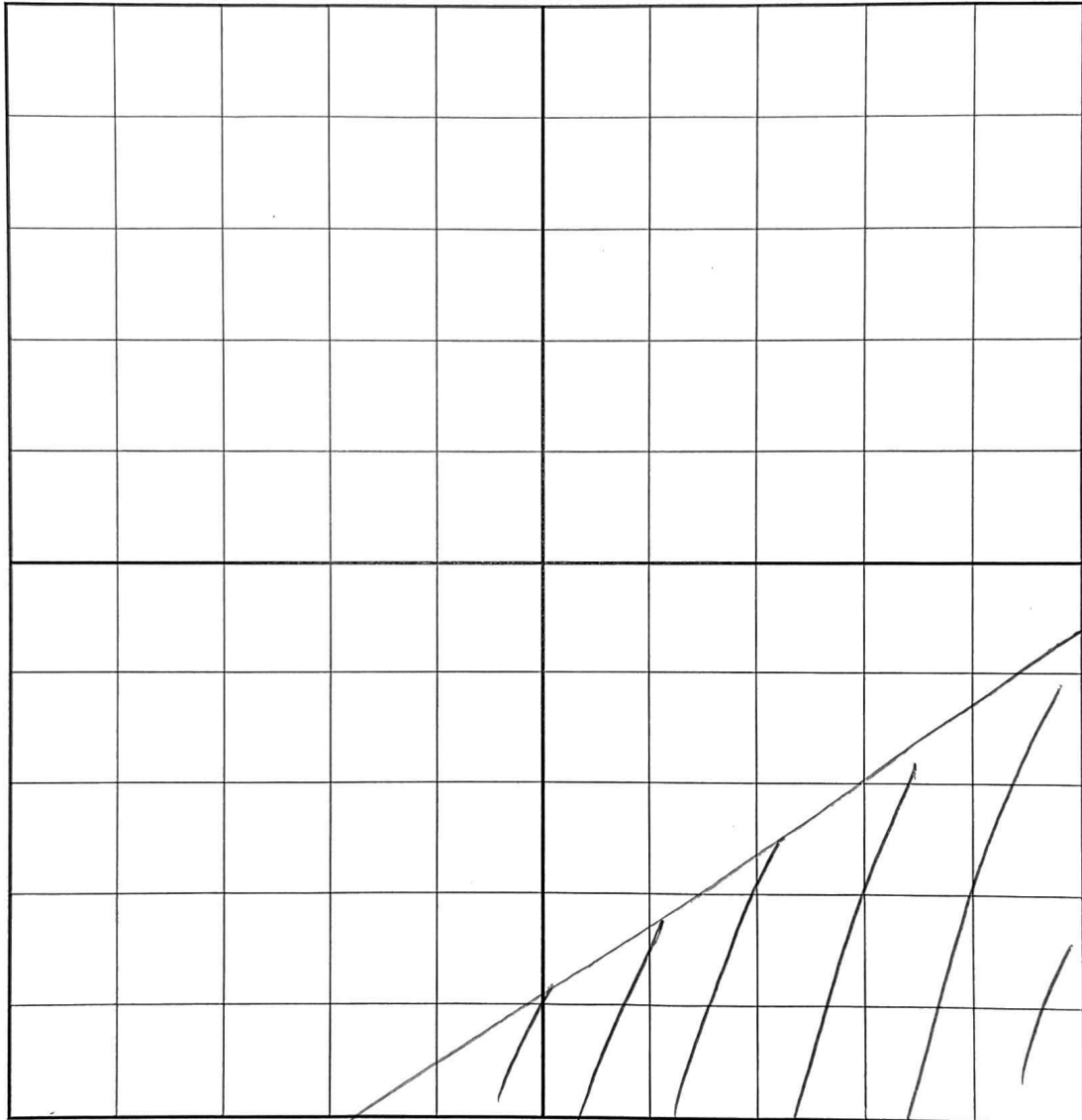
90ft x 90ft

100ft x 100ft

200ft x 200ft

Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

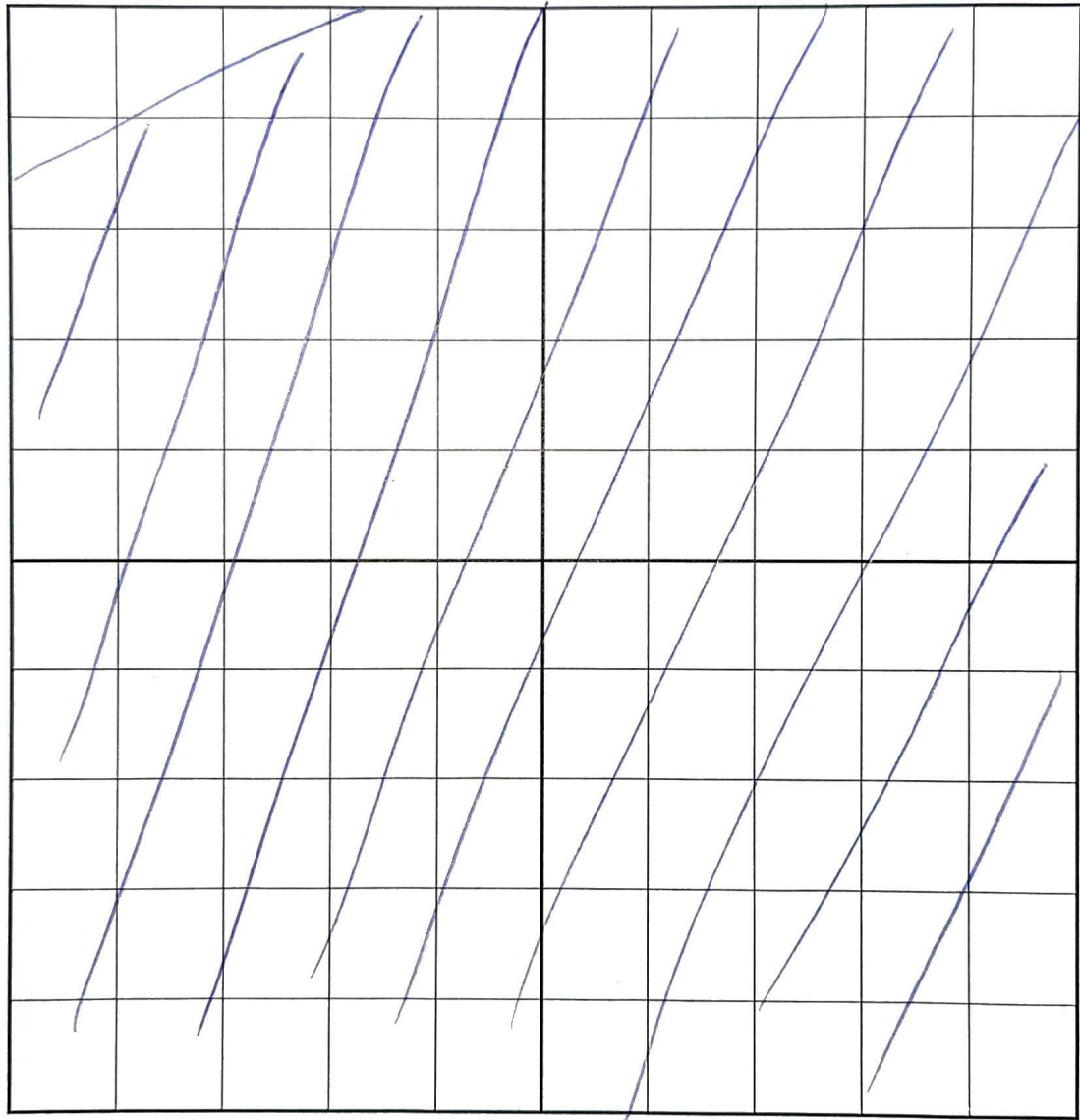
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>D6</i>	Team Number: <i>1</i>	Date: <i>8/9/22</i>

Grid X and Y Dimensions (check the appropriate box):

- 30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

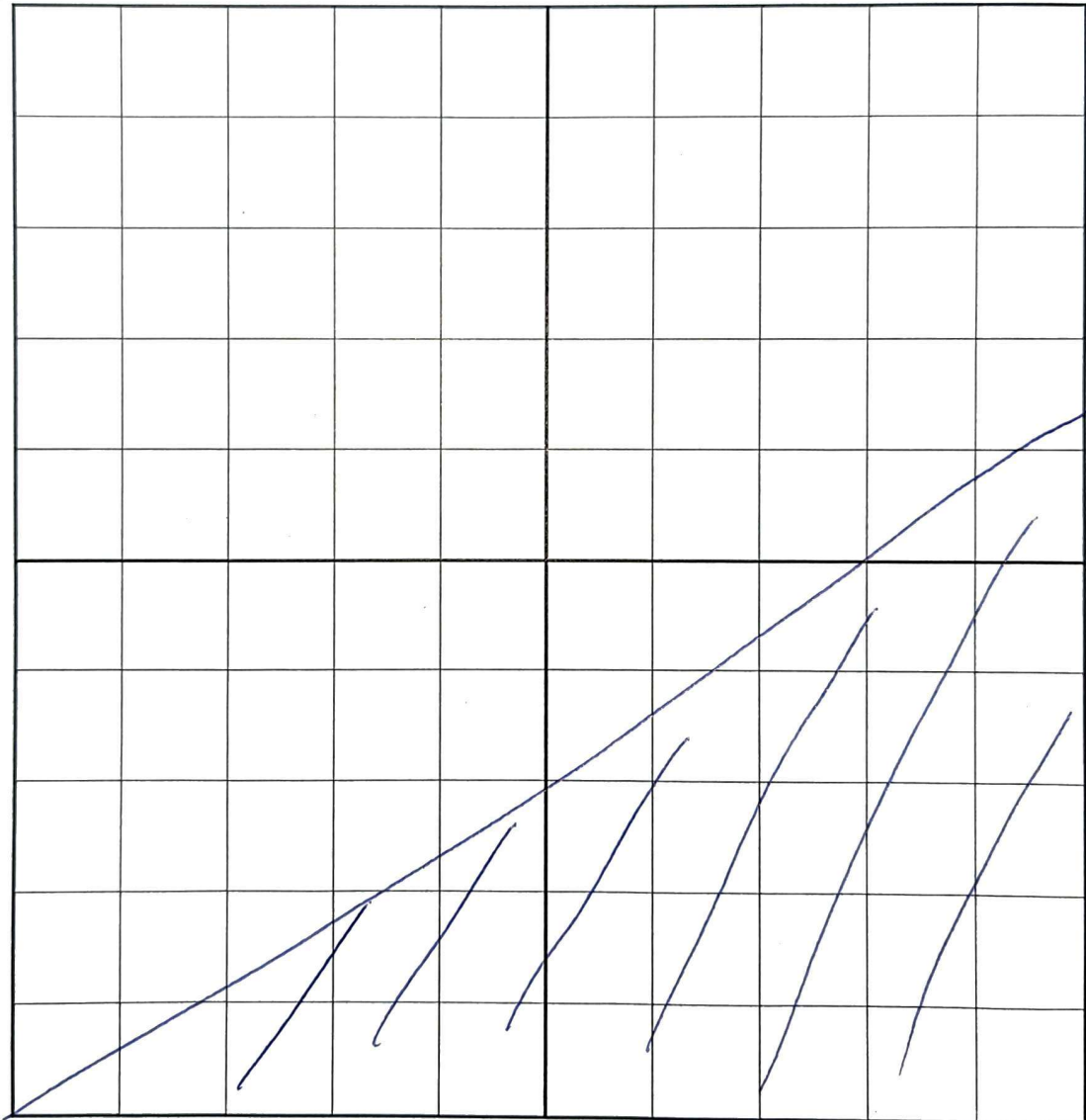
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-Ø2</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: 313 <i>Ø2</i> <i>F4</i>	Team Number: <i>1</i>	Date: <i>8/9/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name:

RSA-313 MRS-Ø2

Site Location (city/state):

HSV, AL

Grid or Polygon ID:

F5

Team Number:

1

Date:

8/9/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m

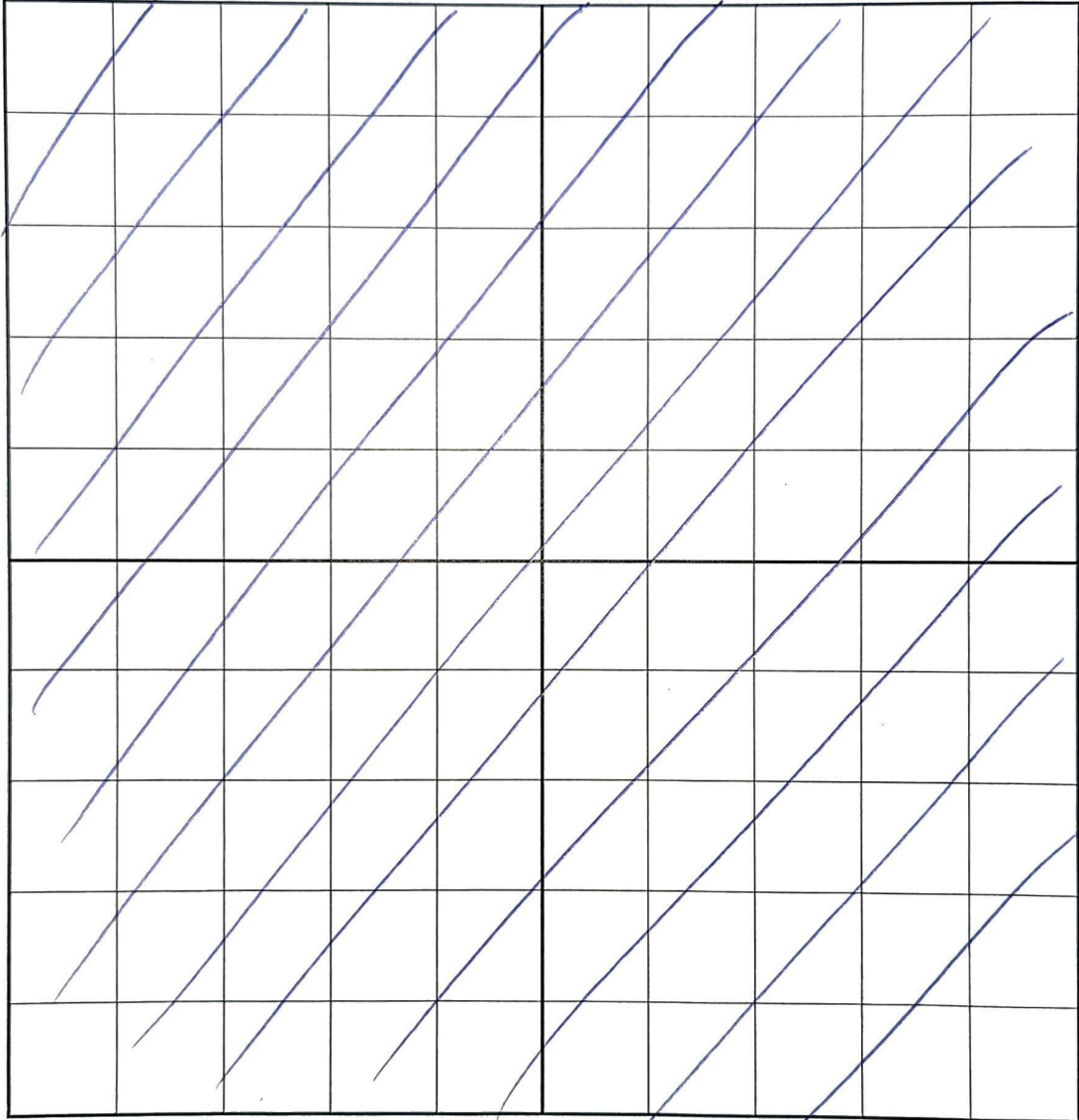
90ft x 90ft

100ft x 100ft

200ft x 200ft

Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name:

RSA-313 MRS-02

Site Location (city/state):

HSV, AL

Grid or Polygon ID:

~~B~~ ~~3~~ ^{gas} G4

Team Number:

1

Date:

8/9/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m

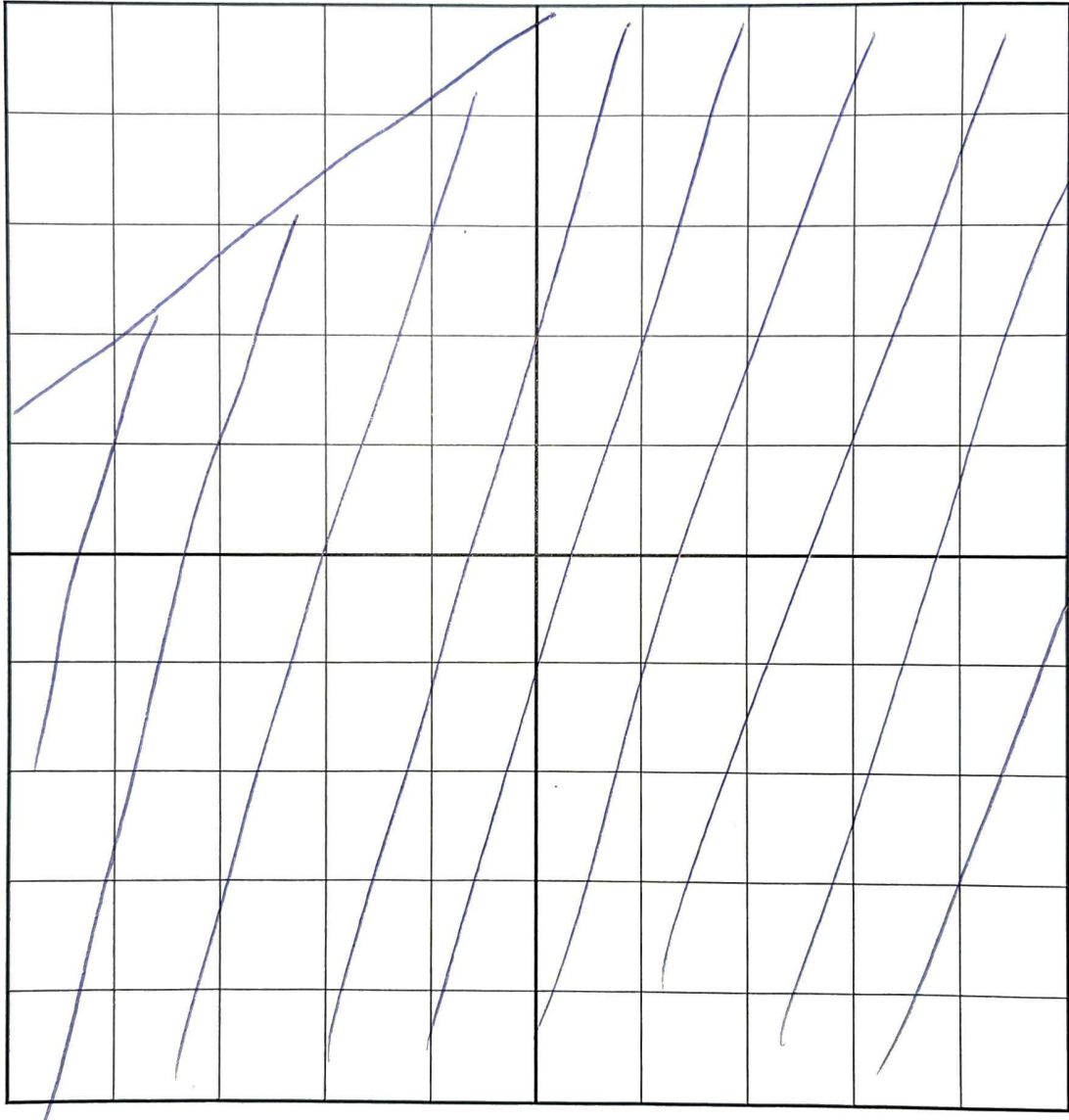
90ft x 90ft

100ft x 100ft

200ft x 200ft

Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Team Leader Grid Sheet

Project Site Location (name, city and state): <div style="font-size: 1.2em; margin-top: 5px;">RSA-313</div> <div style="font-size: 1.2em; margin-top: 5px;">MRS-02</div>	Team Number: 1	Date: 8/10/22
Team Leader: J. SANDERS		Signature: <i>J. Sanders</i>

Grid or Polygon ID	Other Debris lbs.	MD lbs	RRD lbs	Anomalies	Percent Complete
A7	Ø	Ø	Ø	Ø	100
B8					100
B9					100
C8					100
D7					100
D8					100
E5					100
E6					100
E7					100
F6					100
G5					100
G6	Ø	Ø	Ø	Ø	100

MEC items located:

Item	Grid or Poly ID	Classification			Comments
		UXO	DMM	MC	

Comments:

