AECOM

Final
Remedial Investigation
Work Plan

Williston Local Training Area, North Dakota

Munitions Response Site NDHQ-008-R-01
North Dakota Army National Guard

Army National Guard

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Acronyms and Abbreviations

AEDB-R	Army Environmental Database Restoration
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CSM	conceptual site model
Cu	copper
DU	decision unit
ISM	incremental sampling methodology
LTA	Local Training Area
MC	munitions constituents
MEC	munitions and explosives of concern
MRS	munitions response site
NDARNG	North Dakota Army National Guard
NDDH	North Dakota Department of Health
NFA	No further action
NOAA	National Oceanic and Atmospheric Association
NPS	National Park Service
NRCS	Natural Resources Conservation Service
ORAP	Operational Range Assessment Program
PA	Preliminary Assessment
RI	Remedial Investigation
Sb	antimony
SI	Site Inspection
SSHP	Site Safety and Health Plan
UFP-QAPP	Unified Federal Policy - Quality Assurance Project Plan
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
XRF	X-ray fluorescence
Zn	zinc

1 Work Plan

This Work Plan has been developed to support the long-term management of the Non-Department of Defense, Non-Operational Defense Site Williston Local Training Area (LTA) Munitions Response Site (MRS). The Williston LTA (Army Environmental Database Restoration [AEDB-R] No. NDHQ-008-R-01) is located near Williston, North Dakota. This is not a stand-alone document, but a supplement to the Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) for Williston LTA (**Appendix A**), and is meant to aid in the execution of Remedial Investigation (RI) field work. For a full description of work to be performed for this RI, please refer to the Williston LTA UFP-QAPP, which is referenced throughout this Work Plan.

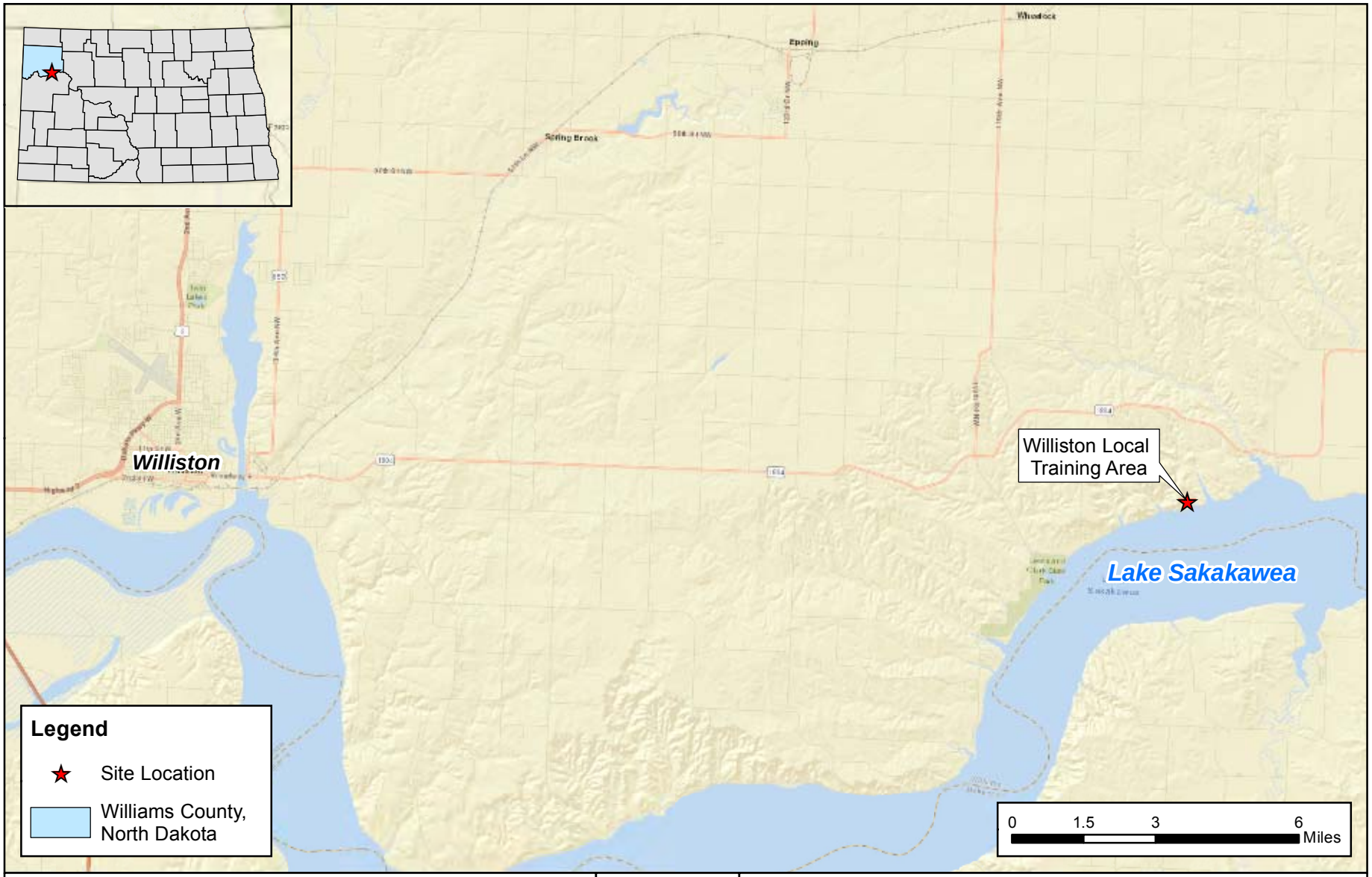
Environmental work is being conducted at the MRS by the Army National Guard (ARNG) Directorate and the North Dakota ARNG (NDARNG). This project is being executed by AECOM Technical Services, Inc. (AECOM), under ARNG Contract Number W9133L-14-D-0001, Delivery Order No. 0008, issued 29 September 2016 and modified 29 June 2017.

The RI of Williston LTA is being conducted to determine whether there is an unacceptable risk to human and ecological receptors from potential munitions constituents (MC) remaining at the MRS from historical training use. This Work Plan includes methods and procedures that the investigative team will employ at Williston LTA. Additional field safety information can be found in the Site Safety and Health Plan (SSHP) (**Appendix B**), which will be reviewed by field personnel prior to mobilization and adhered to during all field tasks.

1.1 Site Description

The Williston LTA MRS is a former small arms range located in a remote area of Williams County, North Dakota, approximately 21 miles east of the city of Williston and roughly 630 feet northwest of the northern shore of Lake Sakakawea, a dammed lake along the Missouri River (**Figure 1**). The 0.52-acre MRS is located in the southwest corner of the 344.5-acre former Williston LTA, which contains rugged terrain with mixed grass prairie and woody draws with rolling prairie and badlands topography. Improved entrance roads and interior trails within the LTA are not well maintained. The area outside of the MRS, within the former Williston LTA, was used by NDARNG for both company and squad level training authorized by Camp Grafton, including: overnight field training, convoy operations training, land navigation, mobility/counter mobility training, engineer obstacle training, and wheeled vehicle training (NDARNG, 2013). Live-fire training no longer occurs. The property is federally owned and administered by the United States Army Corps of Engineers (USACE)-Omaha District and has been co-leased to NDARNG and the Cattle Grazing Association. The MRS is remotely located with access to the site restricted by a fence and locked gate; access is possible by boat from Lake Sakakawea.

The MRS consists of a former 25-meter zero range with an earthen impact berm (**Figure 2**). Soils within the MRS are predominantly loamy and hard packed. The range is located in a coulee, surrounded on three sides by steep, rugged hills; the earthen berm divides the coulee, reaching from the northeastern hill to the southwestern hill slope. In addition to the main berm, a raised side berm was observed during the site visit (**Appendix A**, Worksheet #9) that extends up-range towards the firing point, along the



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PROJECT	RI through DD for Williston LTA, ND MRS			
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SCALE	1:190,080	CHK BY	JL	11/7/2017
SOURCE	ARNG; State of North Dakota, ESRI & Partners	PM	LS	11/7/2017

Williston Local Training Area Site Location

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Figure 1

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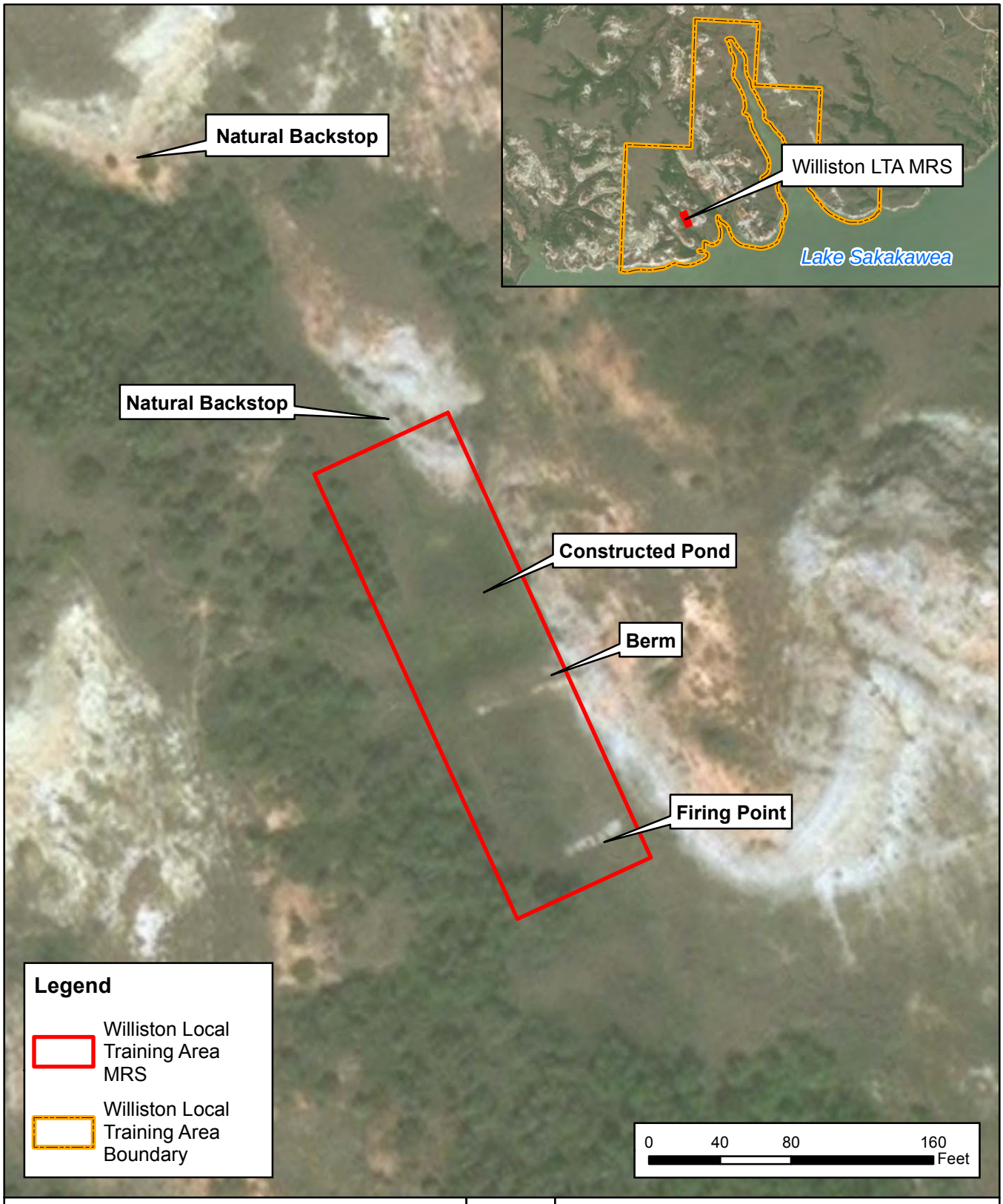

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Williston Local Training Area Site Layout

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Figure 2

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southwestern hill slope (**Figure 2**). During small arms training, the surrounding hills acted as natural backstops. These natural backstop hills are outside of the currently drawn MRS boundary shown in the 2013 Preliminary Assessment (PA; NDARNG, 2013) but will be better delineated during this RI. According to the 2013 PA, a small "duck pond" was constructed behind the 25-meter earthen berm at the request of the USACE (NDARNG, 2013). Since construction, the pond has filled in with cattails, is silted in considerably, and is only wet seasonally.