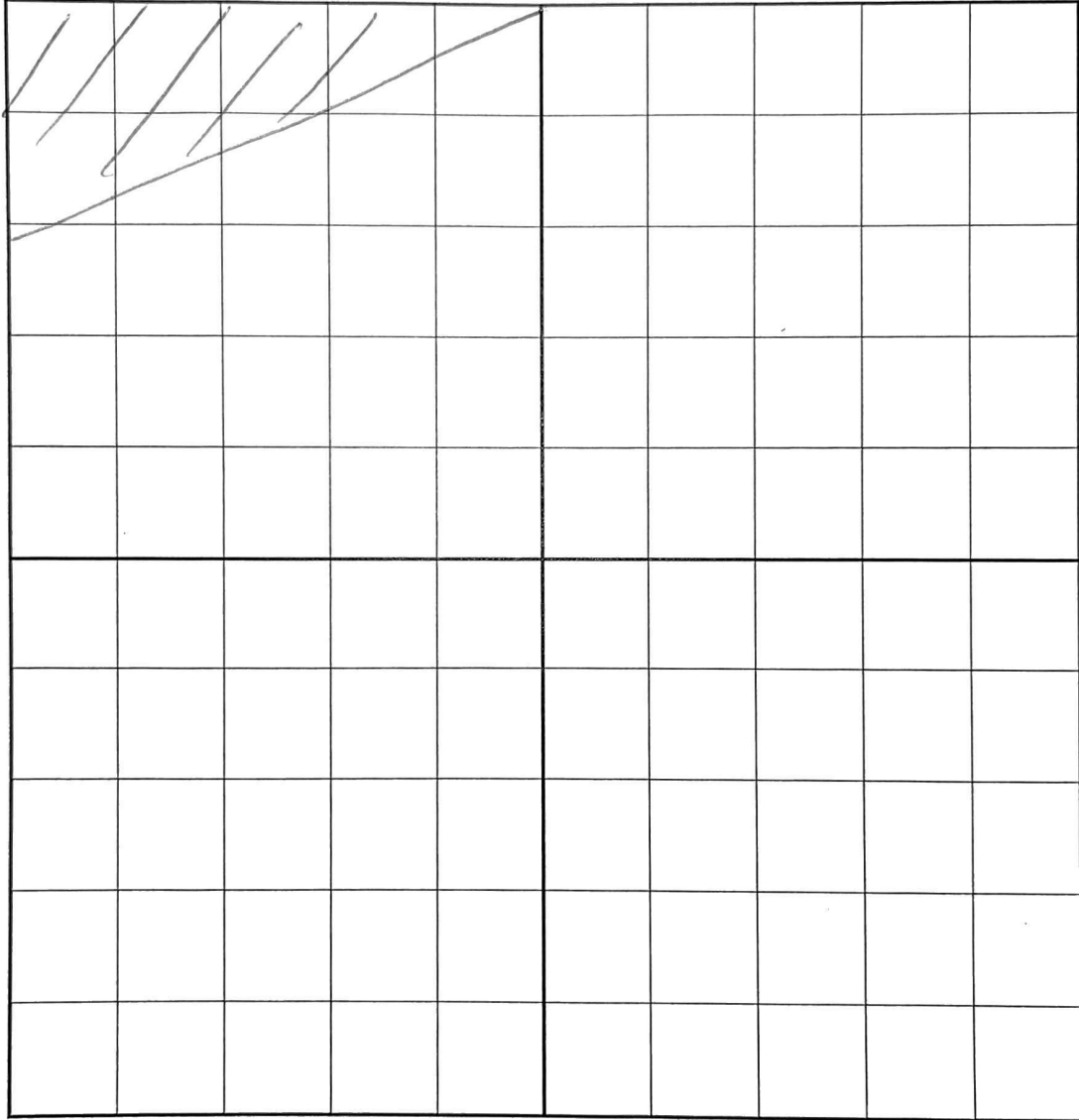
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-Ø2</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>GL</i>	Team Number: <i>1</i>	Date: <i>8/10/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name:

RSA-313 MRS-Ø2

Site Location (city/state):

HSV, AL

Grid or Polygon ID:

F6

Team Number:

1

Date:

8/10/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m

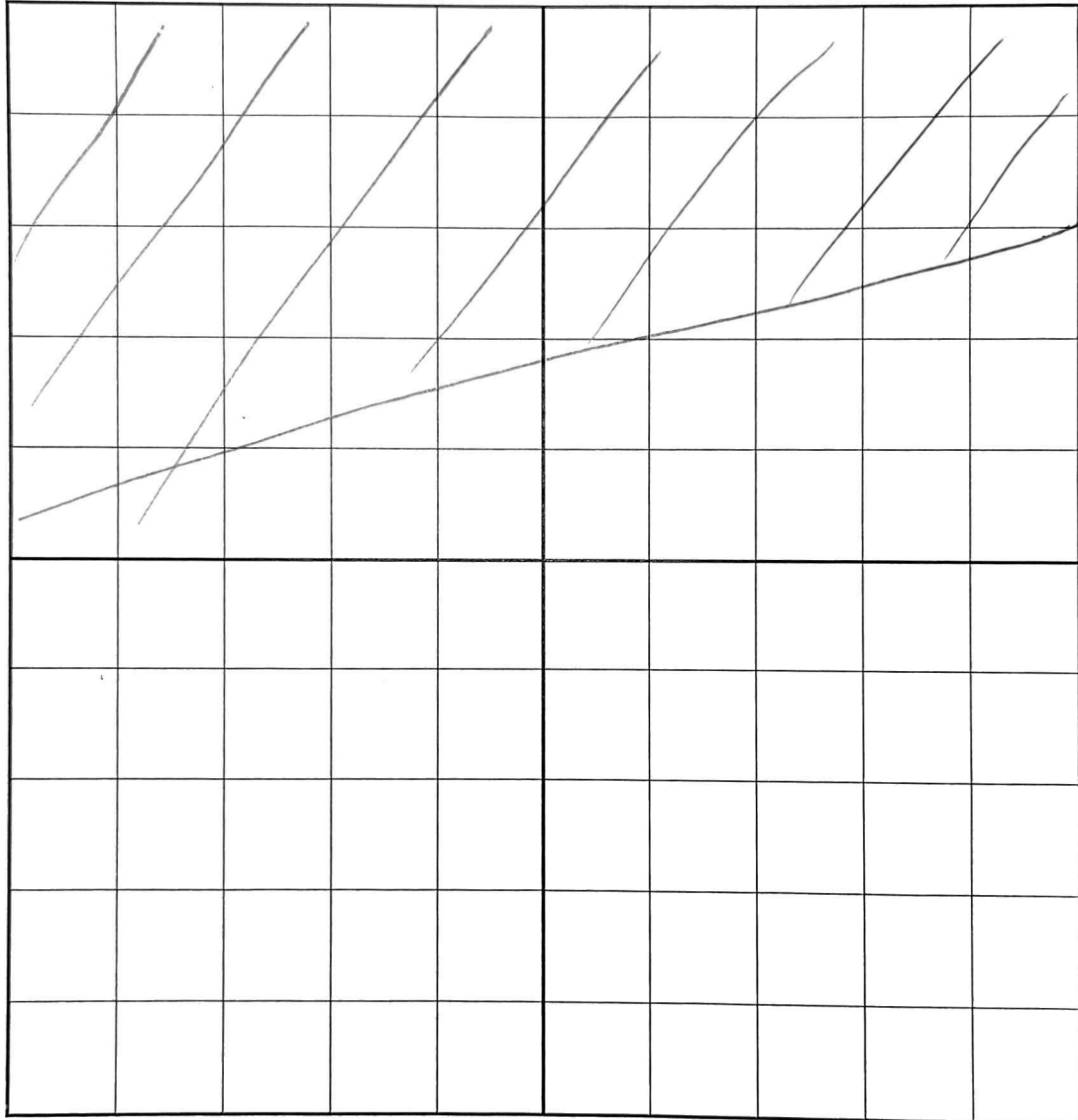
90ft x 90ft

100ft x 100ft

200ft x 200ft

Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name:

RSA-313 MRS-Ø2

Site Location (city/state):

HSV, AL

Grid or Polygon ID:

E5

Team Number:

1

Date:

8/10/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m

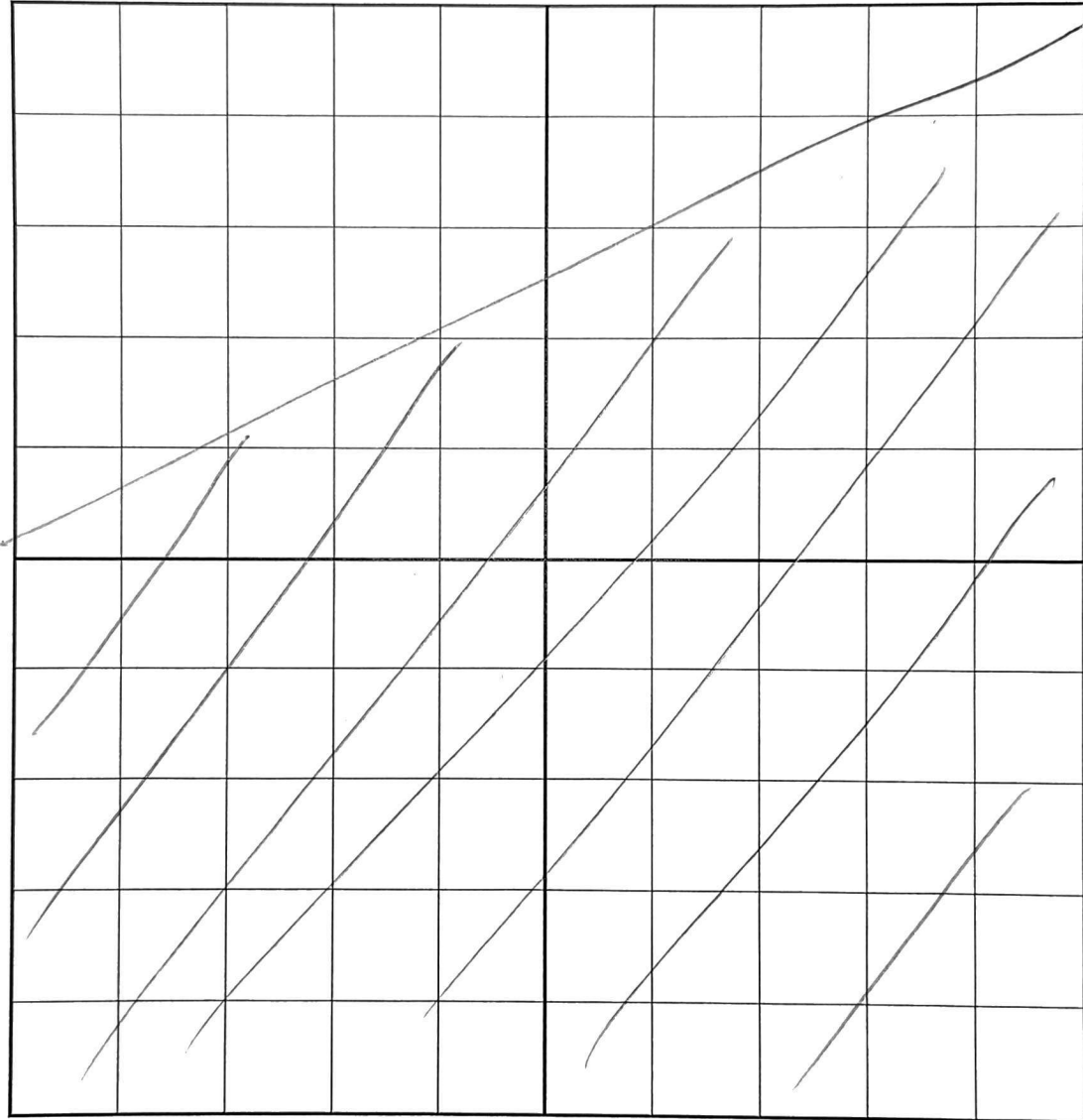
90ft x 90ft

100ft x 100ft

200ft x 200ft

Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

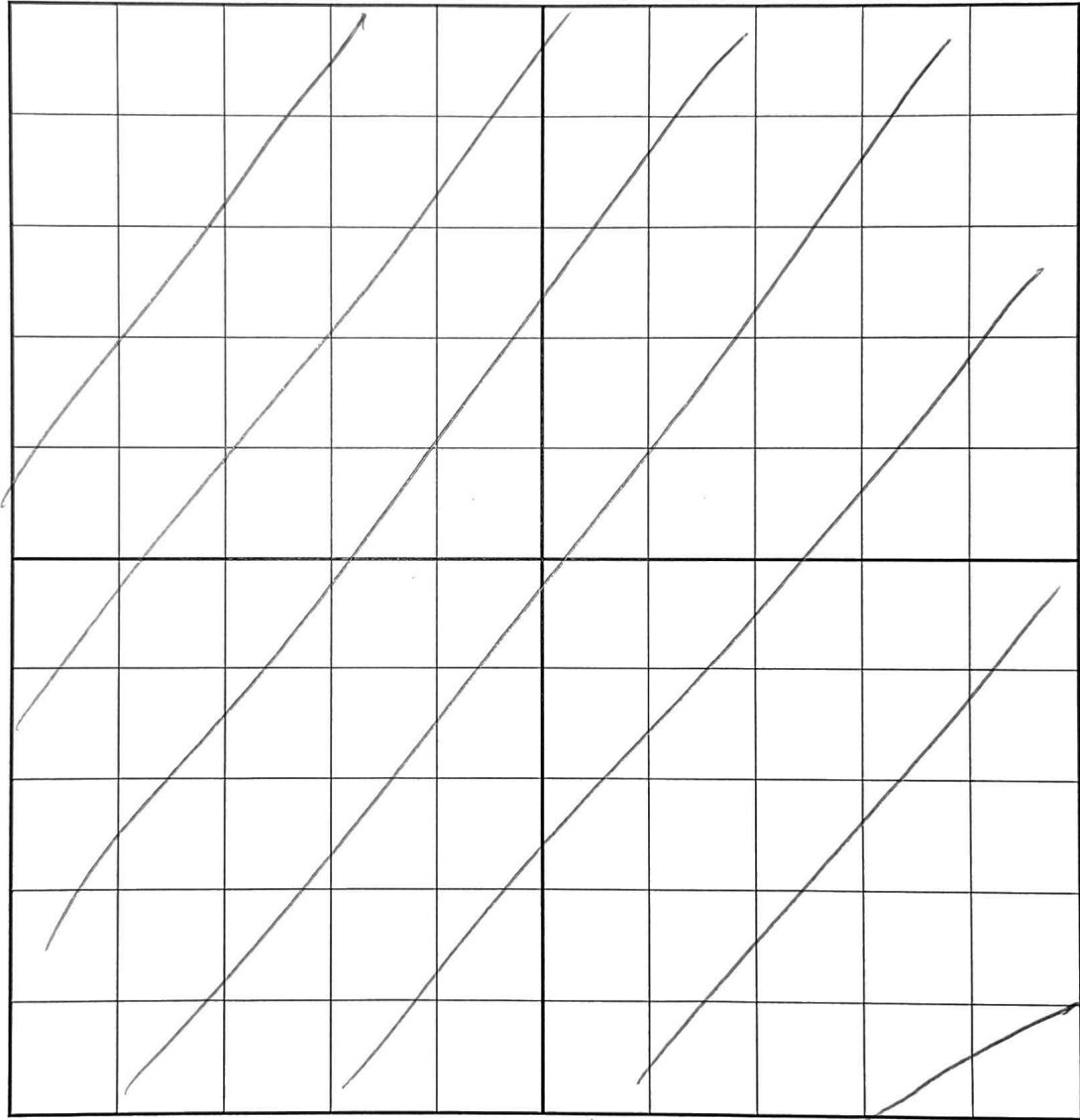
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSU, AZ</i>	
Grid or Polygon ID: <i>E6</i>	Team Number: <i>1</i>	Date: <i>8/10/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

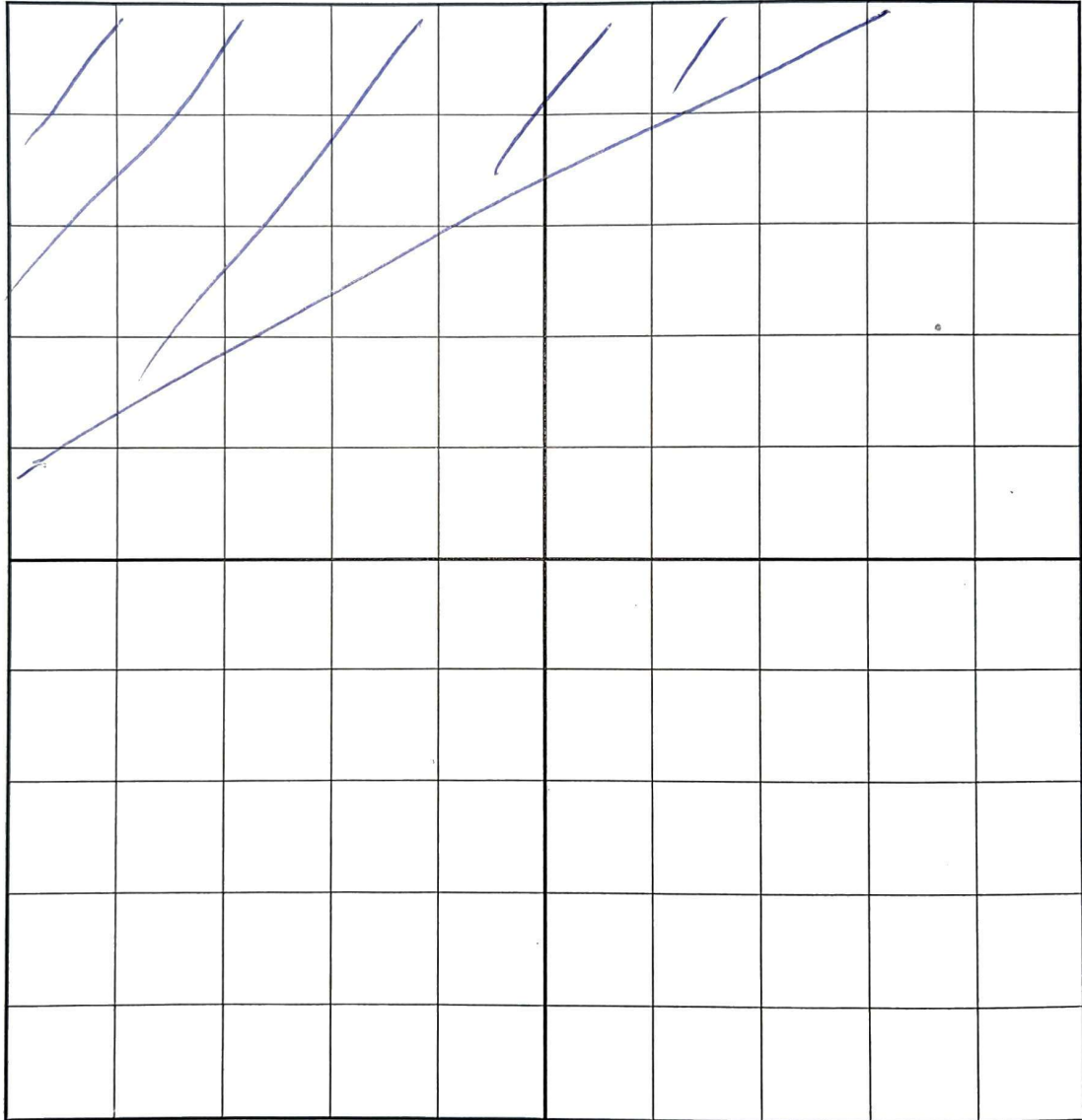
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>E7</i>	Team Number: <i>1</i>	Date: <i>8/10/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

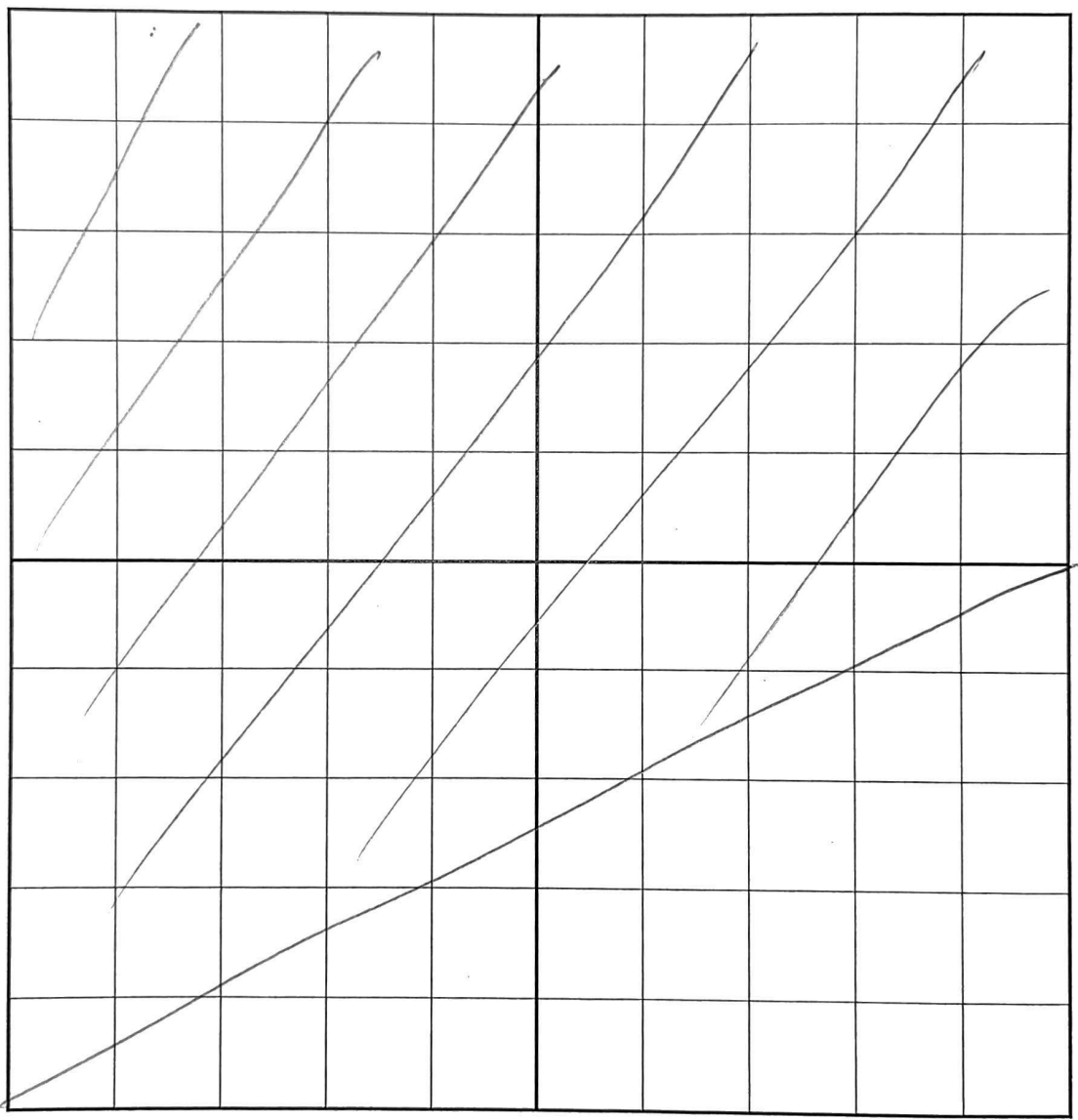
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>D7</i>	Team Number: <i>1</i>	Date: <i>8/10/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name:

RSA-313 MRS-02

Site Location (city/state):

HSV, AL

Grid or Polygon ID:

C8

Team Number:

1

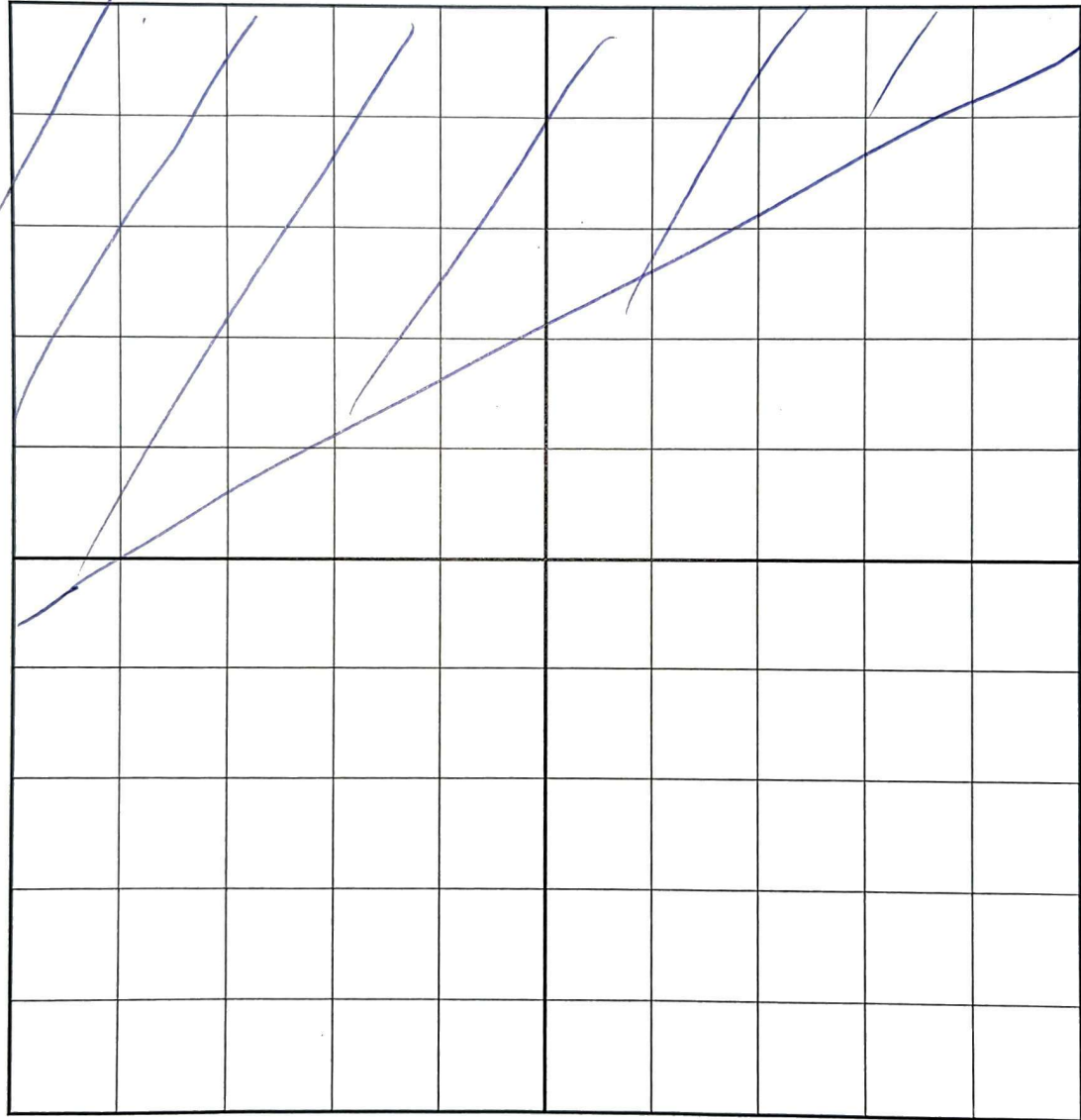
Date:

8/10/22

Grid X and Y Dimensions (check the appropriate box):

- 30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

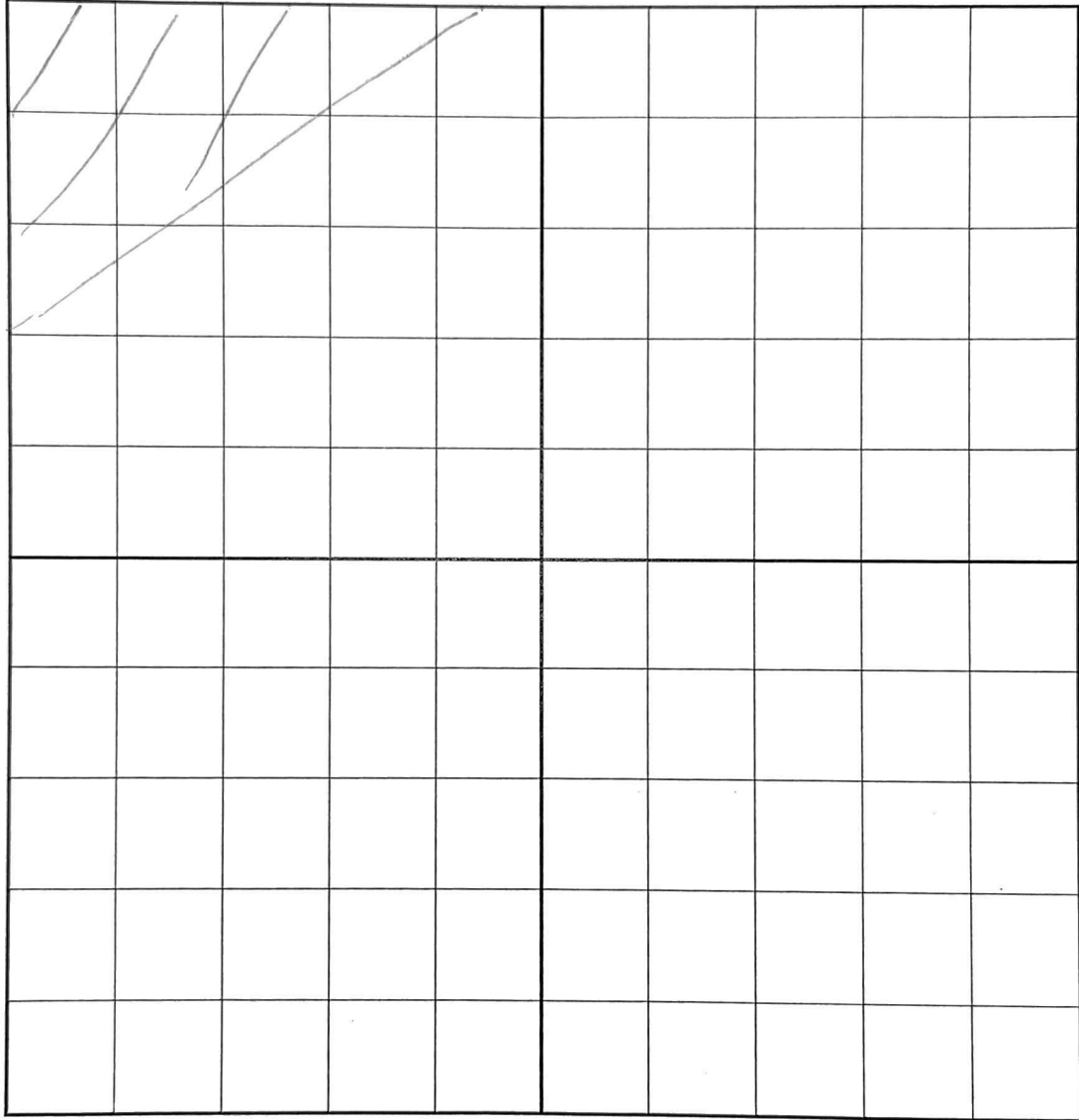
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>B9</i>	Team Number: <i>1</i>	Date: <i>8/10/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name:

RSA-313 MRS-02

Site Location (city/state):

HSU, AL

Grid or Polygon ID:

B8

Team Number:

1

Date:

8/10/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m

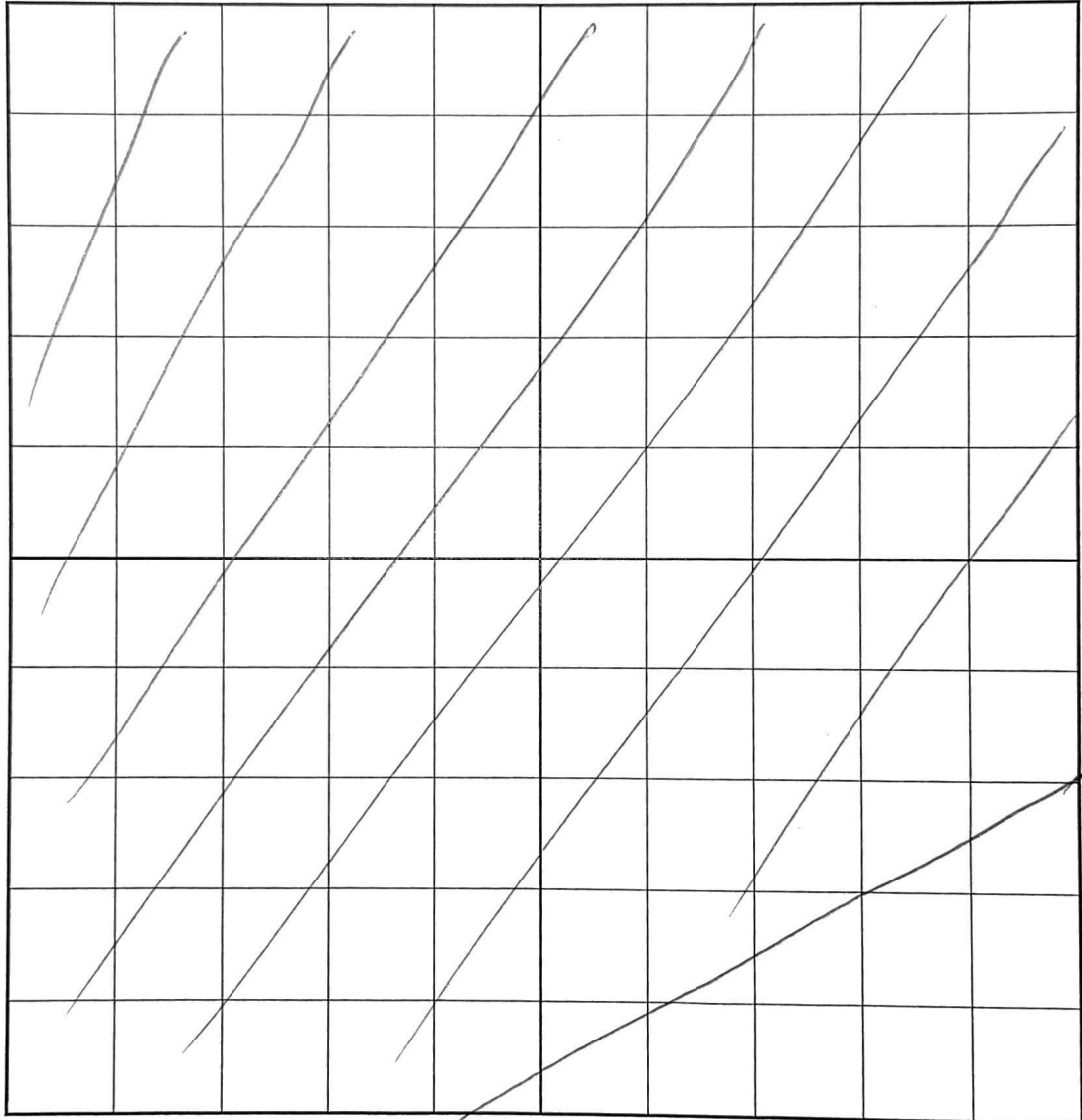
90ft x 90ft

100ft x 100ft

200ft x 200ft

Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

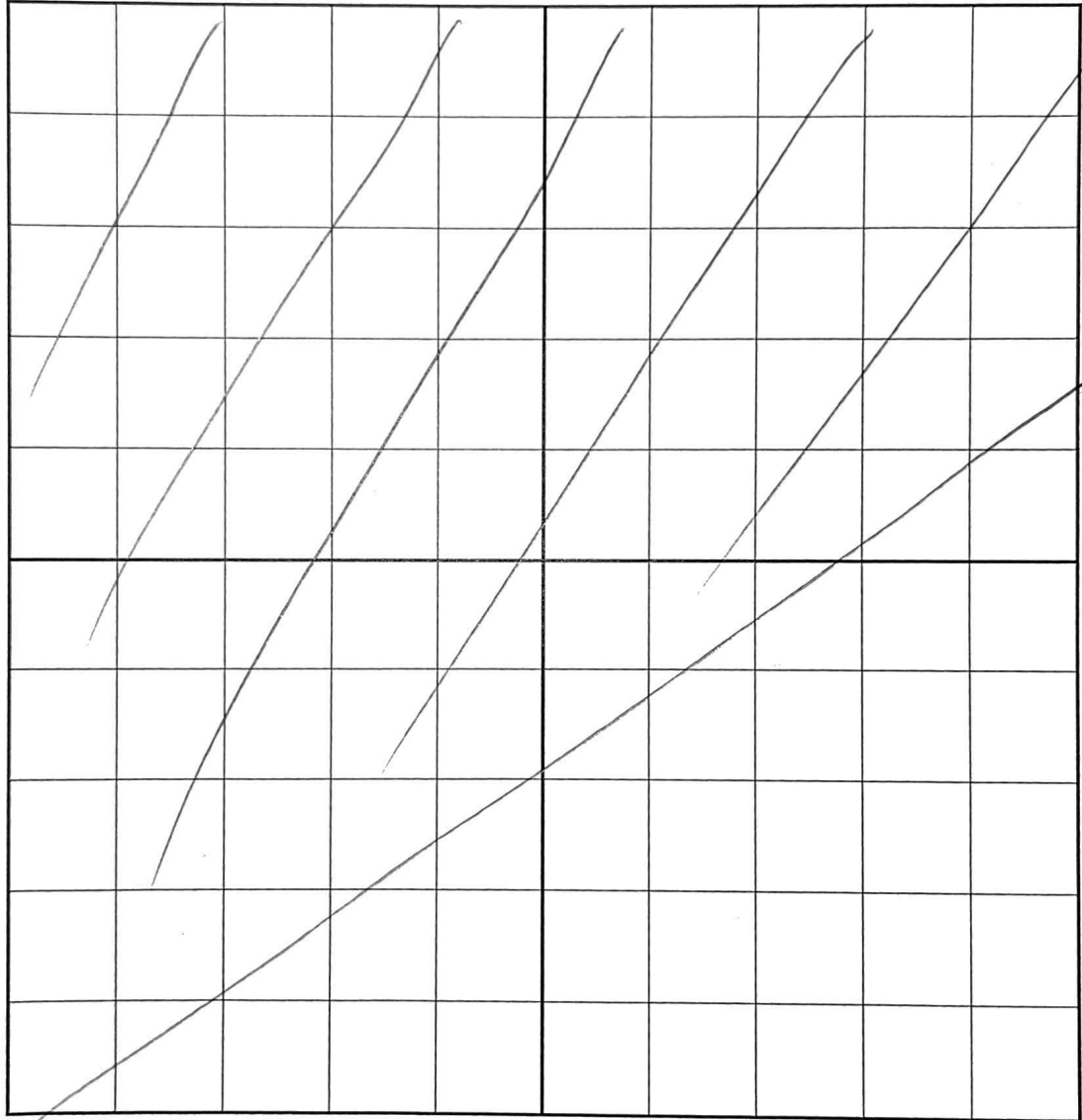
Grid Drawing Sheet

Site Name: <i>RSA-313 MRS-02</i>	Site Location (city/state): <i>HSV, AL</i>	
Grid or Polygon ID: <i>A9</i>	Team Number: <i>1</i>	Date: <i>8/10/22</i>

Grid X and Y Dimensions (check the appropriate box):

30m x 30m 90ft x 90ft 100ft x 100ft 200ft x 200ft Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Grid Drawing Sheet

Site Name:

RSA-313 MRS-02

Site Location (city/state):

HSV, AL

Grid or Polygon ID:

G5

Team Number:

1

Date:

8/10/22

Grid X and Y Dimensions (check the appropriate box):

30m x 30m

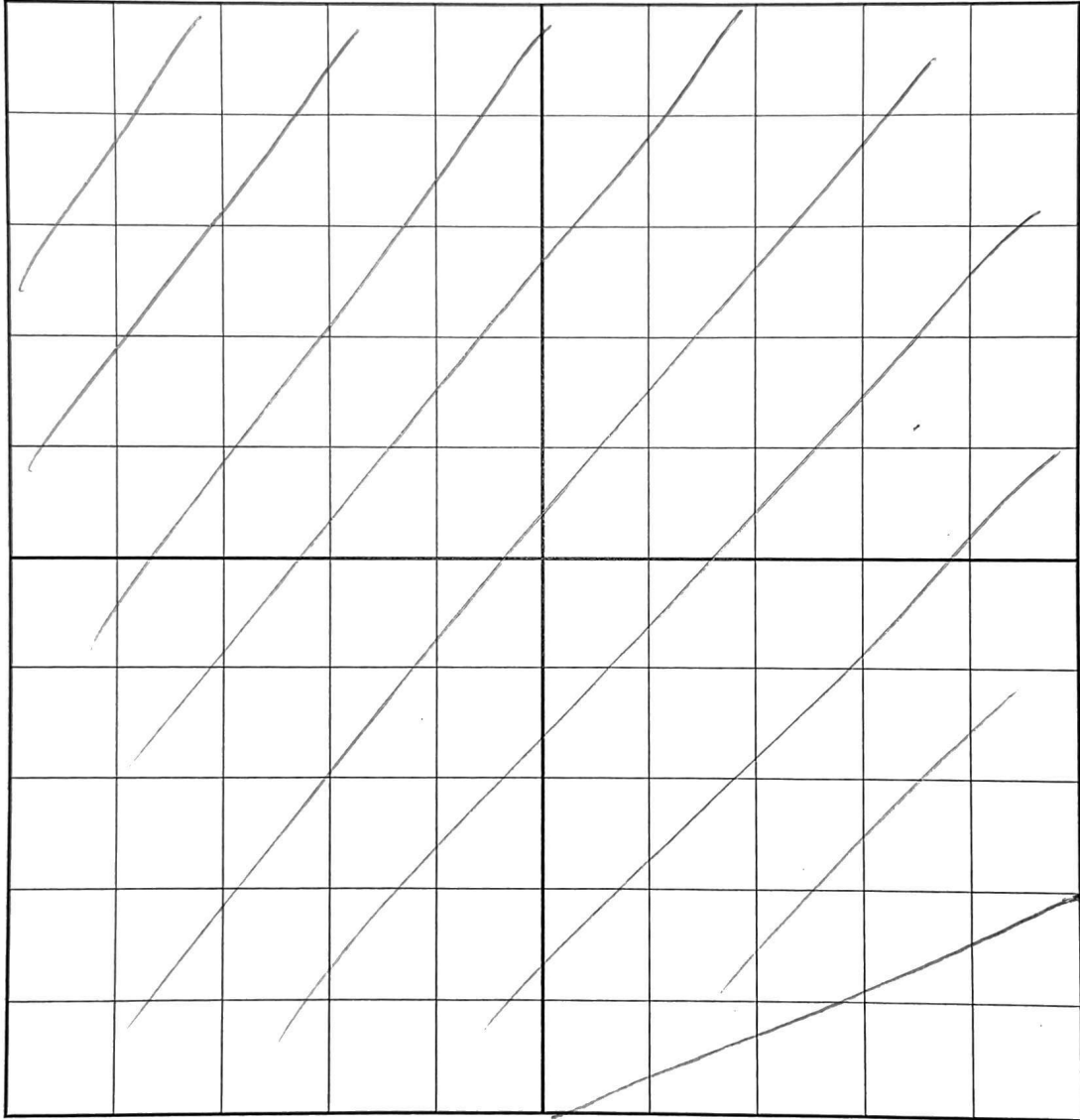
90ft x 90ft

100ft x 100ft

200ft x 200ft

Other _____

Draw in the Grid Box the areas not cleared due to obstacles, terrain, and etcetera. Draw MEC locations and other key data.