1.2 History

According to a PA Narrative Report completed in 1993 (EA Engineering, Science, and Technology [EA], 1993), NDARNG has leased the Williston LTA area from the USACE since 1959 for use as a recreation and training area. The firing range was operational between 1960 and 2002 and was used by NDARNG for small arms qualification and instructional firing purposes. An earthen berm, reinforced with railroad ties, was reportedly constructed around 1991. Prior to construction of the berm, the surrounding hills were used as a backstop to targets used during training. The steep hillsides continued to serve as additional backstop following berm construction. Targets were reportedly set up in the northern end of the coulee. Firing occurred towards the north, away from Lake Sakakawea, from 12 firing points into the earthen berm and hillside backstop.

Munitions usage data is not available for training activities at the Williston LTA range. However, it is known that training was limited to small-caliber ammunition. Operations reportedly included zero and familiarization fire with M1, M14, and M16 rifles, M9 and M1911 pistols, and M2 (plastic training ammunition), M60, and M249 machine guns (NDARNG, 2012). In 1999 a number of installations replaced traditional bullets with lead-free tungsten composite rounds; however, to the best knowledge of NDARNG range personnel, there has been no use of tungsten-containing munitions at the Williston LTA (Personal Communication, NDARNG, Readiness Operations, 2007).

Range operations ceased in 2002 and official closure was obtained in 2012 (NDARNG, 2013). According to NDARNG personnel, approximately 5,000 live-fire small arms rounds were used per training event, on an annual basis. Over the 43-year history of the small arms range (1959-2002), it is estimated that 215,000 small arms rounds were expended at the MRS (Earth Resources Technology, Inc. [ERT], 2008). In addition, there was a one-time use of 6 to 8 cratering charges (approximately 300 to 400 pounds of explosives) in 1998 to construct a small "duck pond" at USACE's request. All charges were verified to have detonated.

Active use of the greater maneuver and training area within the LTA (area outside of the small arms range) continued for five years following closure of the small arms range. Munitions usage within the greater maneuver and training area was consistent throughout its operational history (1959-2007). Small-caliber blank munitions, in addition to other munitions, including limited pyrotechnics, have been used in the maneuver and training area. Common munitions that may have been fired include artillery simulators, ground burst simulators, hand grenade simulators, and booby trap simulators. It is estimated that over the course of the 48-year history of the maneuver and training area, 460,800 blank small arms and 348 pyrotechnics were expended (ERT, 2008).

Since range closure, NDARNG has removed all buildings and structures and has terminated electrical hookups associated with the former range. NDARNG has also removed, and properly disposed of, the railroad ties supporting the earthen berm following waste characterization in 2012 (NDARNG, 2013).

1.3 Previous Investigations

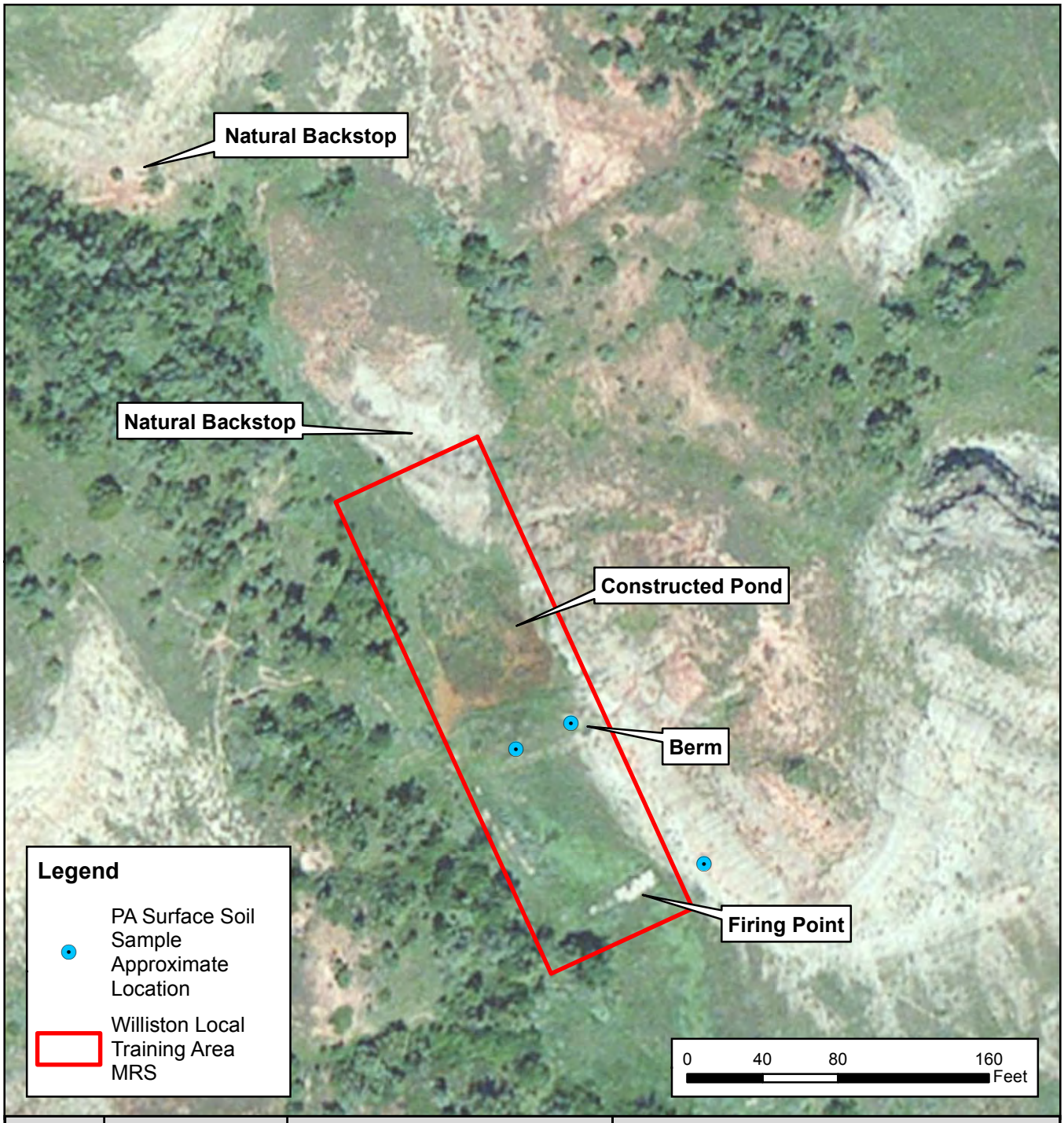
Three environmental assessments have been completed at the Williston LTA since 1993. These include:

- Preliminary Assessment Narrative Report, Garrison Dam and Lake Sakakawea, Riverdale, North Dakota (EA, 1993)
- Operational Range Assessment Program (ORAP), Phase I Qualitative Assessment Report, Williston Local Training Area, Williston, North Dakota (ERT, 2008)
- Preliminary Assessment, Williston Local Training Area, North Dakota (NDARNG, 2013)

A desktop PA Narrative Report was completed in 1993 for what was then called the NDARNG Company B Firing Range. At the time, the range was still operational, and data collection included personnel interviews and desktop research. A site visit was not conducted due to inclement weather causing the roads to be impassable. The narrative detailed the history of the site, based on personal communications with ND guardsmen, and estimated that 1.9 tons of lead and 0.9 tons of copper alloy had been deposited at the range, as a result of weapons training, since it began operation in 1960. Other groups had used the maneuver and training area, including the Williston Police Department who used the area to set up targets to practice shooting while moving. An estimate of only 15 pounds of lead was contributed to the site from police department training activities. The PA narrative concluded that there was no evidence of lead or copper migrating from the range; lead slugs and copper alloy were embedded in the soils of the berm and hillside backstops. Since the range was used by NDARNG for an additional 9 years following the 1993 report, the MC weight estimates reported are likely lower than present day. Furthermore, estimates within the report may be inaccurate due to the application of inaccurate facts and assumptions in weapons type use (i.e., NDARNG did not field the M16 rifle until the early 1970s).

A Phase I Assessment was completed for the Williston LTA in 2008. Data collection efforts made during the Phase I Assessment included Department of Defense and installation-specific data repository and database research, personnel interviews, and a site visit. The primary sources of MC identified during the Phase I Assessment included the firing points and impact areas of the inactive MRS. The assessment concluded that there is no pathway available for potential MC to migrate off-range due to environmental factors such as soil characteristics, distance to off-range areas, and the presence of vegetative cover. The Phase I Assessment categorized the Williston LTA MRS as Unlikely under the ORAP, identifying the range as a site with no known pathways for source-receptor interactions that could present an unacceptable risk to human health or the environment.

As documented in the 2013 PA (NDARNG, 2013), in 2011 NDARNG began the process of returning the Williston LTA to USACE control through the lease termination process; range area cleanup is required as part of lease termination. The NDARNG Environmental Office conducted reconnaissance and sampling of the range in August 2011. Discrete surface soil samples were taken from the earthen berm and a background reference area and analyzed for metals. Concentrations of lead in berm soil



Analyte	USEPA RSL (mg/kg)	Background Reference (mg/kg)	Berm Samples	
			West Side Bullet Pocket	East Side Bullet Pocket
Lead	800	5.74	**6940**	53.4

Note: USEPA RSL = U.S. Environmental Protection Agency Regional Screening Level (Industrial Use)

Bold = RSL exceedance

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Williston Local Training Area PA Results

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Figure 3

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ranged from 53.4 to 6,940 milligrams per kilogram (mg/kg), background soil had a lead concentration of 5.74 mg/kg (**Figure 3**). Results indicated that berm soils contain elevated concentrations of lead associated with firing activities.

Physical and ecological characteristics of the Williston LTA area (e.g., geology) were detailed within the 2008 Phase I Assessment's conceptual site model (CSM). **Table 1** presents the information taken from the Phase I Assessment (ERT, 2008), updated with recent data. This information was incorporated into the development of the Williston LTA CSM (see UFP-QAPP Worksheet #10) that informed the RI approach summarized below.