Comments:

Final
UltraTEM Screener Instrument Verification Strip (IVS)
Technical Memorandum:
Corrective Measures Implementation at
Multiple (9) Sites at the Redstone Arsenal
Madison County, Alabama
RSA-313-R-01, MRS-2

Prepared for:



U.S. Army Engineering and Support Center
Huntsville

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

October 2022

1. Introduction

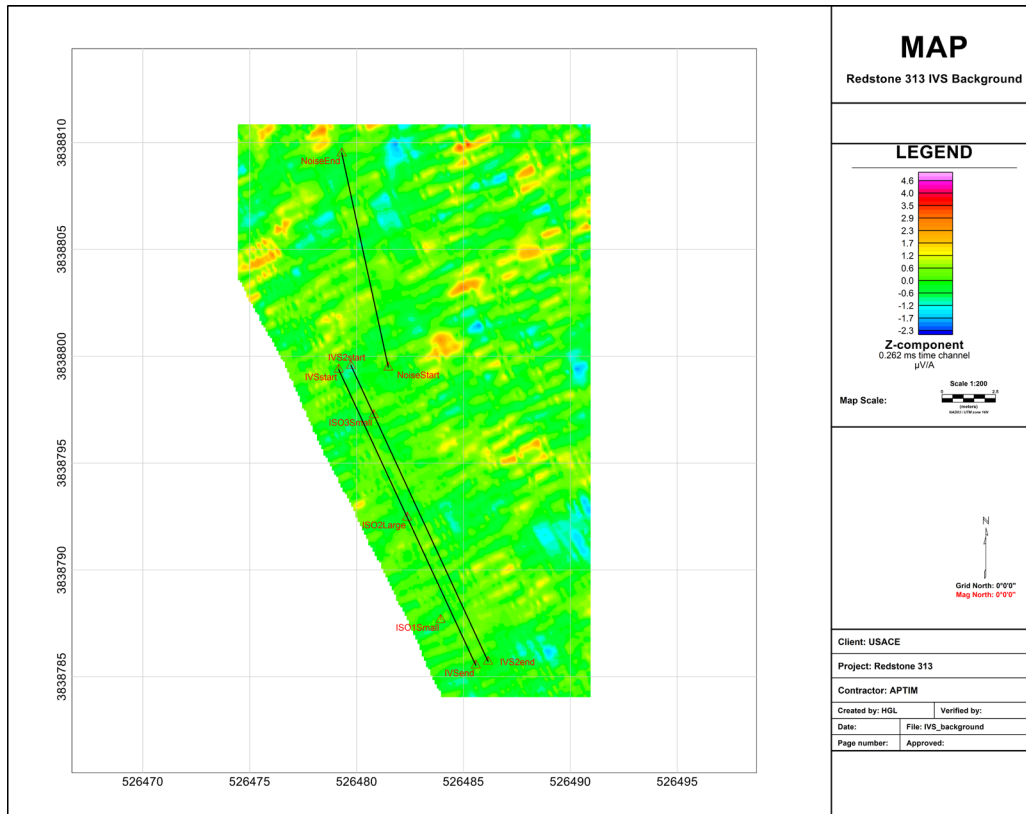
This technical memorandum summarizes the results of initial assembly and instrument verification of the UltraTEM Screener sensor for surveys at Munition Response Site (MRS)-2, located within the surface media site designated as RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Redstone Arsenal. Assembly of the system was performed in accordance with Standard Operating Procedure (SOP) AC-19 of the Quality Assurance Project Plan (Aptim Federal Services, LLC [APTIM], 2021) and initial Instrument Verification Strip (IVS) testing took place during the week of August 15, 2022.

Table 1 summarizes items emplaced at the RSA-313-R-01 IVS, and **Figure 1** shows filtered UltraTEM Screener data collected at the IVS: Z-component data in units of microvolts/ampere, median filtered, 0.262 millisecond [ms] time channel) and location of RSA-313-R-01 IVS seeds. As per the UltraTEM Screener User Manual, seeds 1 and 3 are offset from the IVS center line to verify operation of all receivers. Units are in meters (m).

Table 1. Items Seeded in the IVS

#	Easting (m)	Northing (m)	Depth (m)	Seed type	Azimuth	Dip
1	526484.008	3838787.671	0.11	Small ISO80	cross-track	horizontal
2	526482.376	3838792.625	0.55	Large ISO40	cross-track	horizontal
3	526480.755	3838797.234	0.11	Small ISO80	cross-track	horizontal

Figure 1. Gridded Data



2. UltraTEM Screener Measurement Quality Objective Summary

Table 2 summarizes all initial IVS measurement quality objectives (MQO) from Table 22.2 of the Quality Assurance Project Plan (APTIM, 2021) discussed in this memo. Field Work Variance 002 for the Quality Assurance Project updated the layout of the IVS to meet requirements of the UltraTEM system.

Table 2. UltraTEM Screener Assembly and Initial IVS MQOs

MQO	Definable Feature of Work (DFW)/SOP Reference	Frequency	Responsible Person/ Report Method/ Verified By	Acceptance Criteria	Failure Response	MQO passed? (reference)
Verify correct assembly	DFW 4/ SOP AC-19	Once following assembly	Field Team Leader/instrument assembly checklist/Project Geophysicist	As specified in assembly checklist	Make necessary adjustments and re-verify	Yes (3.1)
Initial Instrument Function Test	DFW 4/ SOP AC-19, AC-04	Once following assembly	Field Geophysicist/ Initial IVS Memorandum/Project Geophysicist	Response (mean static spike minus mean static background) within 20% of predicted response.	Make necessary adjustments and re-verify	Yes (3.2)
Initial dynamic positioning accuracy (IVS)	DFW 4/ SOP AC-19, AC-04	Once prior to start of dynamic data acquisition	Project Geophysicist/ IVS Memorandum/ QC Geophysicist	Derived positions of IVS target(s) are within 25cm of the ground truth locations	Make necessary adjustments and re-verify	Yes (3.3)
Initial derived polarizabilities accuracy (IVS)	DFW 4/ SOP AC-19, AC-04	Once during initial system IVS test	Project Geophysicist/ Initial IVS memorandum/ QC Geophysicist	Library match metric (calculated using primary polarizability only) ≥ 0.9	Root cause analysis/ corrective action	Yes (3.3)

Note: References in last column refer to sections in the memorandum.

3. UltraTEM Screener Measurement Quality Objective Details

3.1 Verify Correct Assembly

Documentation for correct assembly of the UltraTEM is presented in **Figure 2** and photographs of the assembly are presented in **Figure 3**. The measured height to the base of the sensor platform was 25 centimeters (cm). This agrees with the manufacturer’s specification and corresponds to a sensor height of 30 cm. For inversion of IVS and production data, a sensor height of 30 cm will be used.

Figure 2. UltraTEM Screener Assembly Checklist

Table 1: UltraTEM assembly and initial testing checklist. To be completed by the Field Team Leader.

QC Step	QC Process and Guidance Reference	Yes/No	Initial of Field Team Leader or Project Geophysicist
1. Assembly	Is the UltraTEM assembled in accordance with the published instructions and in the sequence specified in the UltraTEM manual?	Yes	JAS
2. Assembly: Cable	Are the cables connected in accordance with the published instructions and in the sequence specified in the UltraTEM manual?	Yes	JAS
3. Assembly: Battery System	Are the batteries connected in accordance with the published instructions and in the sequence specified in the UltraTEM manual?	Yes	JAS
4. Assembly: GPS + AHRS position	Is the GPS and AHRS firmly secured in the correct position in accordance with the published UltraTEM manual?	Yes	JAS
5. Correction: AHRS orientation	Has the correction for YAW been applied in BField? (as specified in the UltraTEM manual)?	Yes	JAS
6. Function test	Has the Function "Calib" test been validated?	Yes	JAS
7. AHRS test	Has the AHRS test data been collected in accordance with the published instructions in the UltraTEM manual?	Yes	JAS
8. IVS test	Has the IVS test data been collected in accordance with the published instructions in the UltraTEM manual?	Yes	JAS
9. Photograph the installation	Have the following photos been taken? 1. Entire assembly showing GPS and AHRS. 2. Height of sensor platform. 3. DAQ with all cables plugged in.	Yes	JAS


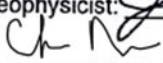
Field Team Leader or Project Geophysicist:  Date: 8/16/22
 QC Geophysicist:  Date: 08/24/2022

Table 2. UltraTEM Pre-survey checklist. To be completed by the Field Team Leader.

QC Step	QC Process and Guidance Reference	Yes/No	Initial of Field Team Leader or Project Geophysicist
1. GPS	Are UltraTEM Receiver Bank/s and Transmitter receiving 1PPS Signal?	YES	JAS
2. GPS	Is UltraTEM GPS Rover receiving Fix 4 RTK GPS positions?	YES	JAS
3. BTFIELD	Are BTFIELD and UltraTEM hardware all set to correct Mode for the project?	YES	JAS
4. Batteries	Is Transmitter Current within acceptable limits?	YES	JAS
5. Batteries	Are all battery voltages within acceptable limits?	YES	JAS
6. Function test 1 (am)	Has the morning Function "Calib" test been validated?	yes, Heesoo Chung, Project Geo, 8/17/22	
7. AHRS test	Has the AHRS test data been collected?	YES	JAS
8. IVS test 1 (am)	Has the morning IVS test data been collected?	YES	JAS
9. Field notes	Have the required field notes been taken?	YES	JAS

Field Team Leader or Project Geophysicist: JAS
 QC Geophysicist: Ch N

Date: 8/16/22
 Date: 08/24/2022

Figure 3. UltraTEM Screener Assembly Photos



Entire assembly



Height of sensor platform.

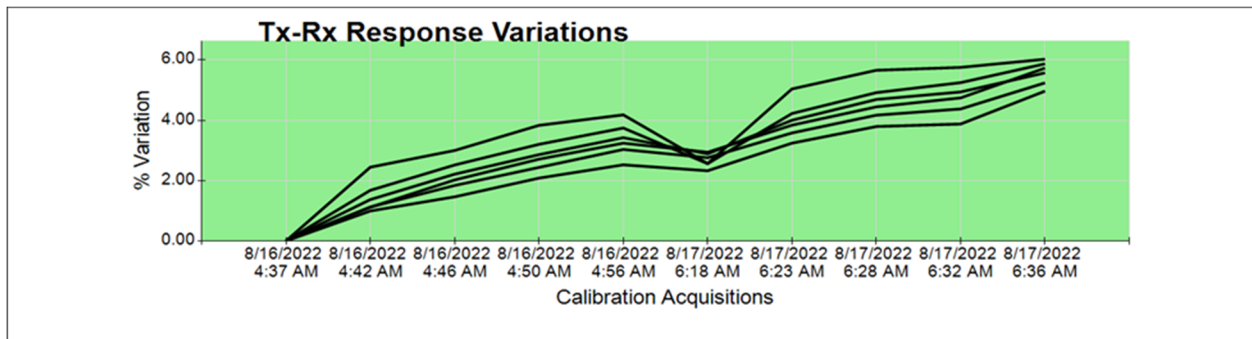


Data acquisition unit with all cables connected

3.2 Initial Instrument Function Test

The initial instrument function test for the UltraTEM Screener comprises a sequence of measurements where a reference item is placed over each receiver cube in the UltraTEM array. The measurements for coupled transmitters and receivers must be within 20% of the initial function test. **Figure 4** shows the measured initial function test data. There is good agreement between tests, with a maximum deviation from the initial measurements of 6.0%.

**Figure 4. Comparison of Measured Function Test Data (collected on 08/16/22 and 08/17/22)
Variation from the Initial Function Test (Survey Event CALIB_1F_220816_06:37:46)**

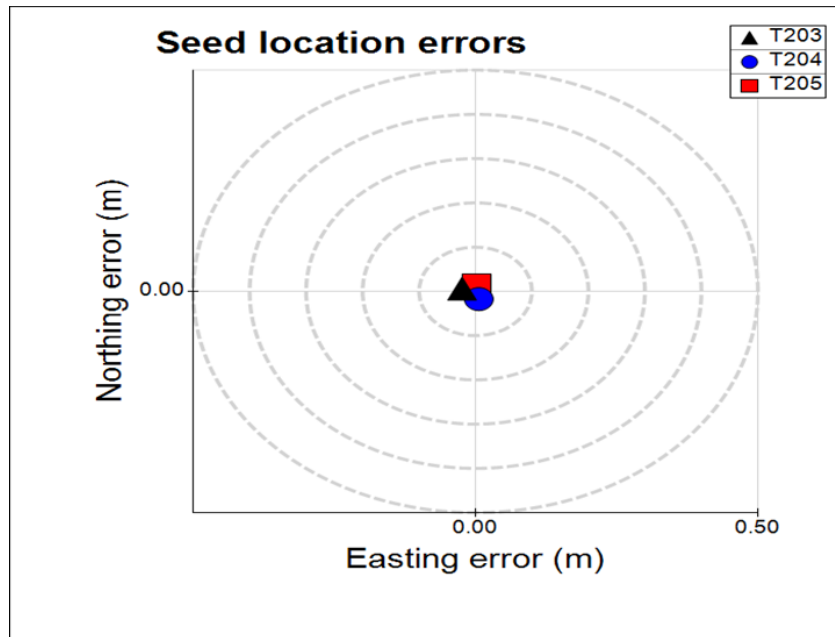


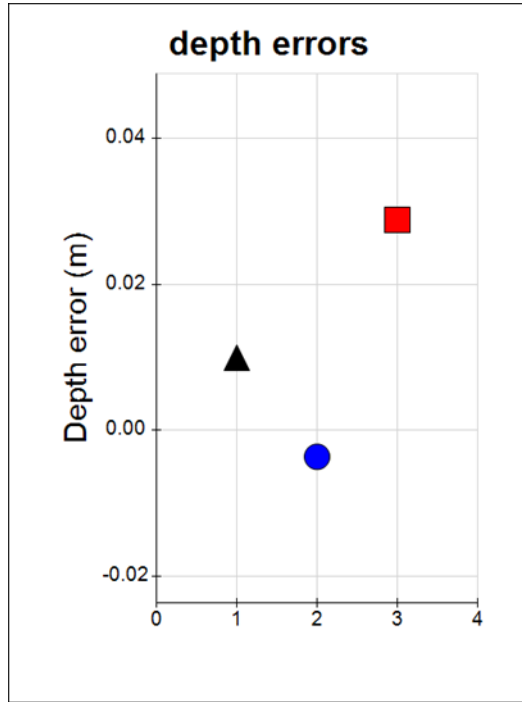
3.3 IVS Derived Target Position and Polarizability Accuracy

Five repeats of the IVS, each consisting of two partially overlapping lines over the IVS, were collected during initial IVS testing. The IVS data were filtered using a de-median filter of length 10 meters and inverted using time channels at 0.262 ms through 2.42 ms. IVS results for the fifth of the repeats is shown in **Figures 5 through 11**. The initial IVS MQOs for location and polarizability accuracy have been achieved for this IVS test.

**Figures 5-6. IVS Fit Offset for Data Collected during Initial IVS Testing
(IVS_1RL_220817_09:06:06).**

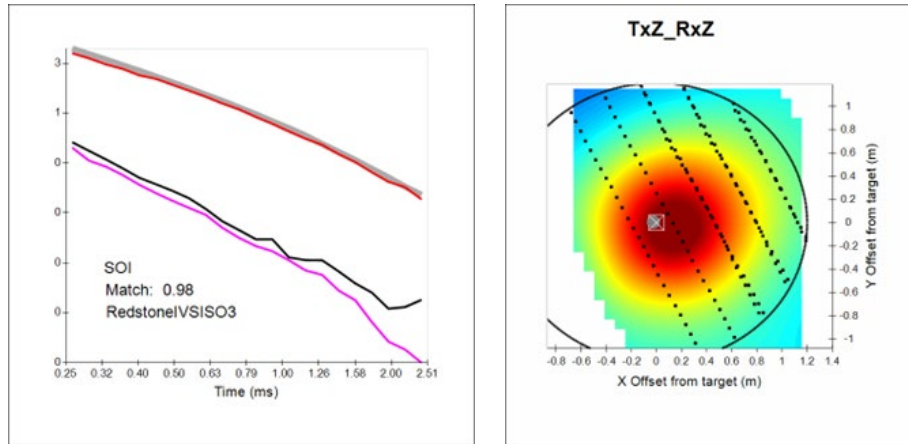
(Note: The black triangle is ISO1, blue circle is ISO2, and red square is ISO3.)

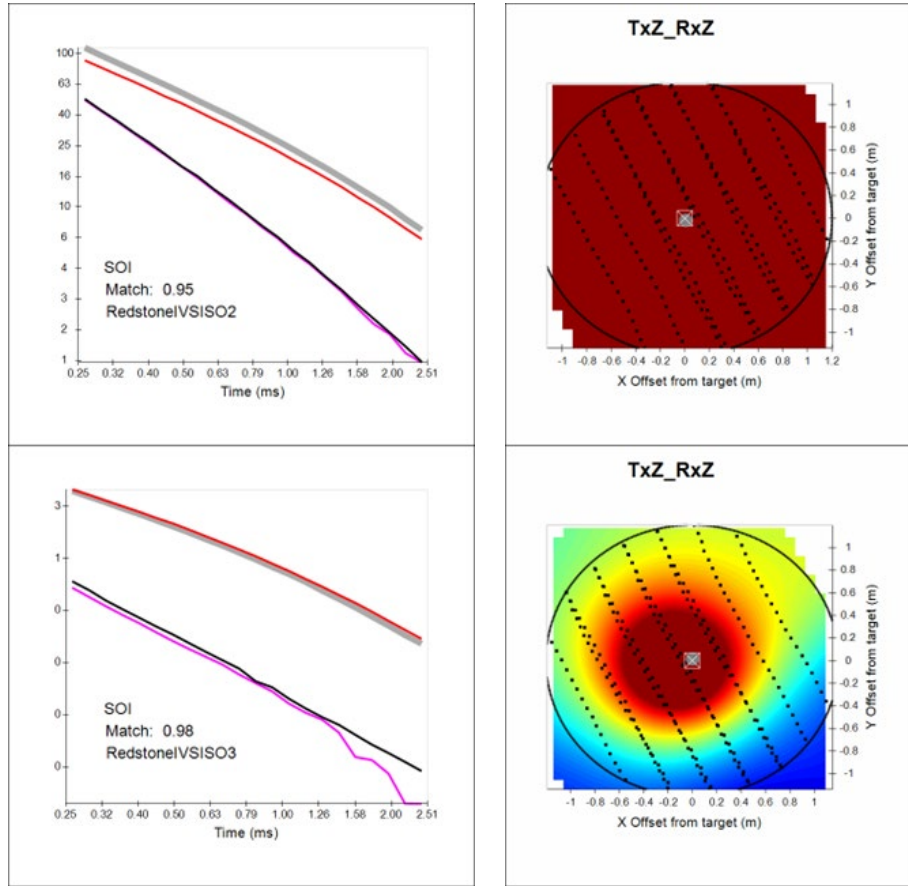




Figures 7 through 9 show the polarizability, match to the initial, and amplitude response for ISOs 1 through 3. The grey polarizability curves represent the initial run and the red curve is the current file.

Figures 7-9. Polarizability, Match to Initial, and Amplitude Response for ISOs 1-3

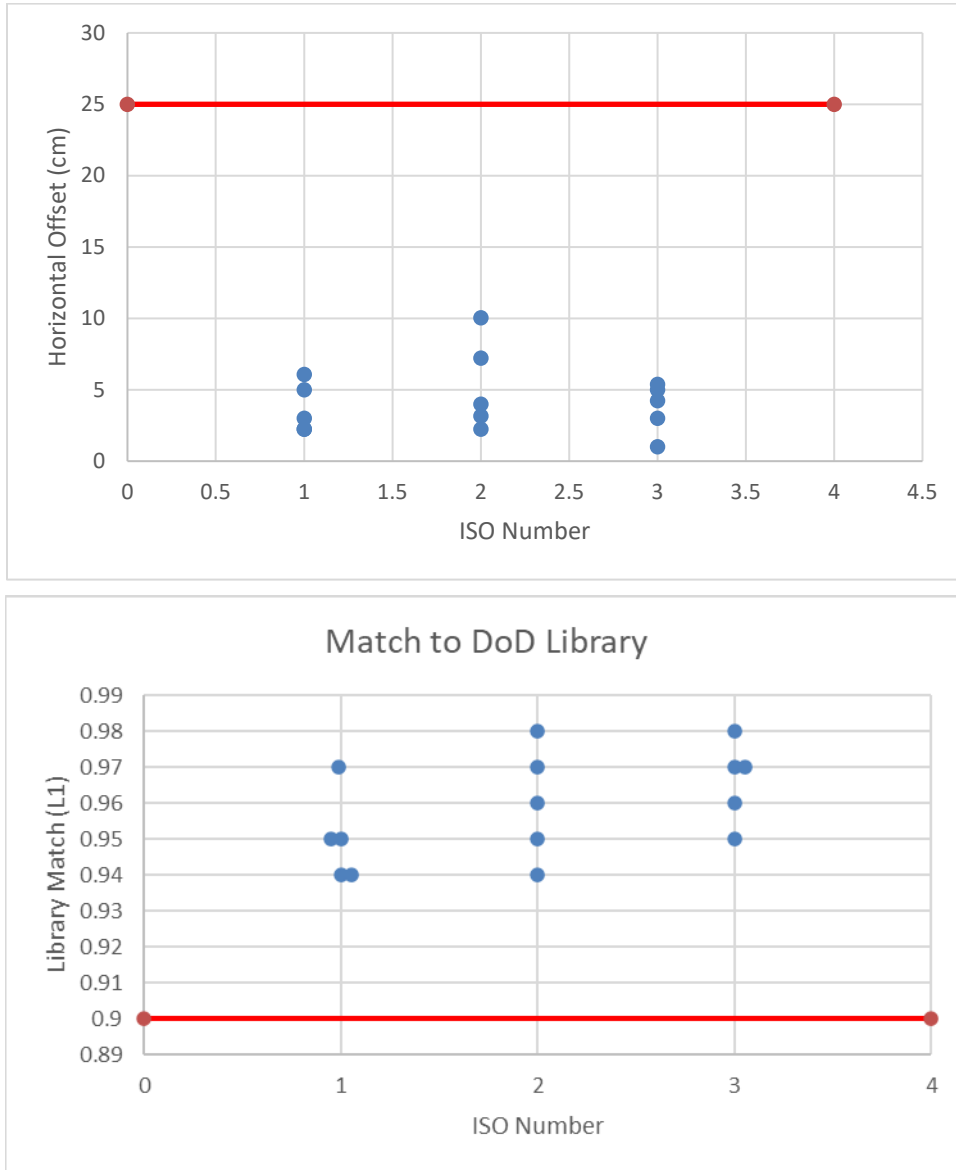




Figures 10 and 11 summarize the initial location and polarizability accuracy MQOs for all five repeats collected during initial IVS testing. The location accuracy results are acceptable (≤ 10 cm error in all cases). The 0.9 polarizability accuracy metric was achieved for all IVS tests.

Figures 10 and 11. Summary of Horizontal Positional Error (top) and Primary Polarizability Fits (bottom) for Five Repeats of the IVS Collected during UltraTEM Screener Initial IVS Testing

(Note: Red solid lines indicate MQO thresholds.)



4. Conclusions

The measurements and derived products described in this memorandum for the UltraTEM Screener pass all required MQOs identified in the Quality Assurance Project Plan (APTIM, 2021) for initial instrument assembly and testing. The Contractor concludes that the sensor can be deployed for advanced geophysical classification detection and screening surveys at RSA-313-R-01, MRS-2.

5. References

Aptim Federal Services, LLC (APTIM), 2021, *Final Revision 0, Uniform Federal Policy, Quality Assurance Plan, Corrective Measures Implementation at Multiple (9) Sites at Redstone Arsenal, Madison County, Alabama, RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Operable Unit 15*, July.

**Final
MetalMapper2x2 Instrument Verification Strip (IVS)
Technical Memorandum:
Corrective Measures Implementation at
Multiple (9) Sites at the Redstone Arsenal
Madison County, Alabama
RSA-313-R-01, MRS-2**

Prepared for:



**U.S. Army Engineering and Support Center
Huntsville**

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

November 2022

1. Introduction

This technical memorandum summarizes the results of initial assembly and instrument verification of the MetalMapper2x2 (MM2x2) sensor for surveys at Munitions Response Site (MRS)-2, located within the surface media site designated as RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Redstone Arsenal, Madison County, Alabama. Assembly of the system was performed in accordance with standard operating procedure SOP 500-01 of the Uniform Federal Policy (UFP) - Quality Assurance Project Plan (QAPP), (Aptim Federal Services, LLC [APTIM], 2021) and initial instrument verification strip (IVS) testing took place from 3 October to 12 October 2022.

Table 1 summarizes items emplaced at the RSA-313-R-01 IVS and **Figure 1** shows filtered UltraTEM data at the IVS collected prior to seeding. Units are in meters (m).

Table 1. Items seeded in the IVS and background location.

#	Easting (m)	Northing (m)	Depth (m)	Seed type	Azimuth	Dip
1	526484.008	3838787.671	0.11	Small ISO80	cross-track	Horizontal
2	526482.376	3838792.625	0.55	Large ISO40	cross-track	horizontal
3	526480.755	3838797.234	0.11	Small ISO80	cross-track	horizontal
Bkg	526481.270	3838799.700	N/A	Background	N/A	N/A

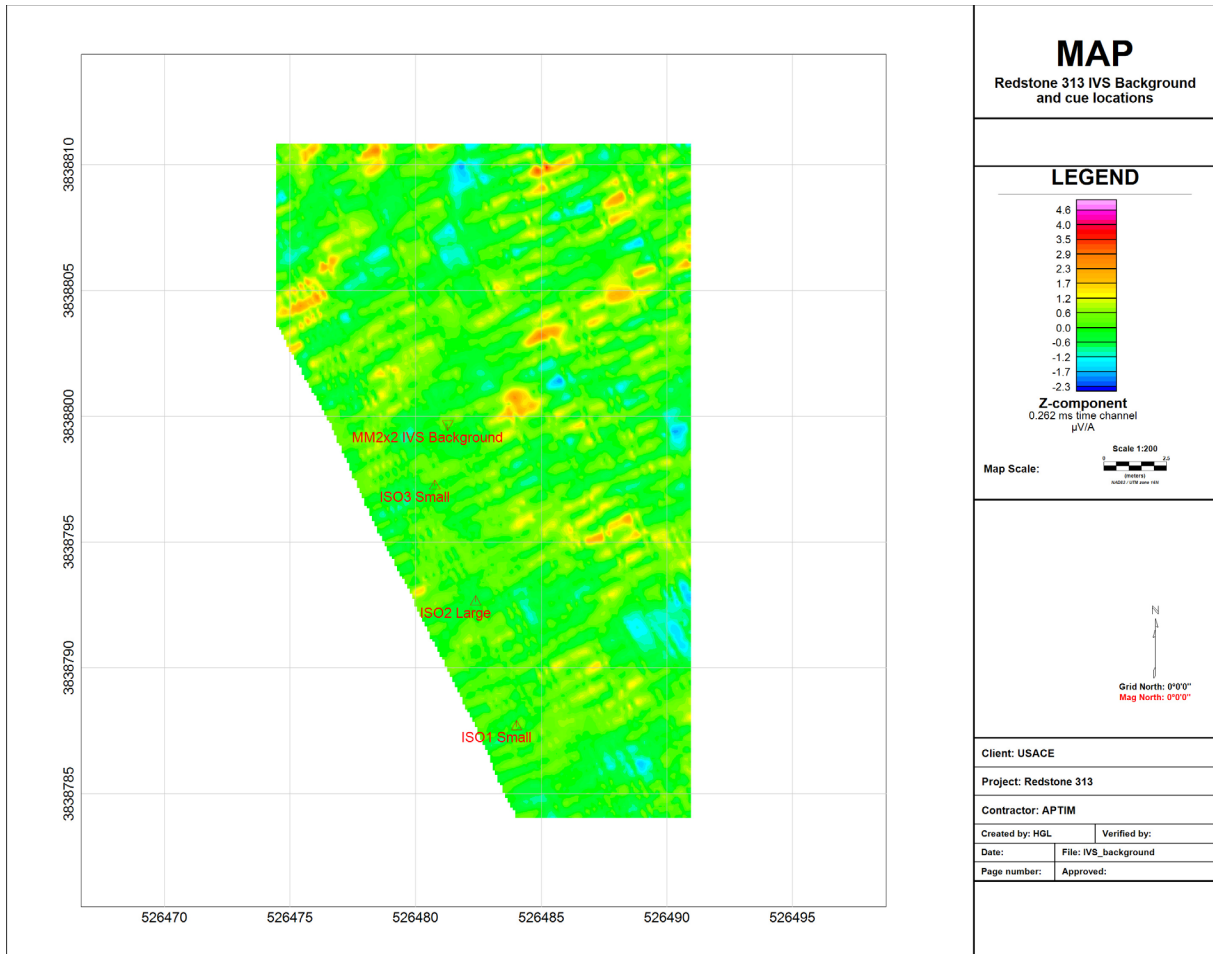


Figure 12. Filtered UltraTEM Screener data collected at the IVS. Z-component data in units of microVolts/Ampere, median filtered, (0.262 millisecond (ms) time channel) and location of RSA-313-R-01 IVS seeds and cued background.

2. MM2x2 Measurement Quality Objective Summary

Table 2 summarizes all initial IVS measurement quality objectives (MQO) from Table 22.3 of the UFP-QAPP (APTIM, 2021) discussed in this memo.

Table 1. MM2x2 assembly and initial IVS MQOs from Table 22.3 of the QAPP. References in last column refer to sections in the memorandum.

MQO	Definable Feature of Work (DFW)/SOP Reference	Frequency	Responsible Person/ Report Method/ Verified By	Acceptance Criteria	Failure Response	MQO passed? (reference)
Verify correct assembly	DFW 8/ SOP 500-01	Once following assembly	Field Team Leader/ instrument assembly checklist/Project Geophysicist	As specified in instrument assembly checklist	RCA/CA: Make necessary adjustments, and re-verify	Y (3.1)
Initial sensor function test	DFW 8,9/ SOP 500-02, SOP 500-08	Once following assembly	Field Team Leader/ instrument assembly checklist/Project Geophysicist	Library match metric ≥ 0.95 for each of the five sets of inverted polarizabilities	RCA/CA: Make necessary repairs/ adjustments and re-verify	Y (3.2)
Initial IVS background measurement and background verification (five background measurements, one centered at the flag and one offset at least 35 cm ³ sensor spacing in each cardinal direction)	DFW 8,9/ SOP 500-02, SOP 500-06	Once during initial system IVS test	Field Team Leader/ Initial IVS Memorandum/ Project Geophysicist	Receiving a pass from the UX-Analyze Background Validation Tool or validated equivalent.	RCA/CA: Reject/replace background location	Y (3.3)
Initial derived polarizabilities accuracy (IVS)	DFW 8,9/ SOP 500-02, SOP 500-08	Once during initial system IVS test	Project Geophysicist/ Initial IVS memorandum/QC Geophysicist	Library Match metric ≥ 0.9 for each set of inverted polarizabilities	RCA/CA	Y (3.4)
Derived target position accuracy (IVS)	DFW 8,9/ SOP 500-02, SOP 500-08	Once during initial system IVS test	Project Geophysicist/ Initial IVS Memorandum/QC Geophysicist	All IVS item fit locations within 0.25 meter of ground truth locations	RCA/CA	Y (3.4)

3. MM2x2 MQO Details

3.1 Verify Correct Assembly

The MM2x2 (serial number 1013) was assembled and tested in accordance with the checklist shown on **Figure 2**. Photographs of the assembled sensor are shown on **Figure 3**.

PREPARATORY ASSEMBLY QC CHECKLIST

This checklist must be completed by the Project or Field Geophysicist and checked by the QC Geophysicist during assembly and initial testing of an AGC sensor.

QC Step	QC Process and Guidance Reference	Yes/No	Initial of Field or Project Geophysicist
1. Assembly	Has the sensor been assembled in accordance with (IAW) the published instructions and in the sequence specified in this SOP?	Yes	KA
2. IMU Orientation Verification Testing	Has the installation procedure and calibration for the IMU orientation been completed IAW this SOP?	Yes	KA
3. Positioning System Testing	Has the positioning system been set up IAW the manufacturer's requirements, has the position been "fixed," and have the coordinates been transferred to the data acquisition computer?	Yes	KA
4. Installation Photography	Has a photograph showing the placement and orientation of the positioning system, cables, and IMU been taken?	Yes	KA
5. Sensor Function Testing	Has the sensor function test been performed IAW this SOP and have the results been uploaded to the field computer and project database?	Yes	KA
6. MQO Documentation	Have the appropriate MQOs from QAPP Worksheet 22 been achieved?	Yes	KA
7. Qualifications	Have the Project, QC, and Field Geophysicists and the Data Processor/Analyst met the requirement of QAPP Worksheets 4, 7, and 8?	Yes	KA

Project GP or Field Geophysicist: Kaitlyn Abernathy _____ Date: 10/11/2022 _____

Project GP or Data Processor/Analyst: *Heesoo Chung* _____ Date: 10/12/2022 _____

QC Geophysicist: *Charles Mann* _____ Date: 10/12/2022 _____

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HGL SOP 410.501.F01 (Rev. 0, 03/2022) 1 of 1

Figure 23. Completed MetalMapper2x2 Assembly Checklist.



Figure 34. Documentation of MetalMapper2x2 (serial number 1013) assembly at Redstone Arsenal. Full sensor assembly (top left), electronics package (top right), and IMU (bottom).

3.2 Initial Instrument Function Test

The static function test directly compares the amplitudes of the measured data to a known reference measurement performed at the factory under controlled conditions. The MQO requires that the response (mean static spike minus mean static background) is within 20% of the predicted response for all monostatic Tx/Rx combinations.

The top panel of **Figure 4** plots the sum of the response of 84 time channels from 0.104 ms to 8.116 ms for the static function test that was acquired at the IVS as part of the initial IVS testing. The bottom panel on **Figure 4** plots the response variation for the function test. The observed maximum variation from the reference measurement is 12.7%. The static function test MQO is therefore satisfied. The test performed at 14:15 shows as a red triangle because the function test was done more than 5 minutes from when the background test was performed. Despite a separation of more than 5 minutes, the background remained stable and the static function test passed.

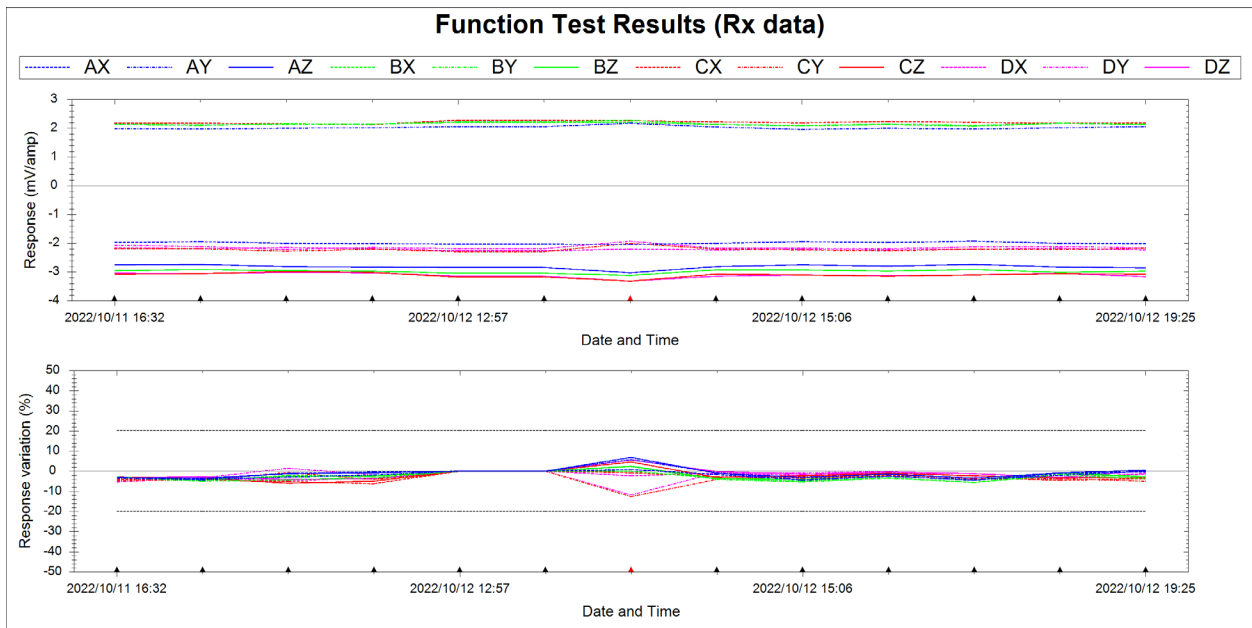


Figure 54. Top: Static function test response for receiver/transmitter combinations. The plotted value is the sum of time channels from 0.104 to 8.116 ms.

Figure 4. Bottom: response variation for the function test. In both plots, lines are color-coded based on receiver and transmitter component. All receiver and transmitter components are tested.

3.3 IVS Background Validation

For background validation, a cued measurement is taken at the designated location followed by four measurements displaced approximately 30 centimeters (cm) in four directions, each separated by approximately 90°. The validation procedure consists of the following steps:

- Synthetically seeding a target into each of the displaced measurements. The target used is chosen based on the conceptual site model for the project as specified in Worksheet 10.1 of the UFP QAPP (APTIM, 2021): a 4.2-inch mortar (DoD library file 4.2-in_M329A2_BP_30_001_11) at 0.66 m depth.
- Generating synthetic data by modeling the response of the synthetically seeded target.
- Background correcting the synthetic data using the center measurement for the background.
- Inverting the background-corrected synthetic data to derive model parameters.
- Comparing the predicted polarizabilities with the set of reference polarizabilities that were used in the initial synthetic seeding step.
- Calculating a polarizability fit metric that measures the similarity of the predicted and reference polarizabilities.
- The MQO for background validation requires that a polarizability fit metric of ≥ 0.9 is required for predicted polarizabilities derived at each of the four displaced locations.

Results of the Oasis montaj Background Validation tool are shown on **Figure 5**.

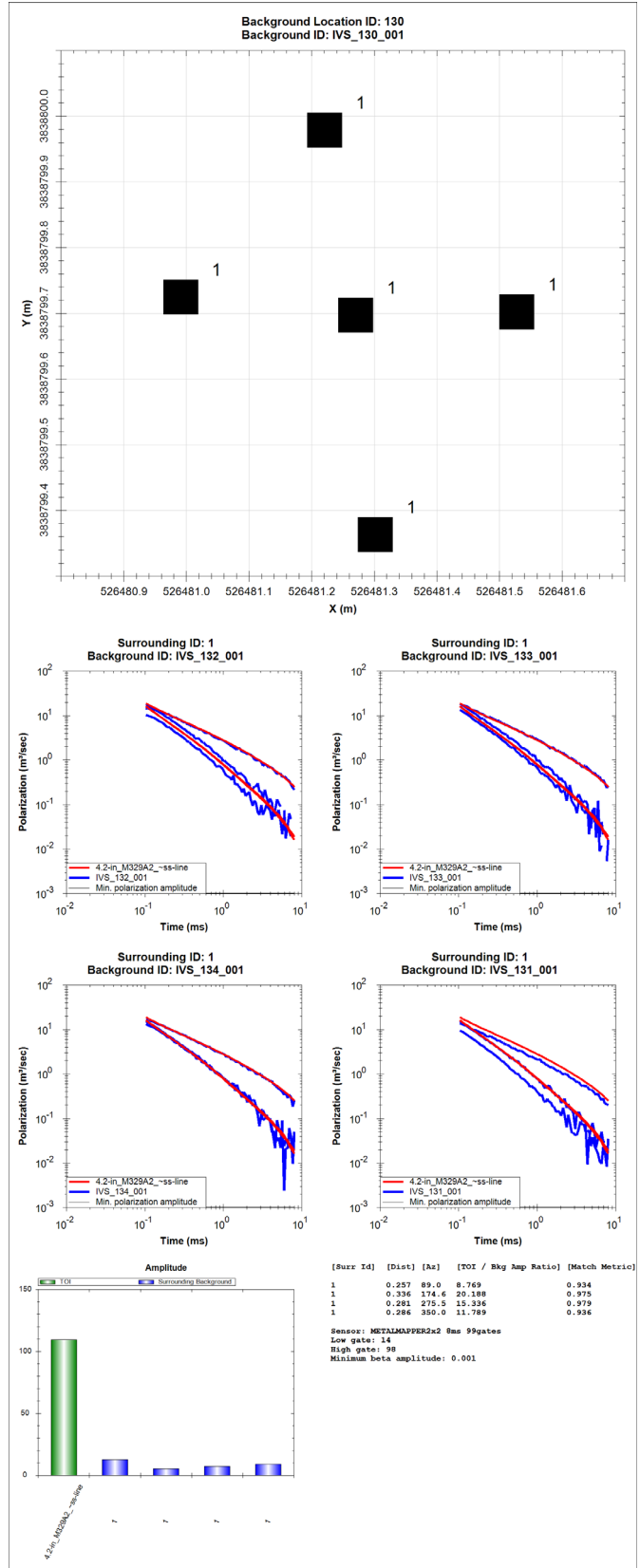


Figure 6. Oasis montaj Background Validation Tool results.

Background validation results are summarized in **Table 3**. Using a seed depth of 0.66 m, the lowest background polarizability match is 0.934.

Table 3. IVS Background Validation Measurements.

Loc #	Seed CSV file	Easting (m)	Northing (m)	Offset (m)	Polarizability fit
1	RSA313 IVS SBR 130 2022284 000	3838799.70	526481.27	n/a	n/a
2	RSA313 IVS SBR 131 2022284 000	3838799.98	526481.22	0.257	0.934
3	RSA313 IVS SBR 132 2022284 000	3838799.70	526481.53	0.336	0.975
4	RSA313 IVS SBR 133 2022284 000	3838799.36	526481.30	0.281	0.979
5	RSA313_IVS_SBR_134_2022284_000	3838799.72	526480.99	0.286	0.936

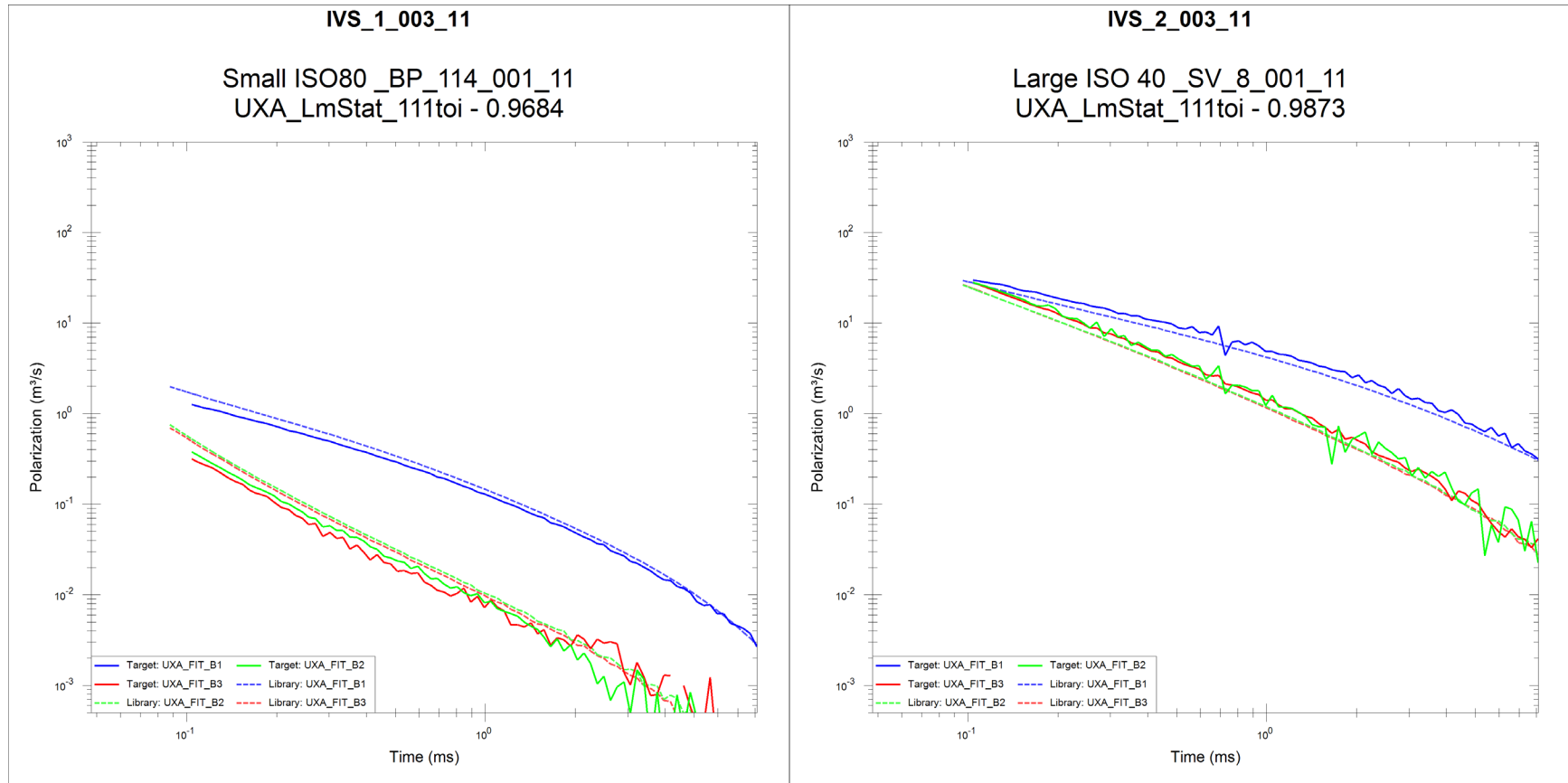
Table 3 details the 5-point background validation measurements at the IVS. The MQO is passed if the polarizability fit is ≥ 0.9 . Location #1 corresponds to center measurement. Offset is distance from center measurement location. Polarizability fit results are for seed depths of 0.66 m.