Table 1. Williston LTA Physical and Ecological Characteristics (ERT, 2008)

Physical Characteristics	
Climate	The climate at Williston LTA is classified as sub-humid and continental characterized by warm summers, occasional droughts, and long, cold winters with low precipitation. The long-term average annual temperature is 44 degrees Fahrenheit (°F) for the Williston, ND area. Summer time (June through August) temperatures range from average low of 55°F in the evenings to an average high of 83°F during the daytime. Temperatures during the remaining part of the year range from the average low of 5.5°F in December to an average high of 75°F in September (National Oceanic and Atmospheric Association [NOAA], 2017). The total annual average rainfall is 15 inches for the Williston, ND area. June is typically the rainiest month with an average of 2.6 inches and January is typically the driest with less than one inch (approximately 0.35 inches). The majority of precipitation occurs as snowfall from November through mid-April and as rain from mid-April through October. Winter snowstorms can occur from September through May with the harshest conditions occurring December through March (NOAA, 2017). Tornadoes are associated with thunderstorm conditions and can occur May through September, most commonly in June through August. The percent relative humidity for the region averages between 59 percent and 80 percent (North Dakota Agricultural Weather Network). The annual wind speed is approximately 8.6 miles per hour (NOAA, 2017). The average mean lake evapotranspiration is approximately 33 inches per year (Shjeflo, 1968).
Geology	Williams County lies within the center of the structural and sedimentary Williston Basin, a glaciated section of the Missouri Plateau of the Great Plains Province. Glacial drifts underlie the majority of Williams County with the exception of the area surrounding the Missouri River. The glacial deposits underlying Williston LTA are typically a few feet deep and commonly include till, sand, gravel, and a combination of clay and silt. Directly beneath the glacial sediments at Williston LTA lies the Tertiary Butte Formation comprised of alternating beds of somber-colored clays, silts, and sands (Freers, 1970). Williston LTA is located within the lower tertiary aquifer of the Northern Great Plains Aquifer System of alternating beds of sandstone, siltstone, claystone, and commonly lignite. Water is typically stored and moves through the sandstone layers, and the system is approximately 300 feet deep (U.S. Geological Survey, 2007).

Physical Characteristics	
Topography	Williston LTA is situated within the Nesson Valley, primarily characterized by rolling prairies and badlands inundated by finger draws (inlets and bays) that drain into Lake Sakakawea. Topographic relief of the training area drastically climbs from 2,204 feet above sea level near the shore to 2,362 feet above sea level 150 to 170 feet away from the shore. The remaining portion of the training area experiences minimal topographic relief (approximately 78 feet) with the maximum elevation achieved in the northeast portion of the range at 2,554 feet above sea level (Sedivec et al., 2007).
Soil	There are five upland prairie soil series which dominate at Williston LTA: Williams-Zahl, Amor Williams Zahl, Amor-Zahl-Cabba, Bradenburg-Channery, and Cahba-Badland. These upland soil types were glacially derived and developed under the prairie vegetation with permanent grass cover. These soils are typically loams with slopes of 3-70 percent and have a fibrous root system on a growth and death rotation which created humus soil (Sedivec et al., 2007). Additionally, soils at the MRS have a neutral pH ranging between 7.0-7.2 (Natural Resources Conservation Service, 2007). Typically, soils in this area are susceptible to wind erosion if exposed.
Hydrogeology	Williston LTA is associated with the Lake Sakakawea watershed, a fresh water feature, which supports fish life, macro, and micro-invertebrates. Groundwater is assumed to flow south towards Lake Sakakawea from the MRS, and is also a source of recharge for the lake. Information pertaining to the depth of groundwater at the former range is limited; however, it is noted that the water table can be as shallow as one to two feet near the two finger draws. There is one groundwater well located near the south-central area east of the small arms range that has been decommissioned and abandoned. When in use, this source was used for non-potable supply only. Little data was available for this well; however, it is believed to be at a depth of 80 feet. Additionally there are 13 groundwater wells utilized as a domestic water source and nine wells utilized for irrigation purposes located east of the training area within four miles. There is a single groundwater well utilized for irrigation purposes north of the training area, also within four miles.
Hydrology	Williston LTA is located within the Lake Sakakawea watershed. Four intermittent drainages were documented at the training area (Sedivec et al., 2007); however, aerial imagery and topographic maps identified a single stream. Ninety percent of the training area's surface water is thought to be drained in one of the four documented intermittent drainages, down-gradient into Lake Sakakawea. The single identifiable drainage originates north of the training area boundary and drains to the Lake. Lake Sakakawea is a reservoir located in the Missouri River basin. This reservoir has an approximate maximum storage capacity of 23.8 million acre feet, and has a normal surface area of 307,000 acres. White Tail Bay, located approximately four miles east, and Tobacco Garden Bay, located approximately three miles south, are designated recreational areas collocated within the Lake. There is approximately one acre of wetlands located along the riparian zone and shoreline of Lake Sakakawea occurring both on, and off of the lease area. The extent of wetlands is directly influenced by the fluctuating water levels in the lake.

Physical Characteristics	
Vegetation	Williston LTA is largely situated within the mixed grass prairie community of North Dakota which includes upland, midland, lowland, and woody draw vegetation. Typically, these communities are comprised of both native prairie and introduced grasses with intermixed forbs. Upland prairie vegetation occurs on the hilltops of the training area and generally has a high tolerance of dry conditions. Typical grass-like species found in this community include: western wheatgrass (*Pascopyrumn smithii*), blue grama (*Bouteloua gracilis*), needleleaf sedge (*Carex duriuscula*), prairie sandreed (*Calamovilfa longifolia*), threadleaf sedge (*Carex filifolia*), prairie junegrass (*Koeleria macrantha*), plains muhly (*Muhlenbergia cuspidata*), and needle-and-thread (*Hesperostipa comata*). Additionally, various seasonal forbs are found in this area. Midland prairie vegetation occurs on the hillsides of the training area. Typically this community is more vegetated than the upland prairie community due to moist soil conditions. In addition to the above referenced grass-like species commonly found in the upland prairie areas, little bluestem (*Schizachyrium scoparium*), porcupine grass (*Hesperostipa curtiseta*), and green needlegrass (*Nasella viridula*) can be found. Various seasonal forbs can also be found in this area.
Vegetation (cont.)	The lowland prairie community is found near the wetland areas, the lake, and at the bottom of the drainage way at Williston LTA. Common plant species typically found in these areas include various grass and grass-like plants such as slender wheatgrass (*Elymus trachycaulus*), big bluestem (*Andropogon geradii*), Baltic rush (*Juncus balticus*), Kentucky bluegrass (*Poa pratensis*), prairie dropseed (*Sporobolus heterolepis*), and wedgegrass (*Sphenopholis obtusata*). Various seasonal forbs can also be found in this community. Woodland draws occur in the drainage found in the midland prairie communities adjacent to the hillsides toward the outlet at Williston LTA. Similar to the midland prairie, moist soils dominate the area and have a high density of plant species. Common grassy species found in this community are the same as those typically identified in the lowland communities. Various seasonal forbs can also be found in this community.
Cultural, Archaeological and Historical Resources	Several American Indian Tribes have historically inhabited the Williston LTA area. The USACE reports that it will coordinate with the Tribes and ND State Historic Preservation Office.
Wetlands	According to the National Wetland Inventory (U.S. Fish and Wildlife Service [USFWS], 2017a), there are no wetland areas that occur within the MRS.
Demographics	The estimated population of the city of Williston was 26,426 in 2016; the population density (using square mileage from 2010) is 3,524 inhabitants per square mile (US Census Bureau, 2017). The population of Williams County was 34,337 in 2016 (US Census Bureau, 2017). There are no residents on the MRS.
Ecological Characteristics	
Habitat Type	As previously discussed in the vegetation section above, common habitats which occur at Williston LTA include both native and non-native grasslands, forbs, and marsh areas (wetlands and streams) associated with Lake Sakakawea.

Physical Characteristics	
Ecological Receptors	There are seven federally listed threatened and endangered wildlife species which have the potential to occur in Williams County, North Dakota including the Whooping Crane (*Grus Americana*), Pallid sturgeon (*Scaphirhynchus albus*), Interior least tern (*Sterna antillarum*), Piping plover (*Charadrius melodus*), Northern long-eared bat (*Myotis septentrionalis*), Red knot (*Calidris canutus rufa*), and the Gray wolf (*Canis lupus*) (USFWS, 2017b). While the Bald eagle (*Haliaeetus leucocephalus*), has been de-listed from the national endangered list, the species is still protected under the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Specifically, the Whooping crane and Interior least tern have the potential to be located at the Williston LTA for short periods of time. USACE completed annual breeding surveys for the Interior least tern and there have been no reported sightings during these surveys. Central North Dakota is located within the spring and fall migration pathway for the Whooping Crane; however, they have never been sighted in the Williston LTA area (Sedivec et al.)
Ecological Receptors (cont.)	The Piping plover (*Charadrius melodus*) can be found on the shores of Lake Sakakawea in Williams county. Shorelines of the Lake can provide critical habitat for the nesting Piping plover; however the shoreline is directly affected by the expansion of vegetation from the mainland. During the surveys by USACE in recent years, there were no sightings of breeding pairs in the area of Williston LTA. The Piping plover has designated critical habitat in Williams County; however, no federally or State listed species have been identified as occupying the MRS. The remaining aforementioned species have not been identified on or surrounding Williston LTA.
Degree of Disturbance	The area is used for activities associated with the Cattle Grazing Association. The land within the LTA is also used for recreation. Minimal disturbance is expected from these types of activities.

1.4 Investigation Approach

The sampling approach of the RI is designed to characterize the nature and extent of MC contamination in the soil berm, natural hillside backstop area, and the constructed pond. To accomplish this, a phased approach that includes assessing the lateral extent of MC contamination in the field using X-ray fluorescence (XRF) analysis followed by laboratory analysis of soil samples collected using incremental sampling methodology (ISM) will be used. Although munitions and explosives of concern are not anticipated at the MRS, all field activities will be conducted with USACE provided unexploded ordnance avoidance support.

Based on the findings of the Phase I Assessment (ERT, 2008), potential MC are limited to small arms metals: antimony, copper, lead, and zinc. Since explosives were used to create the constructed pond, explosives MC will be assessed for that area only during the RI. All soil samples collected for laboratory analysis will be sent to GCAL Analytical Laboratories, LLC, in Louisiana for analysis of target small arms metals. Waste characterization parameters will also be collected. The results of waste characterization will be used to inform the Feasibility Study, should one be warranted.

Three areas have been identified within the MRS as decision units (DUs) for MC: the berm, backstop area, and constructed pond (**Figure 4**). The faces of the natural hillsides, used as a backstop, are embedded with bullets and bullet pieces. Overtime, particulate MC in soil has eroded from the hillsides

and been transported downslope to the floor of the coulee and the constructed pond. The Backstop Area DU addresses the floor area for MC. Large fragments and intact bullets have been left behind in the hillside and accumulated at the base of the hills. The presence of bulk/coarse bullets will be noted visually during field activities and recorded.