3.4 IVS Derived Target Position and Polarizability Accuracy

Cued data were collected over each IVS item. Soundings were background corrected using the measurement at the IVS background location (location Bkg on **Figure 1**). Each sounding was inverted to solve for one sources.

MQOs for the initial IVS measurements require that (1) all polarizabilities match library polarizabilities with a fit of ≥ 0.90 ; (2) predicted locations from inversion are within 0.25 m of ground truth locations; and (3) transmitter current for all measurements, including backgrounds, is between 6 and 9 amps. MQOs for target location accuracy and polarizability accuracy passed for all targets. The measured instrument current range of 9.3 to 9.7 amps are outside the QAPP MQO acceptance criteria but are within normal expected values and do not represent a problem with the instrument or data. The MQO for maximum transmitter current does not match the instrument manufacturer’s guidance and will be revised as described in minor Field Work Variance -003. The maximum horizontal offset was 12.7 cm and the maximum vertical offset was 3.6 cm. The minimum library polarization match was 0.931, however, this was while testing a battery that was found to quickly degrade. This particular battery will no longer be used. The next lowest match was 0.967.

For ongoing IVS surveys, polarizabilities derived from the initial IVS measurements will be used for ongoing polarizability matching.



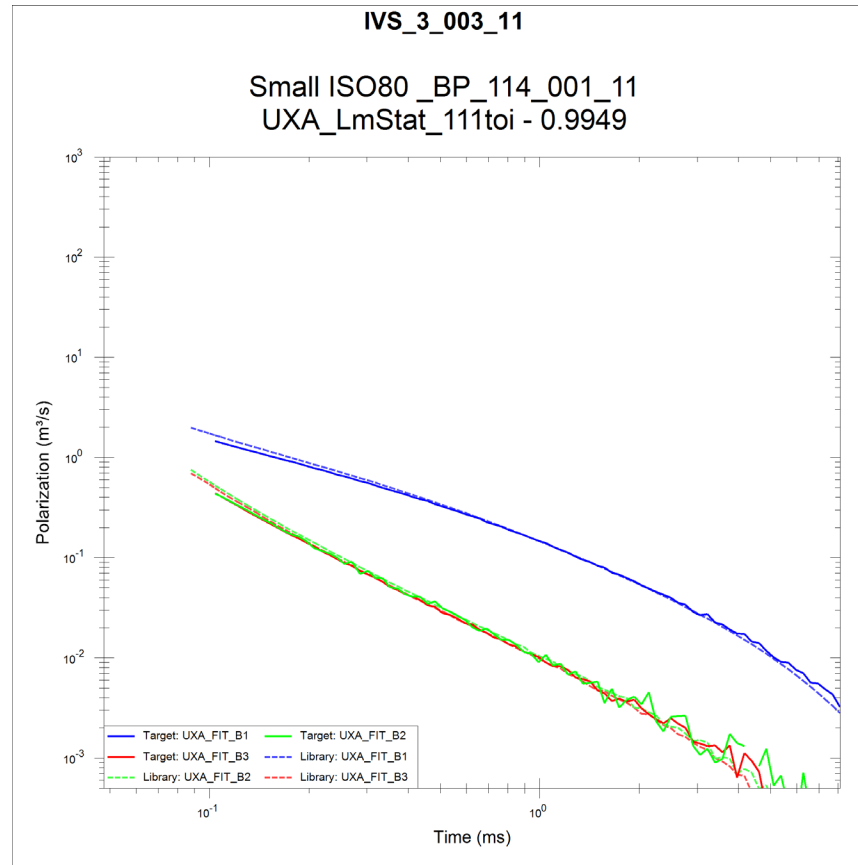


Figure 6. Initial IVS polarization curves compared to the DoD library for cued MM2x2 data collected during initial IVS testing.

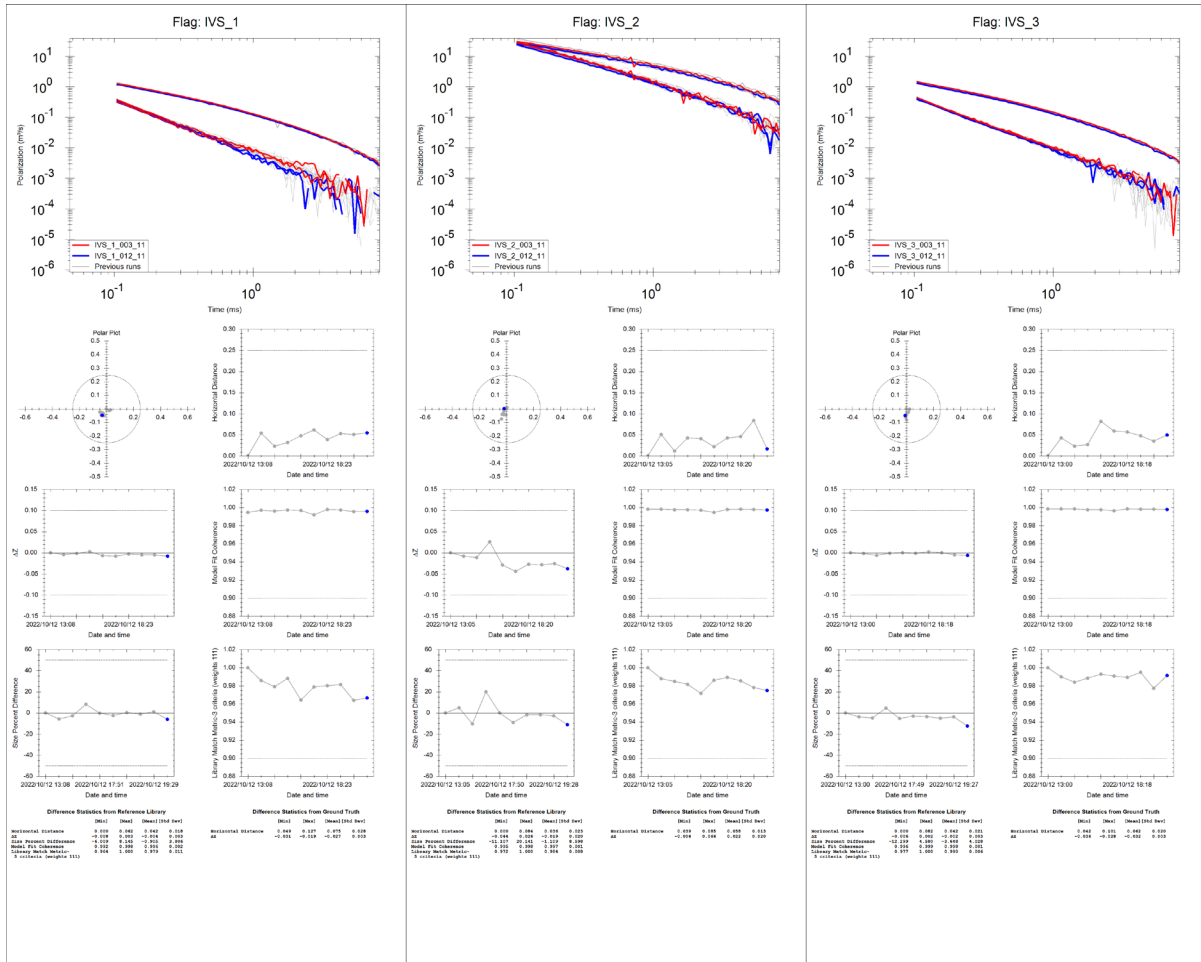


Figure 7. IVS results for all data collected on 10/12/22. The data are compared to the initial IVS measurement. This day included data collected with different cables and batteries for troubleshooting purposes. All results were acceptable. However, there was a decrease in fit when using battery #3 (the final two measurements). This battery was found to quickly degrade during previous days and will no longer be used.

The top row of **Figure 7** details the recovered polarizabilities (blue lines) for each emplaced IVS target, together with the initial polarizabilities (red) collected at this IVS. The polarizability curves between observed and initial polarizabilities are shown in the top of each plot. The second row left panel shows the offset between the observed and initial modeled source location. The second row right panel shows the total horizontal offset. The third row left panel shows the vertical offset. The third row right panel shows the model fit coherence. The fourth row right panel shows the estimated size percent difference (this is not an MQO). And lastly the fourth row left panel shows the library match metric comparing the observed and initial polarizabilities.

4. Discussion and Conclusions

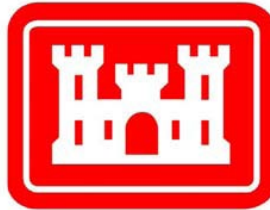
The measurements and derived products at the initial IVS described in this memo for the MM2x2 sensor (serial number 1013) deployed at RSA-313-R-01 passed all required MQOs identified in the UFP QAPP (APTIM, 2021) for instrument assembly and testing. The testing and troubleshooting stage took many days as the results at the IVS were inconsistent. The MM2x2 backpack, cables, MM2x2 coils/cubes, and batteries were systematically replaced and tested. Battery #3 was found to quickly degrade after charging and will not be used. No cued data were collected with battery #3. Static Background validation files collected with this battery will be recollected. Sensor 1013 gives high quality results with two sets of cables and the other batteries. The Contractor concludes that the sensor can be deployed for advanced geophysical classification cued surveys at RSA-313-R-01.

5. References

APTIM, 2021, *Final Revision 0, Uniform Federal Policy, Quality Assurance Project Plan, Corrective Measures Implementation at Multiple (9) Sites at Redstone Arsenal, Madison County, Alabama, RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Operable Unit 15*, July.

**UltraTEM Screener Data Usability Assessment:
Corrective Measures Implementation at
Multiple (9) Sites at the Redstone Arsenal
Madison County, Alabama
RSA-313-R-01, MRS-2**

Prepared for:



**U.S. Army Engineering and Support Center
Huntsville**

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

February 2023

1. Introduction

This Data Usability Assessment (DUA) report provides a review of UltraTEM Screener data collected using Advance Geophysical Classification (AGC) methods at Munitions Response Site (MRS)-2, located within the surface media site designated as RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Redstone Arsenal. The UltraTEM Screener data were collected with a real time kinematic global positioning system. A total of 18.5 acres were surveyed from 17 August 2022 to 29 August 2022.

This Dynamic DUA covers the following Definable Features of Work (DFW) as discussed in Worksheet Nos. 14.0 *Definable Features of Work and Associated Tasks*; 17.0 *Sampling Design and Project Work Flow*; 22.0 *Equipment Testing, Inspection, and Quality Control*; and 37.0 *Data Usability Assessment of the RSA-313-R-01 UFP-Quality Assurance Project Plan (QAPP) (APTIM, 2021)*:

DFW 4: ASSEMBLE ADVANCED GEOPHYSICAL SENSOR AND TEST SENSOR AT INSTRUMENT VERIFICATION STRIP (IVS)

DFW 5: CONDUCT DETECTION SURVEY

DFW 6: CONDUCT DETECTION SURVEY PROCESSING AND TARGET SELECTION

DFW 7: VALIDATE DETECTION SURVEY AND CUED TARGET LIST

QAPP Worksheet No. 37, Table 37.1 Data Usability Assessment for Dynamic AGC Data

STEP 1: PROJECT OBJECTIVES AND SAMPLING DESIGN			
Evaluation	Yes/No	Reference	Comments
<i>Are the dynamic Data Quality Objectives (DQO) and Measurement Performance Criteria (MPC) still applicable?</i>	Yes	QAPP Table 22.2 Detection Survey (UltraTEM Screener Person-Portable) and Worksheet No. 12 Measurement Performance Criteria	
<i>Are the underlying assumptions in the DQOs and MPCs still valid?</i>	Yes		
<i>If relevant DQOs, MPCs, or Measurement Quality Objectives (MQO) for dynamic data have changed, are changes documented?</i>	Not applicable		
<i>Is the dynamic sampling design consistent with project objectives?</i>	Yes		

STEP 2: REVIEW THE DATA VERIFICATION AND VALIDATION OUTPUTS			
Activity	DFW 4: ASSEMBLE ADVANCED GEOPHYSICAL SENSOR AND TEST SENSOR AT IVS		
Data Output/Record	Verified? (Y/N)	Validated? (Y/N)	Briefly Describe How the Data Output Supports Verification and/or Validation of the Activity
<i>IVS Technical Memoranda: UltraTEM</i>	Yes	Yes	
<i>Production Area Quality Control (QC(=) Seed Report</i>	Yes	Yes	
Activity	DFW 5, 6 and 7: CONDUCT DETECTION SURVEY and CONDUCT DETECTION SURVEY PROCESSING AND TARGET SELECTION and VALIDATE DETECTION SURVEY AND CUED TARGET LIST		
Data Output/Record	Verified? (Y/N)	Validated? (Y/N)	Briefly Describe How the Data Output Supports Verification and/or Validation of the Activity
<i>UltraTEM Data Deliverable(s)</i>	Yes	Yes	
<i>UltraTEM QC Deliverable(s)</i>	Yes	Yes	
<i>Root Cause Analysis (RCA)/Non-Copnformance Report (NCR)</i>	Yes		<p>RCA 01 documents a seed not placed on the cued list. The RCA led to discussions with Black Tusk Geophysics (BTG) about appropriate parameters in the BTField software. Additional targets were added where the merge radius had been set too large. Additionally, processing parameters in the Informed Source Selection step were changed to fix too strict of model failure parameters. All data was reprocessed with the updated parameters. This does not affect data usability as all data was reprocessed.</p> <p>RCA 02 documents a seed with too great a horizontal offset. The cause was determined to be the seed ground truth being incorrect as the seed shifted after initial placement. This likely occurred when the hole was backfilled with the mini excavator. This issue does not affect data usability.</p> <p>RCA 03 documents a seed which was not placed on the cue list. The target was properly modeled and selected but inadvertently marked as being within a Saturated Response Area (SRA). All targets marked as within an SRA were double checked, this does not affect data useability.</p>
<i>Field Change Request</i>	NA		
<i>Weekly Geophysical QC Reports</i>	Yes		
<i>Seed Tracking Log</i>	Yes	Yes	
<i>Target Selection Technical Memo</i>	Yes		
<i>Verification Cues</i>	Yes	Yes	157 dynamic targets filtered during the ISS step for having a size below the threshold were cued in order to verify the size threshold. Of these, 7 are marked as Inconclusive and are on the dig list, so final

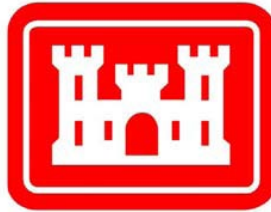
		verification is pending until intrusive work is done. 145 are category 3 and 5 are category 0 with no observable response in the decay plots. These 150 all support the size threshold.
STEP 3: DOCUMENT DATA USABILITY, UPDATE CSM, AND DRAW CONCLUSIONS		
Evaluation	Yes/No	Comments
<i>Have the relevant DQOs/MPCs for dynamic data been met?</i>	No	Some QC seeds were missed as documented in RCAs 01-03, but updates to the processing as outlined in RCA 01 means all DQOs have ultimately been met.
<i>Can the dynamic data be used as intended?</i>	Yes	
<i>Are there limitations on dynamic data use?</i>	Yes	Areas which were inundated with water were inaccessible to the AGC sensor. These areas have been marked off and will need to be investigated using analog methods in the follow-on work.
<i>Is there new information to be added to the Conceptual Site Model (CSM) and, if so, does the CSM need to be updated?</i>	No	
STEP 4: DOCUMENT LESSONS LEARNED AND MAKE RECOMMENDATIONS		
Evaluation	Yes/No	Comments
<i>Could the DQOs, MPCs, or sampling design have been improved for similar future studies?</i>	No	
<i>Have lessons learned and recommendations been documented?</i>	Yes	BTField is new software that hasn't yet been used extensively by contractors. The documentation for best practices / default values for some parameters are not clear. Conversations with BTG cleared up the proper parameter values to use. Also, BTG planned to update their default values in the next release of BTField to be in line with their recommended values. Future users of BTField should confirm all parameters with BTG before running each processing step.

2. References:

APTIM, 2021, *Final Revision 0 Uniform Federal Policy Quality Assurance Project Plan, Corrective Measures Implementation at Multiple (9) Sites at Redstone Arsenal, Madison County, Alabama, RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Operable Unit 15*, July.

**MetalMapper 2x2 Cued Data Usability Assessment:
Corrective Measures Implementation at
Multiple (9) Sites at the Redstone Arsenal
Madison County, Alabama
RSA-313-R-01, MRS-2**

Prepared for:



**U.S. Army Engineering and Support Center
Huntsville**

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

March 2023

1. Introduction

This Data Usability Assessment (DUA) report for MetalMapper (MM) 2x2 data collected at Munitions Response Site (MRS)-2, located within the surface media site designated as RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Redstone Arsenal. The MM 2x2 data were collected with a real time kinematic global positioning system. A total of 2928 targets were cued from 12 October 2022 to 14 November 2022.

This Cued DUA covers the following Definable Features of Work (DFW) as discussed in Worksheet Nos. 14.0 *Definable Features of Work and Associated Tasks*; 17.0 *Sampling Design and Project Work Flow*; 22.0 *Equipment Testing, Inspection, and Quality Control*; and 37.0 *Data Usability Assessment* of the RSA-313-R-01 UFP-Quality Assurance Project Plan (QAPP) (APTIM, 2021):

DFW 4: ASSEMBLE ADVANCED GEOPHYSICAL SENSOR AND TEST SENSOR AT INSTRUMENT VERIFICATION STRIP (IVS)

DFW 8: COLLECT CUED DATA

DFW 10: CLASSIFY ANOMALIES AND MAKE DIG/NO-DIG DECISIONS

DFW 11: VALIDATE CUED SURVEY AND CLASSIFICATION

Table 37.1 Data Usability Assessment for Cued AGC Data

STEP 1: PROJECT OBJECTIVES AND SAMPLING DESIGN			
Evaluation	Yes/No	Reference	Comments
Are the cued DQOs and MPCs still applicable?	Yes	Table 22.2 and Worksheet 12	
Are the underlying assumptions in the DQOs and MPCs still valid?	Yes		
If relevant DQOs, MPCs, or MQOs for cued data have changed, are changes documented?	Not Applicable		
Is the cued sampling design consistent with project objectives?	Yes		
STEP 2: REVIEW THE DATA VERIFICATION AND VALIDATION OUTPUTS			
Activity	DFW 4: ASSEMBLE ADVANCED GEOPHYSICAL SENSOR AND TEST SENSOR AT IVS		
Data Output/Record	Verified? (Y/N)	Validated? (Y/N)	Briefly Describe How the Data Output Supports Verification and/or Validation of the Activity
IVS Technical Memoranda: MM 2x2	Yes	Yes	

<i>Production Area QC Seed Report</i>	Yes	Yes	
Activity	DFW 8, 10 and 11: COLLECT CUED DATA and CLASSIFY ANOMALIES AND MAKE DIG/NO-DIG DECISIONS and VALIDATE CUED SURVEY AND CLASSIFICATION		
Data Output/Record	Verified? (Y/N)	Validated? (Y/N)	Briefly Describe How the Data Output Supports Verification and/or Validation of the Activity
<i>MM 2x2 Data Deliverable(s)</i>	Yes	Yes	
<i>MM 2x2 QC Deliverable(s)</i>	Yes	Yes	
<i>RCA/NCR(s)</i>	Yes		RCA 04 documents two seeds not placed on the dig list. The seeds are ≥ 0.9 m depth and beyond the classification depth of the MM 2x2. RCA 05 documents a seed originally placed with a high offset. Reprocessing with a different background returned better results and an offset less than 10 cm. The original background data showed some noise but not enough to warrant deeming the background unusable. In hindsight, the noise was enough to affect the quality of the results. Although the target still ends up on the dig list and for a large item even with a higher offset, it should be recovered.
<i>FCR(s)</i>	Not Applicable		
<i>Weekly Geophysical QC Reports</i>	Yes		
<i>Seed Tracking Log</i>	Yes	Yes	
<i>Classification Technical Memo</i>	Yes		
<i>Verification Cues</i>	Yes	Yes	157 dynamic targets filtered during the ISS step for having a size below the threshold were cued in order to verify the size threshold. Of these, 7 are marked as “Cannot Analyze” and are on the dig list, so final verification is pending until intrusive work is done. 145 are category 3 and 5 are category 0 with no observable response in the decay plots. These 150 all support the size threshold.
STEP 3: DOCUMENT DATA USABILITY, UPDATE CSM, AND DRAW CONCLUSIONS			
Evaluation	Yes/No	Comments	
<i>Have the relevant DQOs/MPCs for cued data been met?</i>	No	Two QC seeds were missed as documented in RCA 04, but the seeds were placed at depths beyond the detection limits and expected TOI depth so this does not indicate a failure in objectives. One seed had a modeled offset outside of the MQO. Reprocessing with a different background improved the quality of the results. The seed was buried at 0.63 m and so near but less than the expected TOI depth. However, the item would still have been recovered due to the size and response.	
<i>Can the cued data be used as intended?</i>	Yes		

Are there limitations on cued data use?	No	There are no limitations up to the depth of the deepest recovered TOI at the site (4.2 inch mortar at 0.66 m). Although deep TOI are not expected at the site, classification at depths below 0.66 m is limited.
Is there new information to be added to the CSM and, if so, does the CSM need to be updated?	No	
STEP 4: DOCUMENT LESSONS LEARNED AND MAKE RECOMMENDATIONS		
Evaluation	Yes/No	Comments
Could the DQOs, MPCs, or sampling design have been improved for similar future studies?	No	
Have lessons learned and recommendations been documented?	Yes	Some seeds were placed beyond the classification limit of the MM 2x2. However, the UltraTEM dynamic data shows a good match. A combination of cued and dynamic data is best to build the dig list when looking for TOI at great depths.