Ex-situ XRF analysis will be performed to characterize the lateral extent of surface soil lead contamination (0-6 inches below ground surface [bgs]) at the Berm and Backstop Area DUs. The results of this analysis will be used to refine the boundaries of DUs that will be sampled using ISM. Subsurface samples from 12 to 18 inches will be collected from high concentration (worst case) areas in order to determine the vertical extent of MC in soil.

Locations where XRF values exceed the human health screening criterion for lead will refine the boundary of the MRS DUs. Should samples taken along the boundary of the initial DUs exceed the screening criterion, step-out samples will be taken until exceedances are no longer encountered. Step-out samples with screening exceedances may increase the size of their respective DUs. If no exceedances are found along the initial Berm DU boundary, the initial boundary will be used during ISM sampling. If no exceedances are found along the initial Backstop Area DU boundary, the initial boundary will be revised to contour the area of contamination since there is more uncertainty regarding the presence and extent of MC within the soil of the Backstop Area DU. Step out sampling will not be conducted on hillsides that are too steep to be safely traversed.

It is anticipated that soil within the Constructed Pond DU will be too moist for XRF use. Since the Constructed Pond DU is encompassed by the Backstop Area DU, the initial boundary for the Constructed Pond DU will be used during ISM. Once all DU boundaries are confirmed, an approximate 30- to 50-part incremental sample will be collected in triplicate from surface soil at each DU and analyzed for metals MC (antimony, copper, lead, and zinc). The Constructed Pond DU incremental samples will also be analyzed for explosives MC.

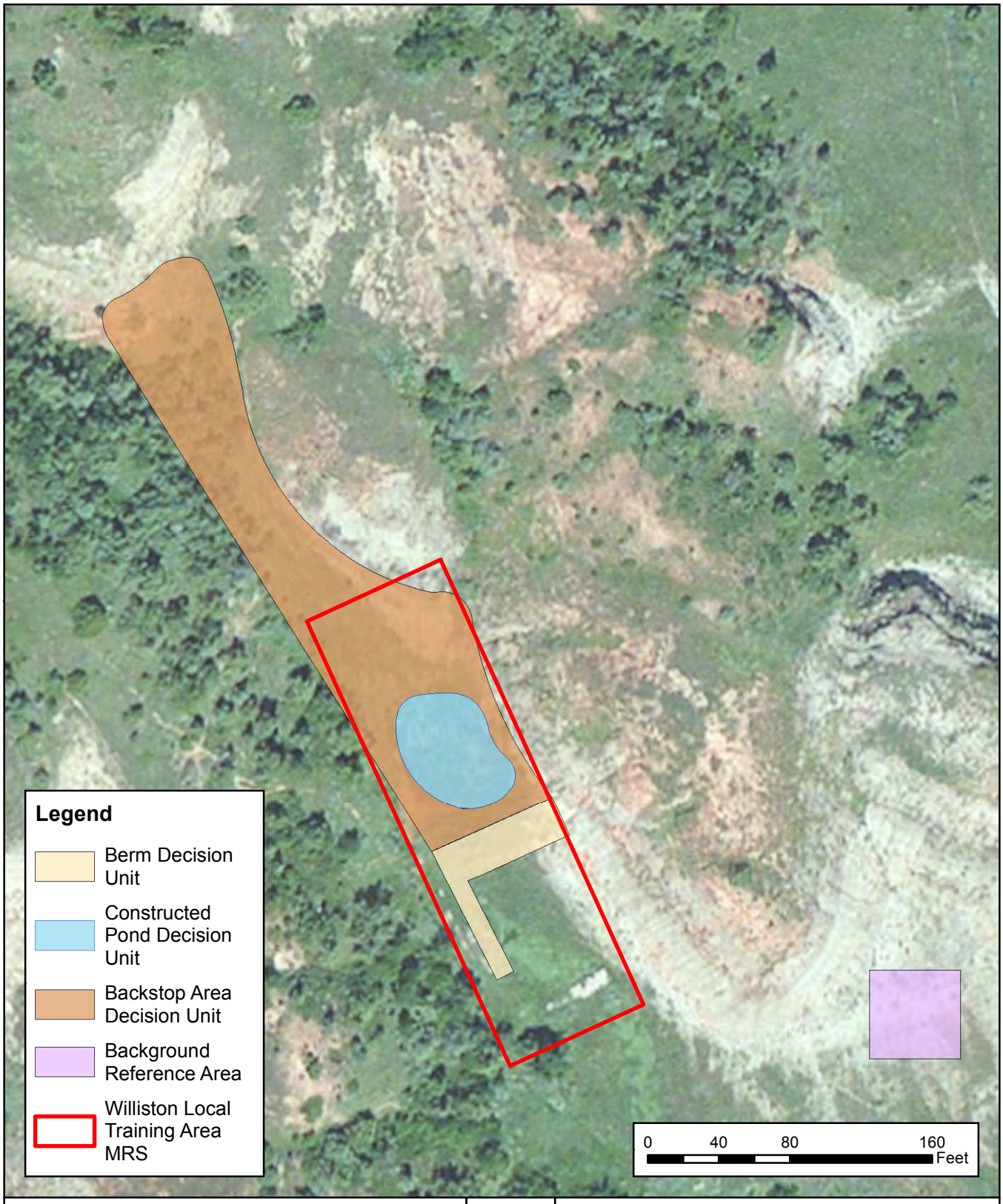
A discrete soil sample will be collected from the location with the highest XRF lead result at each DU for waste characterization analysis (e.g., toxicity characteristic leaching procedure) for lead. A random location will be selected for sampling within the Constructed Pond DU. Laboratory analysis of waste characterization samples will be contingent on the results for lead from incremental samples collected from the respective DU. These data will be used in alternative evaluation during the Feasibility Study.

The vertical extent of MC will be characterized by collecting discrete subsurface soil samples from 12 to 18 inches bgs by hand auger where select surface soil XRF readings exceed the human health screening criterion for lead. Subsurface samples will be analyzed by both XRF (where applicable) and laboratory analytical methods for metals MC. The results of the subsurface XRF analysis will be used to determine whether deeper samples are needed from 24 to 30 inches bgs to bound the vertical extent of contamination. Since XRF will not be used at the Constructed Pond DU, two random locations will be selected for subsurface sampling. At each location, a 12 to 18 inches bgs and 24 to 30 inches bgs sample will be collected. Laboratory analysis of samples collected from 24 to 30 inches bgs will be contingent on the results from the above sample. In anticipation of the end use of data (i.e., soil removal volume estimates) it is unlikely that resolution finer than 12 inches vertically within the soil profile is needed as

most soil removal equipment will excavate soil in 1-foot lifts. Discrete samples will be analyzed for metals MC (antimony, copper, lead, and zinc); Constructed Pond DU discrete samples will also be analyzed for explosives MC. If RI results indicate the need for remedial action, future soil removal activities would include the removal of soil that exceeds action level(s) to a depth of 18 inches bgs. Confirmation samples would be taken to insure levels are acceptable. If the confirmation sample exceeds the action level(s), further removal action would continue until the substrate is left below action levels.

In addition, a background reference surface soil sample will be collected in triplicate using ISM from an area not affected by historical training activities. The area will be representative of undisturbed media and of an appropriate size to adequately characterize background concentrations and be comparable to investigative samples. The proposed location for background reference sample collection is shown on **Figure 4**. The results of all ISM samples will be used in the risk assessment in the RI report.

Details regarding the investigative approach, including the site specific conceptual site model (Worksheet #10), Data Quality Objectives (Worksheet #11), and detailed sampling design and rational (Worksheet #17), are provided in **Appendix A**. Rights of entry are not required for the RI because the land is owned by the USACE and leased to the NDARNG.



CLIENT	Army National Guard			
PROJECT	RI through DD for Williston LTA, ND MRS			
REVISION NO	0	GIS BY	MS	11/9/2017
SCALE	1:960	CHK BY	JW	11/9/2017
SOURCE	ARNG; State of North Dakota, ESRI & Partners	PM	LS	11/9/2017

N

Williston Local Training Area RI Approach

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 4

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Appendix A

Uniform Federal Policy – Quality Assurance Project Plan

AECOM

Final
Uniform Federal Policy – Quality Assurance Project Plan Military Munitions Response Program
Williston Local Training Area, North Dakota

Munitions Response Site NDHQ-008-R-01

North Dakota Army National Guard

Army National Guard

Contract No. W9133L-14-D-0001

Delivery Order No. 0008

JUNE 2018

Prepared for:
Army National Guard
NGB-AQ-W9133L
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Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
ARNG	Army National Guard
ARNG-IED	Army National Guard – Cleanup & Restoration Branch
bgs	below ground surface
CD	Compact Disc
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
COR	Contracting Officer's Representative
CRP	Community Relations Plan
CSM	Conceptual Site Model
Cu	copper
CCV	Continuing Calibration Verification
DD	Decision Document
DO	Delivery Order
DoD	Department of Defense
DQI	Data Quality Indicators
DQO	Data Quality Objective
DU	decision unit
DUA	Data Usability Assessment
EPA	Environmental Protection Agency
ERIS	Environmental Restoration Information System
FS	Feasibility Study
GCAL	Gulf Coast Analytical Laboratory
HHRA	Human Health Risk Assessment
ICAL	Initial Calibration
ICB/CCB	Initial and Continuing Calibration Blank
ICS	Interference Check Solutions
ICV	Initial Calibration Verification
IDW	Investigative derived waste
ITRC	Interstate Technology Regulatory Council
IS	Internal Standards
ISM	incremental sampling methodology
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicates
LDR	Linear Dynamic Range
LOD	level of detection
LOQ	level of quantitation
LTA	Local Training Area
MB	Method Blank
MC	munitions constituent
MEC	Munitions and Explosives of Concern
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NDARNG	North Dakota Army National Guard
NDDH	North Dakota Department of Health
NDNODS	Non-Department of Defense, Non-Operational Defense Sites
NFA	No Further Action

ORA	Operational Range Assessment
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PALs	Project Action Limits
PARCC	precision, accuracy/bias, representativeness, comparability, and completeness
Pb	lead
PDF	Portable Document File
PDS	Post-Digestion Spike
PM	Project Manager
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QL	Quantitation Limit
RI	Remedial Investigation
RPD	relative percent difference
RSD	relative standard deviation
Sb	antimony
SDG	sample delivery group
SLERA	Screening Level Ecological Risk Assessment
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
TCLP	toxicity characteristic leaching procedure
TPP	Technical Project Planning
TSA	Technical Systems Audit
UCL	upper confidence limit
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plans
USEPA	U.S. Environmental Protection Agency
XRF	X-ray fluorescence
Zn	zinc

QAPP Worksheets #1 & #2 - Title and Approval Page

(UFP-QAPP Manual Section 2.1; EPA 2106-G-05 Section 2.2.1)

Project Name:	Remedial Investigation through Decision Document for Five Army National Guard Munitions Response Sites, Williston Local Training Area (LTA), North Dakota (AEDB-R#: NDHQ-008-R-01)
Site Location:	Williston, ND
Contract/Delivery Order:	Contract No. W9133L-14-D-0001 Delivery Order No. 0008
Preparation Date (Month/Year):	June 2018

Laurie Stenberg — **11 June 2018**

Investigative Organization's Project Manager: Signature Date
Printed Name / Organization: **Laurie Stenberg / AECOM**

Jerry Kashatus — **12 June 2018**

Investigative Organization's Project QC Manager: Signature Date
Printed Name / Organization: **Jerry Kashatus / AECOM**

HATCHER.JULIE.ANN.1187151593 Digitally signed by HATCHER.JULIE.ANN.1187151593 Date: 2018.06.28 09:05:01 -04'00'

Lead Organization's Project Manager: Signature Date
Printed Name / Organization: **MAJ Julie Hatcher / ARNG-IED**

Curtis D. Erickson July 3, 2018

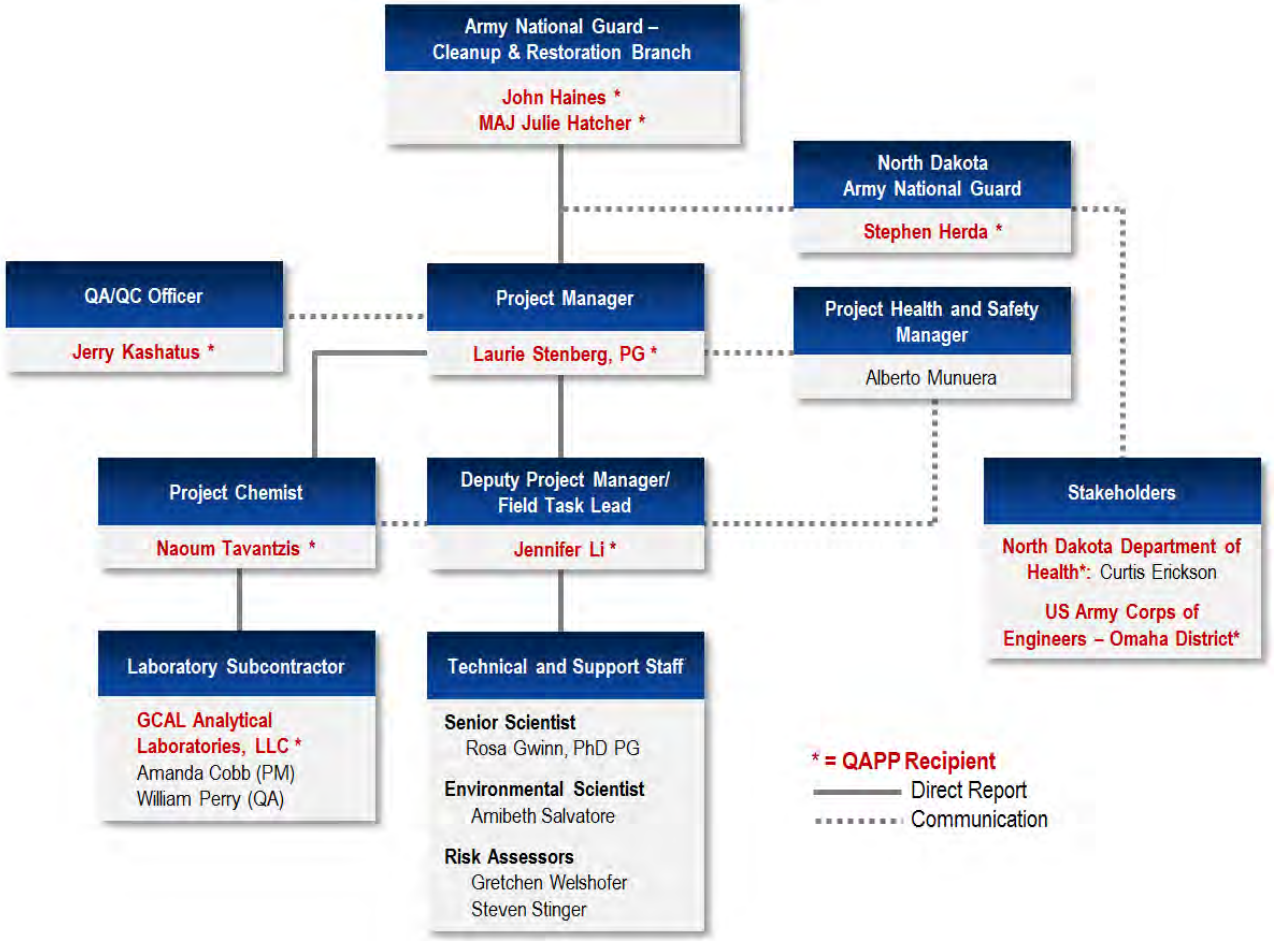
Regulatory Agency Project Manager: Signature Date
Printed Name / Organization: **Curtis Erickson / North Dakota Department of Health**

QAPP Worksheets #3 & #5 – Project Organization and QAPP Distribution

(UFP-QAPP Manual Sections 2.3 and 2.4; EPA 2106-G-05 Sections 2.2.3 and 2.2.4)

The project team organization for this project is presented in the chart below. Recipients of controlled copies of the Quality Assurance Project Plan (QAPP) are identified with an asterisk in the chart. The draft QAPP, final QAPP, and any changes/revisions will be provided to the QAPP recipients, who are responsible for document control within their organization.

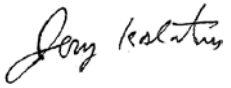
Project Organizational Chart



QAPP Worksheets #4, #7, & #8 – Personnel Qualifications and Sign-off Sheet

(UFP-QAPP Manual Sections 2.3.2 – 2.3.4; EPA 2106-G-05 Sections 2.2.1 and 2.2.7)

Organization: AECOM Technical Services, Inc.

Name	Project Title/Role	Education/Experience	Specialized Training/ Certifications	Signature/Date
Laurie Stenberg	Project Manager (PM)	Education: BA, Geology Experience: 27 years of experience. Army National Guard (ARNG) Operational Range Assessment (ORA) Phase II Installation Team Leader at 8 Installations. Directed QAPP development for ORA Phase IIs at ARNG Installations. Experience executing Military Munitions Response Program (MMRP) projects at ARNG installations.	Professional Geologist (PA) AECOM Certified PM	Laurie Stenberg 11 June 2018
Jennifer Li	Deputy PM/ Field Task Leader	Education: MS, Environmental Systems; BS, Biology Experience: 6+ years of experience with 3 years direct experience working on munitions constituent (MC) investigations under MMRP and ORA for ARNG and the Army. Direct experience developing QAPPs for MC investigations.	USEPA Incremental Sampling Training, 40hr HAZWOPER, 8hr OSHA Supervisor, First Aid/CPR	 11 June 2018
Rosa Gwinn	Project Senior Scientist (Independent Technical Reviews)	Education: PhD, Geological Sciences; MS, Geological Sciences; BA, Geological Sciences Experience: 27+ years of experience performing and managing environmental investigations and remediation projects; 10+ years at military ranges; installation team leader on multiple ARNG ORA Phase II sites.	Professional Geologist (WA, UT)	 12 June 2018
Jerry Kashatus	Project QA/QC Officer	Education: MS Geological Sciences, BS Earth Sciences Experience: 30+ years of experience performing and managing environmental investigations for federal clients. Has served in QA/QC capacity on projects for 25+ years; completed training for performing quality audits per AECOM's internal requirements. Works with staff to ensure compliance with the corporate Quality Management System.	Professional Geologist (PA)	 12 June 2018

Name	Project Title/Role	Education/Experience	Specialized Training/ Certifications	Signature/Date
Amibeth Salvatore	Environmental Scientist	Education: Master of Environmental Science & Management Experience: 6+ years of experience working on munitions constituent (MC) investigations under MMRP and ORA for ARNG and USMC. Direct experience developing QAPPs and other planning documents and serving as field and technical leader for MC investigation at multiple sites.	40hr HAZWOPER, 8hr OSHA Supervisor, First Aid/CPR	11 June 2018
Naoum Tavantzis	Project Chemist	Education: BS, Environmental Science, MBA Experience: 9+ years of experience, 2 years of experience as an analyst in an environmental laboratory; 6+ experience in developing UFP-QAPPs for field investigations at military ranges, as well as working with analytical laboratories to ensure project objectives are achieved; Senior Chemist on multiple ORA and MMRP investigations and military restoration projects.		11 June 2018
Gretchen Welshofer	Human Health Risk Assessor	Education: BA, Communication; MS, Environmental Science Experience: 17+ years of experience performing human health risk assessments; expertise in evaluating potential risks and hazards to human health posed by MC emanating from small arms and large caliber ranges; expertise in evaluating contaminant fate and transport for validity of exposure pathways.		12 June 2018
Steven Stinger	Ecological Risk Assessor	Education: MS, Environmental Science and Engineering; BS, Environmental Resource Management Experience: 31+ years of experience in the management and remediation of hazardous waste sites, including preparation of human health and ecological risk assessments and development of risk-based cleanup levels.		13 June 2018

Name	Project Title/Role	Education/Experience	Specialized Training/ Certifications	Signature/Date
Alberto Munuera	Regional Health & Safety Manager	Education: MS, Occupational Health and Safety; BS, Geological Sciences Experience: 11+ years as a Health and Safety Manger responsible for managing large scale safety programs that include risk assessments and implementation of control measures, ergonomics, industrial hygiene, social psychology and environment protection.		Signature included in Attachment B (Site Safety and Health Plan) of the Work Plan

Organization: Gulf Coast Analytical Laboratory (GCAL)

Name	Project Title/Role	Education/Experience	Specialized Training/ Certifications	Signature/Date
Amanda Cobb	Project Manager (GCAL)	Education: BS, Biology 3+ yrs of experience as Project Manager		Amanda Cobb 6/11/18
William Perry	Laboratory Quality Assurance Specialist (GCAL)	Education: BS, Chemistry ACS program. Experience: 30 years of experience including QAPP development, data validation, laboratory auditing and procurement, laboratory and sampling management, organic analysis and sample preparation management.	Statistics and 17025/TNI/QSM standards	GCAL-QAM Mon Jun 11 2018 14:20:26

QAPP Worksheet #6 – Communication Pathways

(UFP-QAPP Manual Section 2.4.2; EPA 2106-G-05 Section 2.2.4)

Communication Driver	Responsible Entity	Name	Contact Information	Procedure (timing, pathway, documentation, etc.)
Small Arms Ranges Program Manager and/or Contract Officer Representative decisions and modification	ARNG-IED Project Manager	MAJ Julie Hatcher	703-607-9166 julie.a.hatcher4.mil@mail.mil	Communicate award of work and options as directed by National Guard Bureau Contracting Officer. Track project progress through monthly reporting and daily field reporting. Stop work for quality or performance concerns.
NDNODS Program Manager: decisions and modification	ARNG-IED Program Manager	John Haines	703-607-7986 john.b.haines.ctr@mail.mil	Track Non-Department of Defense, Non-Operational Defense Sites (NDNODS) project progress through monthly reporting and daily field reporting.
North Dakota MRS specific decisions and modification	ARNG-IED North Dakota PM	John Haines	703-607-7986 john.b.haines.ctr@mail.mil	Communicate North Dakota specific decisions and status updates to AECOM PM.
Regulatory agency interface	North Dakota ARNG (NDARNG)	Stephen Herda	701-333-2070 stephen.p.herda.nfg@mail.mil	Communicate technical approaches and decisions directly to regulatory agency representative(s).
Coordination of work at Williston LTA	NDARNG	Stephen Herda	701-333-2070 stephen.p.herda.nfg@mail.mil	Communicate with AECOM Field Task Leader to schedule field tasks and timing.
Monthly status & field progress reports	AECOM PM	Laurie Stenberg	301-820-3123 laurie.stenberg@aecom.com	Provide progress reports to the ARNG-IED Project Managers.
Stop work due to safety issues	AECOM All	Alberto Munuera	757-408-4276 (mobile) alberto.munuera@aecom.com	Work may be stopped at any time for any safety concern. Refer to the Site Safety and Health Plan (SSHP) for specifics related to health and safety. Persons other than the responsible entity may also stop work for safety concerns.
QAPP changes prior to field work	AECOM PM	Laurie Stenberg	301-820-3123 laurie.stenberg@aecom.com	Notify ARNG-IED Project Managers of QAPP revisions and request for concurrence.
QAPP changes during project execution	AECOM PM	Laurie Stenberg	301-820-3123 laurie.stenberg@aecom.com	Approval will be obtained for modifications to the QAPP as necessary from ARNG-IED. All approved modifications will be included in Nonconformance Report(s) and resolution / corrective action will be determined.