2. References:

APTIM, 2021, *Final Revision 0 Uniform Federal Policy Quality Assurance Project Plan, Corrective Measures Implementation at Multiple (9) Sites at Redstone Arsenal, Madison County, Alabama, RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Operable Unit 15*, July.

**METALMAPPER 2X2 CUED CLASSIFICATION REPORT:
CORRECTIVE MEASURES IMPLEMENTATION AT
MULTIPLE (9) SITES AT THE REDSTONE ARSENAL
MADISON COUNTY, ALABAMA
RSA-313-R-01, MRS-2**

Prepared for:



**U.S. Army Engineering and Support Center
Huntsville**

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

June 2023

1.0 INTRODUCTION

This technical memorandum describes the classification of cued MetalMapper (MM) 2x2 data collected at Munitions Response Site (MRS)-2, located within the surface media site designated as RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Redstone Arsenal. The MM 2x2 data were collected with a real time kinematic global positioning system. A total of 2928 targets were cued from 12 October 2022 to 14 November 2022. A site-specific library comprised of 29 sets of polarizabilities for 2 unique items (4.2-inch mortar and large industry standard object (LISO) was used for classification. The clutter rejection rate is 90 percent. Quality Control (QC) seeds at great depth (≥ 90 cm) were not correctly classified as likely targets of interest (TOI) however, a remedy has been developed and is provided in root cause analysis (RCA 04, APTIM, 2023a), which received Army approval on January 17, 2023 and is discussed in this report as well.

2.0 CUED DATA

Cued MM 2x2 data were collected from 11 survey units, broken up by column except for columns K and L, which were combined. A total of 2,928 targets were selected from the UltraTEM screener data as provided in the *Final UltraTEM Screener Target Selection Technical Memorandum* (APTIM, 2023b), which received COR concurrence on February 16, 2023.

Table 1. Summary of Targets in Each Survey Unit.

Survey Unit	Target Total	Acres	Average target density (per acre)
colA	433	1.78	243
colB	109	1.82	60
colC	414	1.78	233
colD	584	1.77	329
colE	106	1.77	60
colF	99	1.77	56
colG	116	1.76	66
colH	197	1.76	112
colI	169	1.76	96
colJ	192	1.75	110
colKL	509	1.45	351
Total	2928	19.17038	156

Initial instrument verification strip (IVS) measurements were collected in October 2022 and documented in the *Final MetalMapper2x2 Instrument Verification Strip (IVS) Technical Memorandum* (APTIM, 2022), which received COR concurrence on December 12, 2022. All IVS measurement quality objectives (MQOs) were passed, confirming that the deployed MM sensor and Advanced Geophysical Classification Standard Operating Procedures were suitable for achieving the data quality objectives identified in the Quality Assurance Project Plan (APTIM, 2021).

Cued surveying started on 13 October 2022 and continued until 14 November 2022 for a total of 20 days of production surveying that resulted in usable data (see the Daily Data ID table in the project access database). A total of 3158 cued measurements were made from 2928 targets; 230 of the cues were recollects. Twenty-two background locations were also validated (Background Location Memo in process).

3.0 PROCESSING

Morning and afternoon measurements were made at the IVS during each day of production work, including function tests and background measurements. All daily MQOs were passed (see the Static IVS and Sensor Function Test tables in the project access database).

A total of twenty-two background locations were validated (see the Validated_Backgrounds table in the project access database). All ongoing background measurements used for processing (for both the IVS and production area grids) were successfully verified against the original validation measurement (see the Static_Backgrounds table in the project access database). All cued data were background corrected using a validated background acquired within one hour of the cued measurement.

Cued MM data were collected using a sensor height of 0.26 meters (m) and data were received as H5 files. Cued production data, including all validated background measurement data, were imported into Oasis montaj for processing. Backgrounds used for the background correction were determined using the Level Sensor Data tool in Oasis montaj by selecting for the closest background collected within 1 hour of the cued shot. Data were inverted in Oasis montaj using a 1-, 2-, and 3- object model for the inversion.

Cued processing/quality control included the following steps:

- Ongoing background measurements were validated by comparing the ongoing measurement data with the data from the original center measurement used to validate the background location.
- Check transmitter current levels and ensure it is ≥ 8 Amps.
- Check data fit. All models derived from inversions with a data fit value of < 0.8 were failed.
- Check fit location. Models with an offset of > 0.4 m from the center of the sensor were recollected at an adjusted location.
- Check sensor offset. Cued data with an offset > 0.4 from the center of the sensor to the flag location were recollected. Two locations could not meet this metric due to terrain and were placed on the dig list.
- Check GPS fix quality. All cued measurements to have a fix quality ≥ 4 or are recollected or classified as inconclusive.

Failed models were not used for classification. For a given target, if all models for all measurements (i.e., including recollects) of the target were failed (for any reason), the target was classified as a dig and placed in the cannot analyze/inconclusive (dig category 0) section of the dig list. A total of 325 unique targets were classified as inconclusive due to failures of the model

location, sensor location or data fit MQOs. Additional analysis of the inconclusive targets is described in Section 5.0.

4.0 CLASSIFICATION: SITE-SPECIFIC LIBRARY

The site-specific library used for classification comprises items in the conceptual site model, as well as other items of similar size and shape. Library polarizabilities were taken from the Department of Defense-managed polarizability library. In addition, the LISO from the IVS was added to the library. A list of all TOI types in the site-specific library are detailed in Table 2.

Table 2. TOI in the Site-Specific Library Used for Classification.

Name - Mark/Mod	Number of items
4.2-in Mortar M329A1	6
4.2-in Mortar M329A2	6
4.2-in Mortar M2A1	6
4.2-in Mortar M335A2	6
Large ISO from DoD library	4
Large ISO from IVS	1

5.0 CLASSIFICATION: INITIAL DIG LIST

Dig lists are based on library matching of polarizabilities against the site-specific library. For each target, UX-Analyze will determine the model with the best match to a library item and calculate a decision metric indicating likelihood of the item being a TOI. The model determined for use by UX-Analyze will use a unitless range of 0 to 1, with 1 indicating it is a TOI. The decision metric is a weighted metric taking into account the fit of the three polarization curves and the 1-, 2-, and 3- object inversion models. Given the potential for deeper sources and lower signal to noise ratios, the default Oasis montaj cutoff of a decision metric ≥ 0.825 was used. In addition, models with a decision metric below the cutoff were manually reviewed to determine if the curves or size and decay space indicated a possible TOI. If the analyst determined the model could indicate a TOI, the target was added to the dig list. The target classification was not changed from category 3 but the Dig flag was changed to True.

Models with a fit coherence below 0.8 are failed. If all models from a target fail, that target is classified as “Inconclusive.” Typically, all Inconclusive targets will be added to the dig list. However, the high iron content for this site necessitated a filtering technique that created the possibility of substantial false positives during the target selection process (*Final UltraTEM Screener Target Selection Technical Memorandum*, APTIM, 2023b). Therefore, if a cued shot was classified as “Inconclusive” but the cued decay plots and dynamic data did not indicate a metallic source, the target was removed from the dig list. If the dynamic data appeared noisy or incoherent, or if the anomaly appeared to be a filtering artifact, and the cued decay plots showed no amplitude response above background, the target was considered to show no metallic source. As a result, 161 of the 325 “Inconclusive” targets are not marked for digging. The data analyst included a

comment in the target gdb to indicate targets which showed no metallic source. Some of these targets will be dug as a part of the verification process, as discussed below.

6.0 CLASSIFICATION: SEED RESULTS

RCA 04 received Army approval on January 17, 2023. RCA 05 is in progress and has not been finalized. RCA 04 details two seeds that were not initially placed on the dig list and one seed that was an analyst added dig but had a decision metric below the 0.825 cutoff. In addition, RCA 05 discusses a seed that was placed on the dig list, but with an offset outside of the MQO metric of 0.25 m. The results for all of these seeds point to the limitations of the MM for deep items in an iron rich soil. The MM cannot reliably classify seeds 90 cm bgs or deeper. RCA 05 addresses a seed placed inclined at 63 centimeters (cm). Currently, the deepest TOI recovered for this site is 66 cm. This seed is near, but shallower than that depth. The seed was placed on the dig list initially but with a horizontal offset outside the MQO. Reprocessing with a different background gave higher quality results that brought the offset below the MQO. This shows that TOIs near 66 cm depth can still be classified but have a lower signal to noise ratio. The seeds discussed in RCA 04 are much deeper, at 90 – 93 cm depth. Two of these were not placed on the dig list and the third did not have a decision metric above the cutoff but was placed as an analyst addition. This shows that the MM cannot reliably classify targets to this depth at this site.

However, the seeds were properly classified during the dynamic detection stage using the UltraTEM. The deeper detection and screening capabilities of the UltraTEM means that for this site, the best approach is to use both datasets to generate the dig list. We looked at two approaches.

The first approach looks at high matches of dynamic inversion results to TOI in the library, using all three polarizabilities. UltraTEM screener data typically only uses the primary polarizability for matches, as the data density does not warrant a signal to noise ratio great enough to reliably classify targets using all three polarizabilities. The data density is relatively lower because the UltraTEM screener only has one transmitter coil, while the UltraTEM Classifier and the MM2x2 have multiple transmitter coils. Due to the decrease in data density, the match metric was set to 0.9 or greater to indicate a high quality match to TOI. The second approach uses the default method of only using the primary polarizability for library matching but sets the match metric to a higher standard. In this case, a match greater than or equal to 0.95 is necessary to indicate a high quality match to TOI.

The first approach does not properly classify the deepest seed (93 cm) but will classify the other two seeds with the poor MM results. The first approach results in only four additional digs, and the locations have been added to the dig list.

The second approach may result in a more substantial increase in the number of intrusive locations, and the proximity of the site to Interstate 565 makes limiting the number of digs highly desirable. Deep TOI are not expected, however, if TOI deeper than 66 cm are recovered during intrusive work the approach to finding deep TOI will be revisited. At this time, a large increase in the number of digs is not warranted based on the current site information.

Targets added to the dig list as an analyst dig or due to a high dynamic match will be placed on the dig list below the high probability TOI (Category 1) and the lower probability TOI (Category 2).

7.0 INFORMED SOURCE SELECTION THRESHOLD VERIFICATION CUES

In order to verify the size threshold set during the dynamic target detection and picking stage, 156 targets screened during the Informed Source Selection step were added to the cue list. Of these, 145 are Category 3 targets, indicating they are not TOI. Eleven targets are classified as “Inconclusive.” Four of the 11 targets have no observable response and were removed from the dig list. The other seven remain on the dig list and so final analysis of the size threshold cannot be completed until intrusive results are returned. Six of these remaining have a predicted size well below our size threshold for target selection (these six have a predicted size below 0.6 and our threshold is 1.2) and are unlikely to be TOI. The last one has a predicted large size but a predicted location far from the MM cued shot, indicating low confidence in the model.

8.0 CLASSIFICATION VERIFICATION AND VALIDATION DIGS

In order to verify the stop-dig threshold, targets beyond the stop-dig point will be dug. The final ranked dig list is not simply ranked by the decision metric due to the special cases of the “Inconclusive” targets that show no response. We propose digging the first 50 “Inconclusive” targets from the no-dig list, ranked by the decision metric. If any of these are found to be TOI, the rest of the “Inconclusive” targets will be dug. For the rest of the list, the next 75 targets after the last TOI is found in the ranked list will be dug. Given the conservative thresholds, it is possible that there will be >75 digs after the last recovered TOI, in which case no additional verification digs beyond the initial dig list would be required.

Classification Validation digs will be selected by the Government from the list of non-TOI (per Appendix D of the QAPP). The contractor will provide a no-dig rationale including an expected result where appropriate prior to intrusive activities. Given the size of the site and number of targets, along with a desire to limit digging near the interstate and the lack of MEC recovered so far, the initial plan is to dig 50 validation digs. The final number will depend on PDT agreement and may change depending on the intrusive results.

9.0 CONCLUSIONS

Of the 2928 targets with follow-on cueing, 304 have been selected for intrusive investigation (see Figure 1). This is a reduction of approximately 90 percent. The reduction is relatively higher than anticipated due to the dynamic data having higher than expected noise leading to many false positives. The 304 targets selected for intrusive work include the targets selected using the 3-polarization curve dynamic library matching. Depending on the intrusive results, the additional 1-polarization curve dynamic library matching targets may also be dug (up to 139). The dig list will be included as an attachment to this Memo. Five-hundred and four (504) digs are anticipated, which include verification and validation digs.

Table 3 provides a summary of the number of digs per category and includes verification/validation digs

Table 3. Number of Digs Per Category

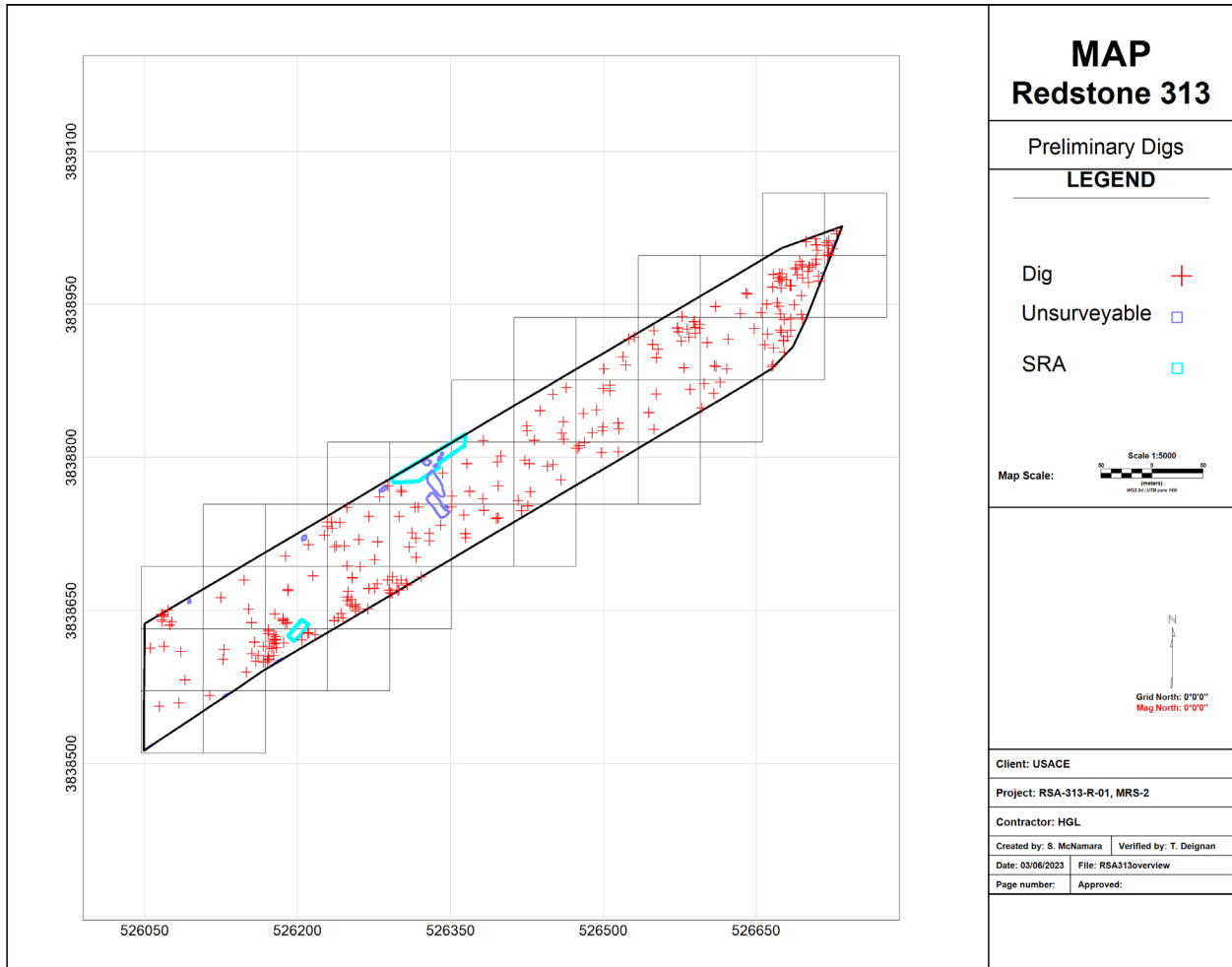
Classification Category	Total Number in Classification Category	Number of Items to Dig Prior to Verification / Validation	Number of ISS Threshold Verification Targets in Classification Category	Number of ISS Threshold Verification Targets to Dig	Number of Inconclusive Targets with no Metallic Source	Number of Verification digs for Inconclusive Targets with no Metallic Source	Threshold Verification Targets in Category	Number of Threshold Verification Targets to Dig	Number of Validation Targets in Category	Number of Validation Targets to Dig	Total Number of Items to Dig
0 (Inconclusive)	325	165	11	9	146	50					215
1 (High Probability TOI)	97	80 ^a									80
2 (Low Probability TOI)	45	35 ^a									35
3 (non-TOI)	2627	24 ^b	145	2			75	75 ^c	75	75	174
Total		304		11		50		75		75	504

a Source removed from dig list due to a duplicate source farther up the ranked list.

b Sources added either by data analyst or due to a high 3-pol dynamic match.

c number of digs past the last recovered TOI; therefore, the final number may be more or less than 75.

Figure 1. SRAs and Dig locations (does not include verification or validation digs)



10.0 REFERENCES:

APTIM, 2023a, *Root Cause Analysis 04*, January.

APTIM, 2023b, *Final UltraTEM Screener Target Selection Technical Memorandum: Corrective Measures Implementation at Multiple (9) Sites at the Redstone Arsenal Madison County, Alabama*, February.

APTIM, 2022, *Final MetalMapper 2x2 Instrument Verification Strip (IVS) Technical Memorandum: Corrective Measures Implementation at Multiple (9) Sites at the Redstone Arsenal Madison County, Alabama, Final, Revision 0*, November.

APTIM, 2021, *Final Revision 0 Uniform Federal Policy Quality Assurance Project Plan, Corrective Measures Implementation at Multiple (9) Sites at Redstone Arsenal, Madison County, Alabama, RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Operable Unit 15*, July.

**UltraTEM Screener Target Selection Technical
Memorandum:
Corrective Measures Implementation at
Multiple (9) Sites at the Redstone Arsenal
Madison County, Alabama
RSA-313-R-01, MRS-2**

Prepared for:



**U.S. Army Engineering and Support Center
Huntsville**

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

February 2023

1. Introduction

This technical memorandum describes target selection for UltraTEM Screener (UT) data collected at Munitions Response Site (MRS)-2, located within the surface media site designated as RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Redstone Arsenal. The UltraTEM Screener data was collected with a real time kinematic global positioning system. A total of 18.5 acres were surveyed from 17 August 2022 to 29 August 2022 (Figure 1).

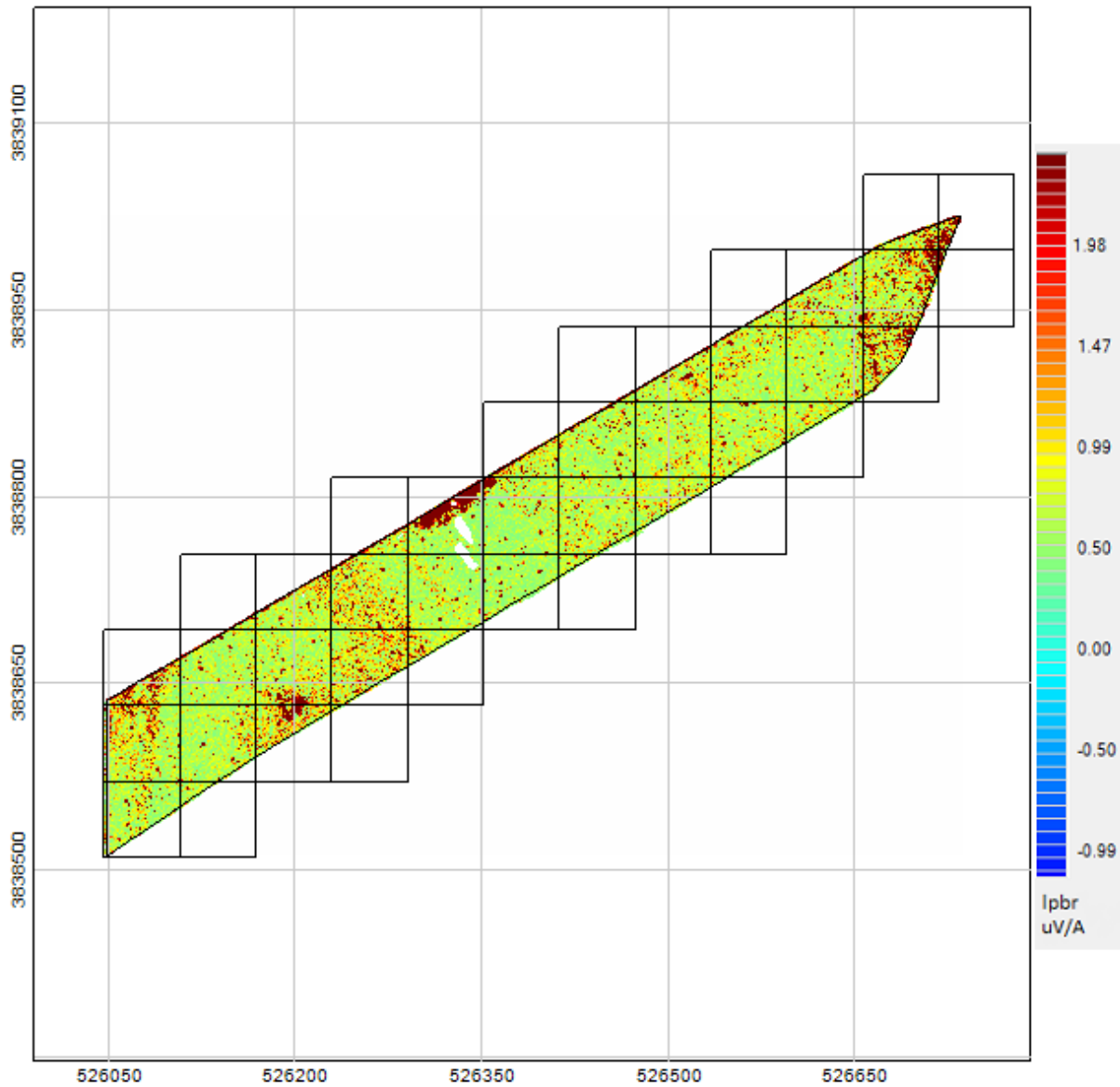


Figure 1. UltraTEM Screener data collected within RSA-313-R-01. MRS-2 boundary is shown as black line.