Communication Driver	Responsible Entity	Name	Contact Information	Procedure (timing, pathway, documentation, etc.)
Field corrective actions	AECOM PM	Laurie Stenberg	301-820-3123 laurie.stenberg@aecom.com	Approval will be obtained for modifications to the QAPP as necessary from ARNG-IED. All approved modifications will be included in Nonconformance Report(s) and resolution / corrective action will be determined.
Sample receipt variances	GCAL	Amanda Cobb	225-214-7047 Amanda.cobb@gcal.com	Report all project nonconformances and problems to the AECOM Project Chemist.
Laboratory quality control (QC) variances	GCAL	Amanda Cobb	225-214-7047 Amanda.cobb@gcal.com	Report all project nonconformances and problems to the AECOM Project Chemist.
Analytical corrective actions	GCAL	Amanda Cobb	225-214-7047 Amanda.cobb@gcal.com	Report all project nonconformances and problems to the AECOM Project Chemist.
Eurofins laboratory modifications and performance problems	GCAL	Amanda Cobb	225-214-7047 Amanda.cobb@gcal.com	Report all project nonconformances and problems to the GCAL PM. GCAL PM will report to AECOM Project Chemist.
Reporting laboratory data quality issues	GCAL	Amanda Cobb	225-214-7047 Amanda.cobb@gcal.com	All QA/QC issues with project field samples will be reported to AECOM as soon as possible, and no longer than within 2 business days.
Data validation issues, e.g., non-compliance with procedures	AECOM Project Chemist	Naoum A. Tavantzis	410-637-1629 naoum.tavantzis@aecom.com	Project Chemist Naoum A. Tavantzis will contact Laboratory Project Manager Amanda Cobb by phone or email if a non-compliance, etc. is identified, and resolution / corrective action will be determined.
Data review corrective actions	AECOM Project Chemist	Naoum A. Tavantzis	410-637-1629 naoum.tavantzis@aecom.com	Project Chemist Naoum A. Tavantzis will contact Laboratory Project Manager Amanda Cobb by phone or email if a non-compliance, etc. is identified, and resolution / corrective action will be determined.

QAPP Worksheet #9 – Project Planning Session Summary

(UFP-QAPP Manual Section 2.5.1; EPA 2106-G-05 Section 2.2.5)

Technical Project Planning (TPP) Meeting 1 and Site Visit for
Williston Local Training Area (LTA) Munitions Response Site (MRS) – Meeting Minutes
Army National Guard (ARNG) Remedial Investigation through
Decision Document for Five ARNG MRSs
Contract No. W9133L-14-D-0001, DO 0008
Wednesday, 06 September 2017
1500 to 1630 hrs

Participants:

Name	Title/Role	Affiliation	Phone #	E-mail Address
John Haines (on phone)	Program & Williston LTA Project Manager	ARNG IED	703-607-7986	john.b.haines.ctr@mail.mil
MAJ Julie Hatcher (on phone)	Project Manager/COR	ARNG IED	703-601-7608	Julie.a.hatcher4.mil@mail.mil
Stephen Herda	Environmental Program Manager	NDARNG	701-333-2070	stephen.p.herda.nfg@mail.mil
Steve Miller (on phone)	Training Specialist	NDARNG		steven.j.miller66.mil@mail.mil
Timothy Kolke	Sr. Realty Specialist	USACE	701-654-7752	Timothy.D.Kolke@usace.army.mil
Jeremy Thury	Natural Resources Specialist	USACE	701-654-7761	Jeremy.J.Thury@usace.army.mil
William Harlon	Environmental Compliance Coordinator	USACE	402-995-2500	William.D.Harlon@usace.army.mil
Curtis Erickson	Hazardous Waste Program Manager	NDDH	701-328-5166	cerickso@nd.gov
Laurie Stenberg	Project Manager	AECOM	301-820-3123	laurie.stenberg@aecom.com
Jennifer Li	Deputy Project Manager	AECOM	301-820-3476	jennifer.j.li@aecom.com
Rosa Gwinn (on phone)	Project Manager	AECOM	301-820-3131	rosa.gwinn@aecom.com

An in-brief package (Attachment 1) was provided in advance of the meeting. Key points that augment the package are provided below. The meeting was held at the North Dakota National Guard in Bismarck, North Dakota.

The in-brief meeting began at 1500 hours CST.

I. Introductions and Agenda (Slides 1-6)

Laurie Stenberg (AECOM) welcomed everyone and began the meeting by circulating a sign-in sheet (Attachment 2). Mr. John Haines (ARNG), MAJ Julie Hatcher (ARNG), Steve Miller (NDARNG), and Rosa Gwinn (AECOM) attended via teleconference.

Laurie introduced Jennifer Li (AECOM) who presented a health & safety moment. A Safe Work Plan for the next day's site visit was made available to the group. Jennifer also shared the importance of placing road flares on both sides of the road if broken down near blind curves or turns.

Introductions began with John Haines welcoming everyone. Curtis Erickson noted that the North Dakota Department of Health (NDDH) is beginning an approximate 2-year process to change its name to the North Dakota Department of Environmental Quality and should still be referred to as NDDH for the time being.

Laurie Stenberg (AECOM) presented the meeting agenda and goals. It was noted that a site-visit would be conducted the following day.

II. TPP Process (Slide 7)

The TPP process and how it will apply to the current project was discussed. The main concepts of the planning phases are to determine what questions need to be answered, what data are needed to answer those questions, and how those data will be obtained. Meeting format is flexible and may include teleconferences. Additional meetings may be held during Proposed Plan and Decision Document phases of the project.

III. Program Drivers and Overview (Slides 8-13)

Slides 8-13 were covered briefly since all project participants were familiar with the topics, including Department of Defense (DoD) environmental investigations of historic munitions sites, the Military Munitions Response Program (MMRP), and Non-DoD Non-Operational Defense Sites (NDNODS). The MMRP was established to address the potential for Munitions and Explosives of Concern (MEC) and munitions constituents (MC) contamination as a result of former DoD use. Historically, the Williston LTA MRS was solely used for small arms training, and MEC is not anticipated at the site.

It was noted on Slide 10 that the Williston LTA MRS was not included in the 2009 NDNODS Inventory because it was operational at the time. It has since become non-operational. The 2013 Preliminary Assessment (PA) included collecting Site Inspection-like samples from berm soil that identified metals MC.

The current project includes all phases of the CERCLA process from Remedial Investigation (RI) through Decision Document (DD). The overall goals of these phases are to characterize the nature and extent of potential contamination, assess the risks to human health and the environment associated with MC exposure, and evaluate potential remedial options to mitigate those risks.

Slide 13 presented the activities that will be conducted to address the objectives of the RI through DD. The first step is to complete a site-specific Work Plan that includes a Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP). A Community Relations Plan (CRP) will also be prepared. The CRP will include discussion of assessing community interest from interested parties such as the cattle grazing association, tribal communities, and nearby recreational facilities.

IV. Williston LTA MRS Information/PA Findings (Slides 14-20)

Jennifer Li reviewed the location and site history of the Williston LTA MRS. The MRS is a 0.52-acre area formerly used as a 25-meter outdoor rifle range located approximately 1.7 miles southwest of Lund's Landing in northwest ND. It includes an earthen berm located at the 25-

meter mark from the firing point. Paper targets were hung in front of the berm at both the 25-, and 10-meter marks. Historically, the berm had rail road ties placed in front of the berm facing the firing point. The rail road ties were sampled for toxicity characteristic leaching procedure (TCLP) during the 2013 PA and subsequently disposed of as non-hazardous waste by the NDARNG. Steep, natural hills frame the MRS and act as a natural backstop. No historical evidence of MEC has been documented or found at the site.

Stephen Herda (NDARNG) informed the group that during the 1970s, the NDARNG used approximately 6-8 cratering charges to create a pond between the earthen berm and the natural backstop. All charges were verified to have detonated. The pond has silted in considerably since creation and is filled with cattails currently. The USACE has expressed interested in maintaining the pond, however, Tim Kolke (USACE) noted that it may not be feasible to maintain due to the infilling. The one-time use of explosives, their known complete detonation, and time elapsed since pond creation indicates that there is very little likelihood of residual explosives MC remaining on site.

Stephen commented that many different types of small arms munitions are present at the MRS due to past civilian and guard use of the site. The range is no longer used by the guard and is currently difficult to reach by potential trespassers.

The 2013 PA methods and results were summarized. The locations of the PA samples were to be confirmed during the site visit. Lead concentrations in berm soil exceeded the "allowable limits" during the PA. Curtis Erickson (NDDH) informed the group that the "allowable limits" referenced during the PA is the range of naturally occurring lead in ND soil (5 – 41 parts per million [ppm]) and not action levels.

The general conceptual site model (CSM) for the MRS was reviewed. The project team discussed land use of the site and appropriate screening level criteria to use during the RI. Current land use includes cattle grazing; occasional trespassers use the site in a recreational manner. Timothy Kolke noted during the meeting that site access is difficult due to a locked gate at the site and an impassable culvert. He provided information to the team following the meeting that the area is zoned for "Recreation – Low Density Use" per the 2007 Garrison Dam/Lake Sakakawea Master Plan. Curtis Erickson noted that NDDH would accept a screening level of ≤1,000 mg/kg for the current and future land use of the site. Other lead values mentioned were the residential criterion of 400 mg/kg and a brownsfield level of 800 mg/kg. AECOM will propose a defensible screening level for use in the RI Work Plan / UFP-QAPP that accounts for current and potential future land use.

AECOM will coordinate the timing of field work with all parties who may want to observe the sampling. The field schedule will also accommodate hunting season (September through December) and will target optimal sampling conditions (dry and no snow, June/July is best). Per the site visit, the access road is likely impassible when raining.

V. RI Objectives, Approach, and Stakeholder Involvement (Slides 21-23)

The overall RI objectives and sampling approach were reviewed (Slides 21-22). The RI will address the potential for MC contamination in both surface soil and subsurface soil. All attendees

present confirmed that they were familiar with the use of incremental sampling methodology (ISM) as an estimate of exposure point concentrations. Surface soil will be characterized using an ISM approached refined by XRF analysis. Discrete samples will be collected to characterize subsurface soil.

An additional RI objective is to maintain coordination with local tribal community stakeholders. Jeremy Thury (USACE) noted that the USACE has a programmatic agreement with the Tribes. USACE archeologist Richard Rodgers will need to review the Work Plan to determine if RI sampling activities will require a USACE survey or site assessment for cultural significance. If a survey of the MRS is needed, the process could take anywhere from 60 to 90 days to complete. Ground disturbance during RI sampling activities will be minimal and is unlikely to necessitate such a survey, according to AECOM.

VI. Schedule and Open Discussion (Slides 24-25)

The preliminary schedule on slide 24 was reviewed. Timothy inquired when a removal action for soil would occur. Stephen explained that the process may take some time (on the order of years) and would occur after the currently scoped project. The group discussed the current lease agreement between NDARNG and USACE; USACE will issue an extension of the lease to the NDARNG that will cover the project through cleanup.

Document distribution of project submittals was discussed. AECOM will transmit documents to the USACE and NDDH on behalf of ARNG on AECOM letterhead. The following distribution was determined:

- NDARNG: Draft and Draft Final documents submitted electronically as source files and PDF versions. Final documents submitted as three hard copies with PDF on CD.
- USACE: Draft Final submitted electronically as source files and PDF versions. Final documents submitted as 1 hard copy with PDF on CD. Jeremy will be the primary recipient and will forward as needed.
- NDDH: All documents submitted electronically as PDF.

The group reviewed information needed to complete the CRP, which is summarized below:

- The NDARNG Public Affairs Officer is MAJ Amber Balken.
- The best local paper for notices is the Williston Herald Newspaper.
- A local library is present in Williston for public access to project documents.
- NDARNG maintains a publically accessible website that can be used for administrative record documents.

TPP1 Presentation concluded at 1630 hours CST.

VII. Site Visit (Thursday, 07 September 2017)

All participants met at Williston LTA at 1130 hours. Attendees were Stephen Herda, Steve Miller, and Jim Bennington (NDARNG); Jeremy Thury, William Harlon, Tim Kolke, and Jeff Keller (USACE); and Laurie Stenberg and Jennifer Li (AECOM).

The group walked on foot from the fourth culvert, which is no longer safe to cross in a vehicle. Attachment 3 presents a map depicting site features and the path site visitors walked. Several features were observed at the MRS and selected photographs are included with the following notes:

A small flat, un-vegetated area is present at the firing points (see Photograph 1).

The 25-meter berm is present and appears to wrap around the west side of the range, approximately half the distance to the firing point.

The pond behind (down range) of the berm is present, although only as an area of cattails and damp soil/silt. No standing water was present at the time of the site visit.

A large number of spent bullets were observed of both military and non-military types. Concentrations of these were especially evident on the berm and natural backstops (especially in eroded channels).

The natural backstop areas surround the MRS to the north, west, and east. These areas are not within the current MRS outline, which is only estimated. The MRS outline will later be updated based on observations and data collected during the RI.

The site visit concluded at approximately 1330 hrs CST.

Site Visit Photographs:

Photograph 1: View looking down range from the firing point (foreground) towards the earthen berm and natural backstop hills. The range floor is vegetated with well-established grasses and sagebrush. Steep hills surround the east, west, and northern boundaries of the MRS. Erosion channels were not observed downgradient from the berm towards Lake Sakakawea.

Photograph 2: View looking up range from the top of the southern natural backstop hill. Site visit participants can be seen standing on the top of the eastern edge of the berm. The pond behind the berm is located center of photograph. Heavy erosion is evident on the face of both natural backstop hills.

Photograph 3: Accumulated military and non-military bullets observed at the base of the southern natural backstop hill.

Photograph 4: View looking north-northwest at the front of earthen berm. Site visit participants are standing on top of the eastern side of the berm. The western half of the berm is vegetated while eastern half is partially vegetated.

Action Items

- NDARNG will send AECOM GIS files associated with the MRS.
- Timothy Kolke (USACE) will send NDARNG and AECOM zoning and lease information regarding Williston LTA.

QAPP Worksheet #10 – Conceptual Site Model

(UFP-QAPP Manual Section 2.5.2; EPA 2106-G-05 Section 2.2.5)

The Conceptual Site Model (CSM) for Williston LTA is presented within this worksheet as a combination of diagrams/figures and narratives. This profile was generated based on the information and findings presented in the 1993 Preliminary Assessment (PA) Narrative Report, 2008 Phase I Qualitative Assessment Report, and 2013 PA. The CSM describes the potential physical, chemical, and biological processes that may transport contaminants from sources to receptors and provides the basis for evaluating potential risks to human health and the environment. The Work Plan presents the site-specific history of Williston LTA, a brief site description, and the physical and ecological characteristics of the area.

Sources

Based on a review of the historical information available, former munitions-related training was limited to small arms (rifles, pistols, and machine guns) at the Williston LTA MRS. Active training occurred between 1960 and 2002 for small arms qualification and instructional firing purposes (North Dakota Army National Guard [NDARNG], 2013). The range is located in a coulee, surrounded to the north, east, and west by steep, rugged hills (see Figure 2 of the Work Plan). The hills surrounding the range acted as a natural backstop during active training (EA Engineering, Science, and Technology [EA], 1993).The MRS includes a 25-meter earthen impact berm, which is still extant within the MRS. A raised side berm extends from the target berm up-range towards the firing point. Firing at the former range occurred in a northwesterly direction toward the target berm and natural backstop. Additionally, a small "duck pond" was constructed behind the target berm (NDARNG, 2013). The pond is currently filled in with cattails, silted in considerably, and only wet seasonally. Topography indicates the pond may be a location where suspended soil particles in stormwater accumulate from the surrounding steep hills.

Munitions expenditure data is not available for the training activities at the Williston LTA MRS; however, it is known that training was limited to small-caliber ammunition. It is estimated that 215,000 small arms rounds were expended at the MRS (Earth Resources Technology, Inc. [ERT], 2008). Potential munitions constituents (MC) present within target berm soil, natural backstop area soil, and constructed pond soil as a result of small arms projectiles are primarily lead (Pb), and secondarily antimony (Sb), copper (Cu), and zinc (Zn). MC contamination was confirmed in surface soil at the target berm at concentrations above human health screening criteria during NDARNG sampling conducted in 2011. Due to the limited coverage of the MRS during the 2011 investigation, MC may also be present in natural backstop area soil and constructed pond soil.

Pathways

MC deposited in surface soil as a result of firing activities at the MRS has limited potential to migrate from source areas (i.e., target berm, natural backstop area, and constructed pond) beyond the Williston LTA boundary. Due to MRS topography and range orientation, stormwater runoff from significant rain events is unlikely to transport suspended soil particles off site. This was confirmed during the September 2017 Site Visit with stakeholders (**Worksheet #9**). Stormwater runoff from the steep hills surrounding the range flows radially inward towards the coulee floor. The target berm and constructed pond effectively separate the coulee floor from soils beyond the MRS boundary (see Cross Section A-A' of **Figure 10-1**). No evidence of erosion or gullies was observed during the site visit on either the berm face or leading from or around the berm. **Figure 10-1** presents a pictorial diagram of the site including the overland flow direction of stormwater. The constructed pond holds standing water only seasonally during rainy periods. Transport pathways from soil in source areas to surface water bodies are incomplete.

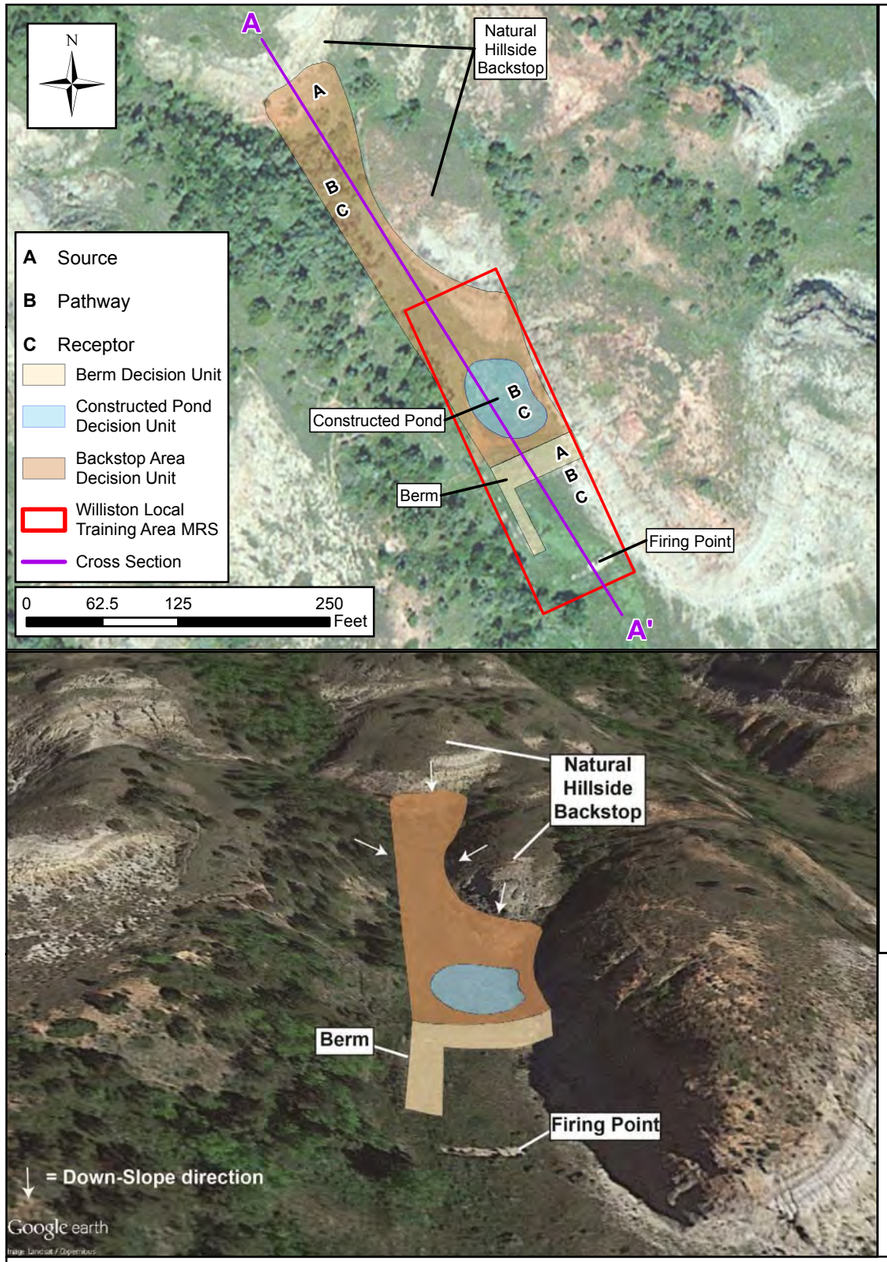
Metals MC have a strong affinity to sorb to soil particles, particularly soils that are rich in organic matter, and usually only migrate via physical transport pathways. Because of these chemical properties, they typically do not leach to groundwater except where shallow groundwater exists less than 5 feet below ground surface (bgs). According to data presented in the 2008 Qualitative Assessment Report (ERT, 2008), groundwater at the MRS is approximately 80 feet bgs (Cross Section A-A' of **Figure 10-1**). Therefore, groundwater pathways are incomplete for the Williston LTA MRS.