2. Detection threshold and target picking

As described in the Uniform Federal Policy (UFP) - Quality Assurance Project Plan (QAPP), a detection threshold of four times the noise level was used (Aptim Federal Services, LLC [APTIM], 2021). Items smaller than a 4.2-inch mortar were filtered out. The four times noise level value was calculated to equal 2.3 microVolts per Amp ($\mu\text{V}/\text{A}$) at the low pass background removal (lpbr) channels. The lpbr channel is equal to the sum of (gates 19 and 40-45) 0.154 and 1.429 - 2.42 milliseconds (ms) channels. The predicted worst-case response was determined using the BTField modeler with a 4.2-inch mortar at a depth of 0.66 m and a line spacing of 1.8 meters. BTField modeler predicted a response of 3.66 $\mu\text{V}/\text{A}$. A safety factor of 0.75 was applied to yield a worst-case response of 2.7 $\mu\text{V}/\text{A}$. This four times noise level value (threshold) is below the predicted worst-case response (2.7 $\mu\text{V}/\text{A}$) of a 4.2-inch mortar at 0.66 meters (m) below ground surface (bgs).

The highly magnetized soil at MRS-2, along with the natural movement of the UT during collection, contributed to create areas with very high noise. The site also contained areas where the typical filtering had trouble with data lines containing large anomaly densities and quiet low anomaly density areas. This led to areas where the filtering pushed the background response lower than true background and smaller anomalies were buried in depressions, or “wells” of negative data. In order to best compensate for these complicating factors, an advanced target picking routine was developed.

The first step of the advanced target picking routine was to process the data using a 10.0 m detrend window, ignoring data outside of the top 70 percentile of responses (“-a” state of filtering). The lower cutoff was set to the 0th percentile. This minimizes the areas with deep negative wells but with the tradeoff of artificially increasing the amplitude of other areas. Therefore, the data were also detrended using the typical values of a 10.0 m detrend window with percentile cutoffs of 30 and 70 (“-b” state of filtering). The first set of filtering parameters is used for the detection step, while the second set of filtering parameters is used for the inversion.

The initial target selection is performed on the lpbr channel at a threshold of 2.0 $\mu\text{V}/\text{A}$, slightly under the site-specific threshold of 2.3 $\mu\text{V}/\text{A}$. Targets under 2.3 $\mu\text{V}/\text{A}$ are screened out at a later step unless kept at the analysts’ discretion. Additional targets are added, if not already selected, at a threshold of 20 $\mu\text{V}/\text{A}$ on the low pass (lp) channel. The default values in BTField (2 for lpbr and 20 for lp) are based on limited data where the approach was tested on magnetic soils. The threshold for lpbr was determined by using 4 times the site-specific noise, which was verified by synthetic seeding. Synthetic seeding of 11 4.2” mortars at 0.66 m depth gave the lowest response on the lp channel of 7.6 $\mu\text{V}/\text{A}$. The lp channel target selection step is meant to catch larger targets, but all synthetic seeds were easily picked by the lpbr channel. Due to this, the default value of 20 $\mu\text{V}/\text{A}$ was used for a threshold. Synthetic seeding does give values below 20 $\mu\text{V}/\text{A}$ on the lp channel, but as it is above 2 $\mu\text{V}/\text{A}$ on the lp channel, this is not an issue. Less than a dozen targets were added below 2 $\mu\text{V}/\text{A}$ on the lpbr channel and below 20 on the lp channel. This led to ten models selected for follow on cueing. None of these resulted in a decision statistic above 0.5. These targets along with the synthetic seeding indicate the thresholds for the two channels are appropriate. A merge distance of 0.6 m was initially used during target selection but was decreased to 0.4 m as part of Root Cause Analysis (RCA)-01 (see Section 4.0 for more information).

Another layer of processing was added to the target detection step to mitigate the site noise. This step followed the method documented in the BTField User’s Guide. The technique creates an lpbr channel

which is the sum of channels 19 for an early, low gate pass and channels 40-45. This channel is then smoothed with an 11 point window. The lpbr approach attempts to use the different decay rates for magnetic soils and the most difficult to detect TOI to reduce the amount of false positive cued locations resulting from soil responses. To characterize the representative decays for soil and TOI, the widest reliable range of time channels is used where the respective decays have the largest difference. The earliest reliable time gate (T19, 0.154ms) is used and for the later time decay information, an average of the last 6 times gates (T40-45) are used to extract reliable decay information from a lower SNR portion of the decay. An optimal time channel vs SNR analysis was not done as it is the earliest and latest reliable channels that are most useful for lpbr.

Next, another lp channel is created but this one is only gate 19 smoothed with an 11 point window. The target selection is then done in two stages. The first stage selects from the lpbr channel at a low threshold and the second stage adds in any unselected targets from the lp channel at a higher threshold.

A total of 7,058 target picks were generated from the lpbr and lp channels. Informed Source Selection (ISS) was applied to these target picks, leaving 2,928 targets for further cueing (Section 4.0).

3. Saturated Response Areas and Unsurveyable Areas

Figure 2 shows UltraTEM Screener data coverage and the Saturated Response Area (SRA) polygons within MRS-2 at RSA-313-R-01. The SRAs represent areas where the anomaly density is too high for reliable target selection and ISS. The boundaries were determined manually. The analyst selected the boundary based on where individual targets could not be discerned. No sources inside the SRAs were included in the final cue list. Figure 2 also shows the unsurveyable areas. Standing water, the tree line, and other obstacles prevented the collection of useful data within 0.14 acres of the site.

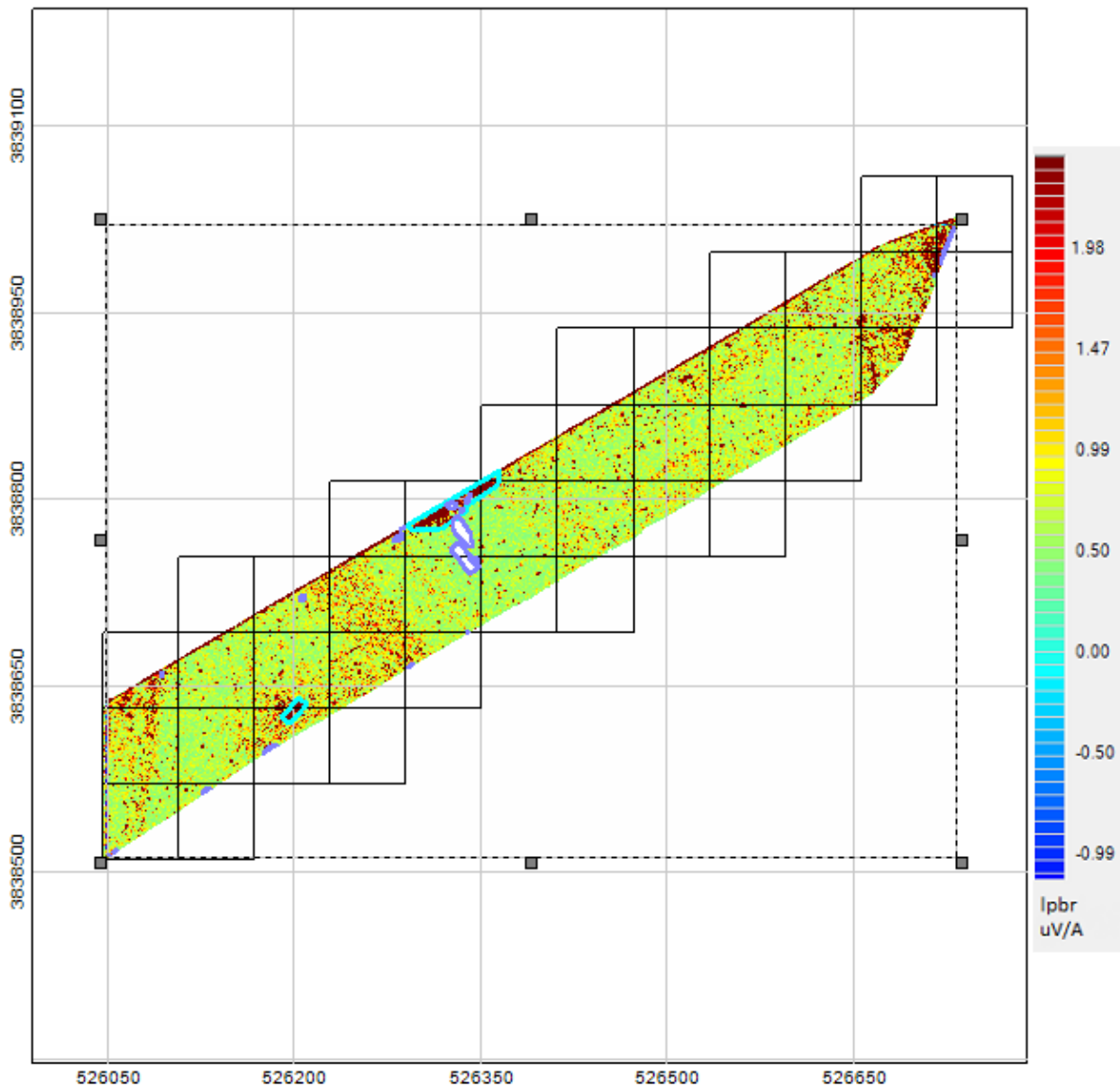


Figure 2. UltraTEM Screener SRAs (cyan) and unsurveyable areas (purple)

4. Informed Source Selection

ISS was carried out using a 4.2-inch mortar as the smallest target of interest. Source parameters were estimated using 1-, 2-, and 3-object inversions for each target pick. Testing with synthetic seeds showed accurate locations could be estimated for all seeds with this approach.

Initial inversion and ISS parameters resulted in a missed seed (RCA-01). Discussion with Black Tusk Geophysics determined that the default parameters for the inversion X and Y boundary limits (0.5 m) were too small. The actual boundaries should be 1 m. Black Tusk will be updating their default parameters to reflect this. As part of RCA-01, all inversions and ISS steps were rerun using an inversion boundary limit of 1 m and a target merge radius of 0.4 m.

Prior to application of ISS parameters in Table 1, automated quality control of inversions and models used the following criteria:

1. All models were failed for inversions with data fit metric < 0.8 , as per the UFP-QAPP (APTIM, 2021).
2. Models at the maximum depth bound (1.8 m) were failed.
3. Models at the maximum inversion offset (1 m in the x or y direction) were failed.

Additionally, sources were removed from the cue list if they were within an SRA, below the detection threshold, or determined to be a signal response from the fence along the northern boundary. If multiple sources were within the ISS merge radius of 0.3 m, only the highest ranked source was kept.

Targets for which all models are failed are treated as inconclusive and cued at the pick location. There were 896 targets classified as inconclusive and selected for cue follow-on during the ISS process. This number of inconclusive targets is larger than typical. This is due to the highly magnetic soils, advanced processing, and the lpbr/lp process. The aggressive filtering performed on the –a state of the data, which was used for target selection, meant that some noise was pushed up into the range of the detection threshold. The –b state of the data, however, would not often show a corresponding anomaly. The targets are on the cue list to ensure the high noise is not masking legitimate anomalies.

It is expected there will be a large number of inconclusive targets in the cued stage as well. If review of the dynamic data shows no likely source and the cue data show no significant response, the target will not be added to the dig list. The lack of significant response in the cued data will show that the target was indeed just due to noise in the –a state of filtering.

An example of this likely scenario is on Figure 3. Target 24800 is inconclusive and will be cued. But a review of the data shows that while there is a response above threshold in the lpbr channel, there is only background signal in the –b state time gate 24 channel.

Key ISS parameters are summarized in Table 1.

Table 1. Informed Source Selection Parameters

Parameter	Value	Description
Polarizability size	1.2 (no units)	Sources with size parameter less than threshold are screened.
Model offset	0.75 m	Sources with horizontal offsets from pick location greater than threshold are screened.
Merging distance	0.3 m	If multiple sources pass ISS and are within the horizontal merging distance, only the highest ranked source is selected for cueing. The highest ranked source is selected based on a heuristic combination of criteria, including polarizability misfit, data fit, and model offset.

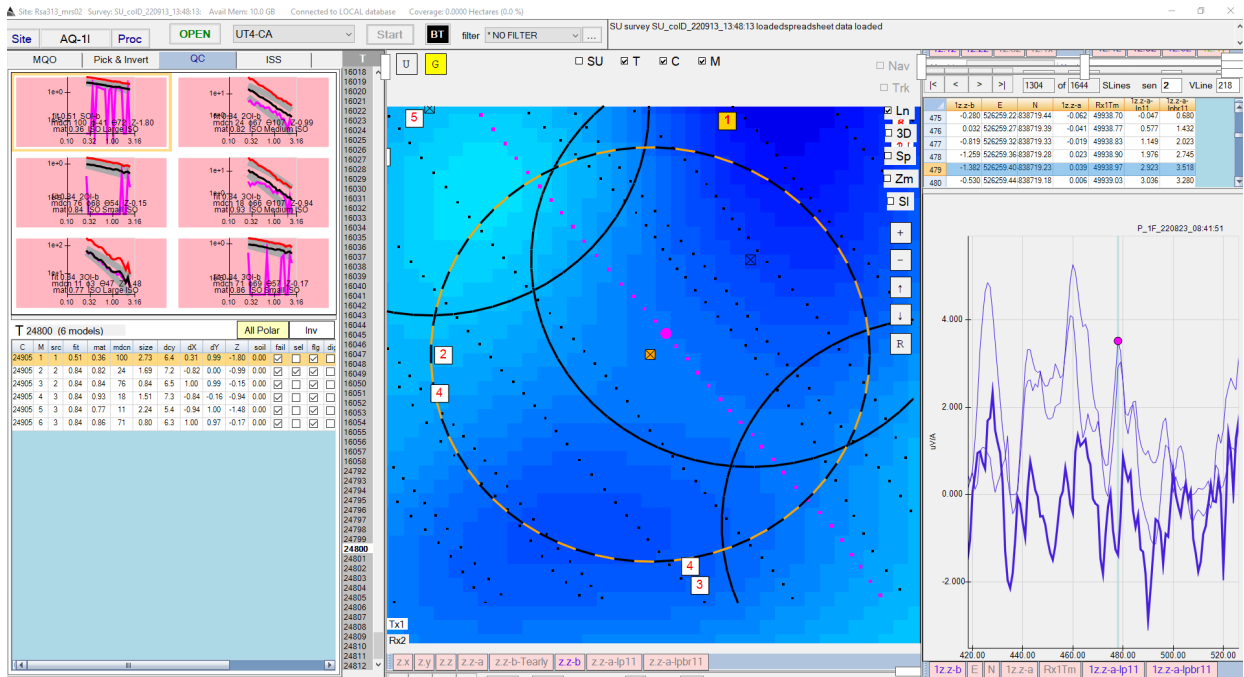


Figure 3. BTField results for target 24800 showing no anomalous response in the -b data

Synthetic seeding of a 4.2-inch mortar at 1.2 m bgs were used to determine the site-specific variability of the size parameter (Table 2). The screening threshold of 1.2 m was determined by taking the smallest recovered synthetic seed size parameter (1.64) and multiplying by a 0.75 safety factor. The 1.2 m bgs depth is greater than the deepest recovered mortar and is therefore a conservative threshold. Additional synthetic seeding of 11 seeds at a depth of 0.66 m in low and high background noise areas gave a size range of 1.4-2.4. The result of 1.4 is an outlier, the median size is 1.75.

Table 2. Distribution of estimated size parameters for synthetically-seeded 4.2-inch mortar at 1.2 m depth

Easting	Northing	Depth (m)	size	lpbr11 (grid value)
526059.0	3838616	1.2	2.01	2.92
526067.6	3838572	1.2	1.64	3.49
526076.5	3838558	1.2	2.25	2.93
526078.4	3838552	1.2	2.26	3.9

5. Summary

A total of 2,928 cues, including 896 inconclusive sources, were selected from the UltraTEM Screener data. Table 3 summarizes the ISS results and Figure 4 shows the selected cue locations.

Table 3. Informed Source Selection results.

Description	Number
Total number of sources	7,058
Screened sources	4,130
Inconclusive	896
Selected sources after merging and application of masks	2,928

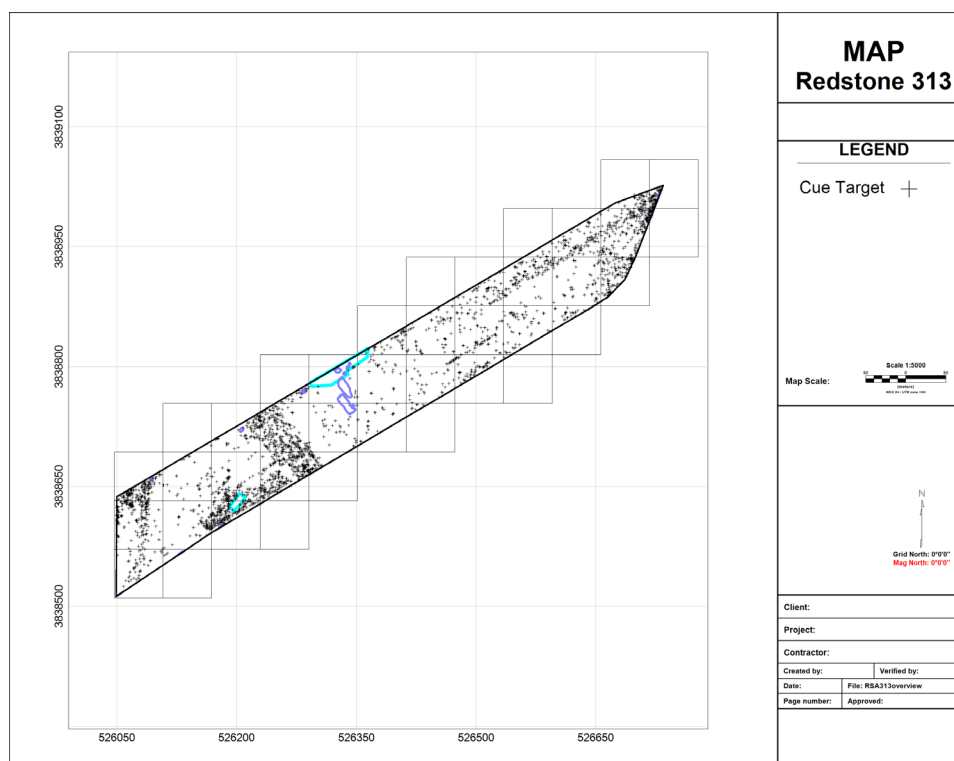


Figure 4. Cue locations (black crosses) determined via ISS.

Application of this procedure to all 2,928 selected targets retained all quality control seeds with UltraTEM Screener data coverage, with mean and maximum horizontal offsets of 7 centimeters (cm) and 19 cm, respectively. Mean and maximum depth offsets were 6 cm and 26 cm, respectively.

6. References

APTIM, 2021, *Final Revision 0, Uniform Federal Policy, Quality Assurance Project Plan, Corrective Measures Implementation at Multiple (9) Sites at Redstone Arsenal, Madison County, Alabama, RSA-313-R-01, Western Side of Former High Explosive Drop Area A, Operable Unit 15*, July.

APTIM, 2022, *Final UltraTEM Screener Instrument Verification Strip (IVS) Technical Memorandum: Corrective Measures Implementation at Multiple (9) Sites at the Redstone Arsenal Madison County, Alabama, Final, Revision 0*, October.

RESPONSE TO COMMENTS

**Responses to Alabama Department of Environmental Management Comment on
Revision 1 RSA-313-R-01 Corrective Measures Implementation Work Plan with Slip Pages,
Western Side of Former High Explosives Drop Area A, Operable Unit 15
Redstone Arsenal, Madison County, Alabama
Dated February 2025**

Comments received from ADEM on May 7, 2025.

Comment 1 **General.** It appears that RSA did not provide the proper revision number (i.e., Revision 2) or revision date (i.e., February 17, 2025) on the cover page of this revision for RSA-313-R-01 and its associated cover letter. The date noted on the cover page is October 2024, which was the date of the prior revision. It appears that Redstone included updated slip sheets into the document but did not provide the correct revision number. In addition, there are numerous references to a “Revision 1” CMIP throughout the document. Please note that when documents were routinely submitted as hard copies, it was common practice to use slip pages to avoid excessive use of paper, and the following revision would keep the same revision number but would add the phrase “with slip pages” to indicate there was a revision. Because electronic copies of the slip sheets are now incorporated into the document, and the document is electronically submitted, the Department would prefer the next revisions to be followed sequentially (i.e., Revision 2, Revision 3, etc.). Sequentially numbering the revisions simplifies the review process and minimizes ambiguity when archived in ADEM’s electronic filing system, as well as when referencing previous revisions in the document text. Please revise this CMIP to a Revision 2, RSA-313-R-01 CMIP and make appropriate changes to dates and references throughout the document.

Response 1: The RSA-313-R-01 CMIP has been revised to note that it is a Revision 2 with a date of May 2025. In addition, staff reassignments within the Army and their contractor have been noted in Appendices D and E of the CMIP.