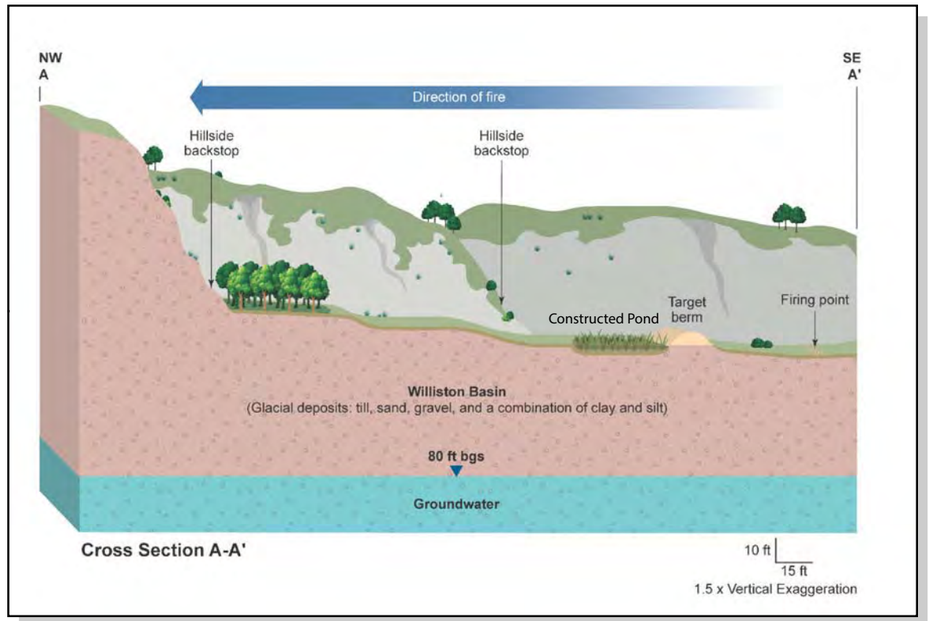
MC within target berm, natural backstop, and constructed pond soil is anticipated to remain within source areas and/or soils on the coulee floor, and not be transported off site. Bulk/coarse bullets are embedded in berm and backstop soil; due to their weight, it is unlikely for them to be transported off-site via overland flow. Exposure pathways between MC and receptors are restricted to the target berm, constructed pond, and backstop areas.

Receptors

Lake Sakakawea is located south of the MRS. The property is remotely located and federally owned by U.S. Army Corps of Engineers (USACE), with access to the site restricted by a fence and locked gate. Human receptors may visit the MRS for sightseeing, hiking, or boating activities from Lake Sakakawea. However, an impassible culvert prevents direct vehicle access to the MRS. The Williston LTA is co-leased by a cattle grazing association. Workers may visit the MRS to conduct activities associated with cattle grazing.

No sensitive ecological habitats (i.e., wetlands) are present within the MRS, but native and non-native grassland, forbs, and marsh area habitats occur within the Williston LTA. The constructed pond is poor habitat due to infilling from erosion of the surrounding hillsides. The Interior Least Tern (*Sterna antillarum*), Whooping Crane (*Grus americana*), Pallid Sturgeon (*Scaphirhynchus albus*), and Gray Wolf (*Canis lupus*) are federal and State endangered species that potentially occur within Williams County. The Piping Plover (*Charadrius melodus*) is a federal and State threatened species with designated critical habitat in Williams County, however, no federally or State listed species have been identified as occupying the MRS. Although the land is co-leased and used for cattle grazing, lead is not known to be significantly bioaccumulative (unlike mercury, for example) within terrestrial food chains (ATSDR, 2007). Cattle pass through the MRS transiently because the land within the MRS boundary is not supportive of grazing due to steeply sloping topography and minimal vegetation. Cattle are not a potential receptor at the MRS.





A – Sources
Particulate metals, particularly lead, and bulk bullets/projectiles in soil on the target berm and natural hillside backstops as a result of historical small arms training.

B – Pathways
Metals MC have limited potential to migrate from soil at the target berm, or natural hillside backstops (Source areas: “A” on map to left) beyond range boundaries. Due to topography and range orientation, stormwater runoff from hillside backstop areas flows towards the “Dry Pond” impoundment behind the earthen berm. Groundwater at the MRS is approximately 80 feet below ground surface (Cross section A-A’). Groundwater pathways are incomplete since metals are highly unlikely to leach from soil in source areas to deep groundwater. MC within MRS soil is anticipated to collect and remain in the target berm, dry pond and backstop areas, and not migrate off-site. Bulk/coarse bullets are embedded in berm and backstop soil; due to their weight, it is unlikely for them to be transported off-site via overland flow.

C - Receptors
The MRS is located within a coulee, surrounded on three sides by steep, rugged hills. Human receptors may recreationally visit the MRS for sightseeing, hiking, or boating activities from Lake Sakakawea. Workers may also visit the MRS to conduct activities associated with the Cattle Grazing Association.

No sensitive ecological habitats (i.e., wetlands) are present within the MRS, but native and non-native grassland, forbs, and marsh area habitats occur within the Williston LTA. The dry pond is poor habitat due to infilling from erosion of the surrounding hillsides. The Interior Least Tern (Sterna antillarum), Whooping Crane (Grus americana), Pallid Sturgeon (Scaphirhynchus albus), and Gray Wolf (Canis lupus) are federal and State endangered species that potentially occur within Williams County. The Piping Plover (Picoides borealis) is a federal and State threatened species with designated critical habitat in Williams County, however, no federally or State listed species have been identified as occupying the MRS.

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 10-1
Conceptual Site Model
Williston Local Training Area, North Dakota

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Date.....November 2017
Prepared by.....AECOM

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QAPP Worksheet #11 – Project/Data Quality Objectives

(UFP-QAPP Manual Section 2.6.1; EPA 2106-G-05 Section 2.2.6)

Data Quality Objectives (DQOs) are used to help decision-makers collect data of the right type, quality, and quantity to support the decision-making process. The approach to developing DQOs is an iterative process geared toward generating data that will be appropriate to making the decisions needed to reach the project goals. The DQO process consists of seven steps as presented in the U.S. Environmental Protection Agency (USEPA) *Guidance on Systematic Planning Using the Data Quality Objectives Process* (USEPA QA/G-4, 2006). Each step is presented below.

Step 1: State the Problem

Historical small arms firing is known to have occurred at the Williston LTA MRS for approximately 43 years prior to 2002. An earthen berm, hillside backstop area, and a constructed pond may have been affected by MC from bullets used during small arms training. Data collected in 2011 during a PA indicate there is likely metals contamination at the earthen berm; MC, lead in particular, is present in soil above background concentrations and screening levels. No sampling data exist for the natural backstop areas, however, a significant number of spent bullets were observed during the site visit embedded in and at the base of the backstop hills (**Worksheet #9**). Sampling data is not available for the constructed pond. This man-made pond acts as a drainage area for the up-gradient backstop hillsides and has silted in over the years with soil likely containing MC.

The lateral and vertical distribution of MC in soil at the earthen berm is unknown and additional data are needed to confirm whether there have been impacts to the backstop area and constructed pond. Additionally, background (also called reference) data for MC, collected using the same methods used for this RI, are needed so that data sets are comparable.

A one-time use of 6 to 8 cratering charges (approximately 300 to 400 pounds of explosives) in 1998 to construct a small "duck pond" (now mostly filled with sediment) at USACE's request. All charges were verified to have detonated but may have left residual MC. Thus, explosives are a potential MC in this particular location. Because explosives do not occur naturally in the environment, any explosives contaminants found here will be deemed related to constructing the pond. Background data for explosives will not be needed.

As described in **Worksheet #9**, the general plan for investigating the nature and extent of MC in soil at the MRS was presented to stakeholders at the project kickoff meeting. Site maps showing detailed sampling locations appear on **Figures 17-2**, **17-3**, and **17-4** of **Worksheet #17**.

Step 2: Identify the Goals of the Study

Sampling at each range wall will provide answers to the following questions:

- *If present, do MC concentrations in soil exceed Project Action Limits (PALs) and background[1]?*
- *What is the lateral and vertical distribution of MC in soil exceeding screening PALs and background?*

[1] Background pertains only to metals MC.

- *If MC is present in concentrations above the PALs and background, do these concentrations pose an unacceptable risk to human health and the environment?*
- *If MC concentrations in soil are below the PALs, can a No Action decision be supported?*
- *If MC is present at concentrations that pose an unacceptable risk to human health and/or the environment, is it sufficiently defined to support an informed risk management decision of potential remedial actions?*

Step 3: Identify Information Inputs

Inputs needed to answer the questions identified in Step 2 are detailed below:

- Historical information and previous PA data were reviewed to design the sampling and analysis approach. Details regarding the sampling design are presented in **Worksheet #17**.
- Soil data are needed from discrete locations to understand the extent of MC laterally and vertically. For risk assessment, defensible exposure concentrations within a decision unit (DU) are needed and this is accomplished by the incremental sampling method (ISM) described in **Worksheet #17** and detailed in standard operating procedure (SOP) MC-4 (**Attachment A**).
- Naturally occurring background metals MC concentrations will be determined in a nearby area that is unaffected by historical site activities, see **Worksheet #17, Figure 17-1**.
- During the RI, ISM results will be compared to the PALs established by following screening criteria detailed on **Worksheet #15** (and area-specific background concentrations):
    - USEPA Regional Screening Levels protective of a residential scenario using a target hazard quotient of 0.1 and a target cancer risk of $1x10^{-6}$ (USEPA, 2017).
    - USEPA Ecological Soil Screening Values (USEPA, 2005a&b, 2007a&b, and 2015)
- Based on these screening criteria and the sampling design, data will be obtained using two methods: on-site X-ray fluorescence (XRF) and off-site laboratory analysis by analytical method; USEPA SW-846 Method 6020B was selected to achieve the required levels of detection (LOD) and levels of quantitation (LOQ).
- The presence of bulk bullets at the MRS is evident. Qualitative visual observations will be made on the extent of bullets during soil sampling.

Step 4: Define Boundaries of the Study

The physical boundaries of the MRS and DUs are shown in **Figure 17-1** of **Worksheet #17**. The investigation/DU boundaries may be refined based on results of the MC investigation during which step-out samples may be collected to define the edge of MC concentrations above the human health screening criterion for lead. There are no significant practical constraints on the sampling, and rights of entry are not needed since the land is leased to NDARNG by the USACE. A USACE survey or site assessment for cultural significance of the MRS may be needed prior to conducting field work following USACE consultation with local Tribes.

Step 5: Develop the Analytic Approach

The purpose of this step is to integrate the outputs from the previous steps into a statement that defines the conditions that would cause the decision-maker to choose among alternative actions. For this RI, the risk-based assessment will be driven by results from incremental samples collected from the DUs established to characterize possible MC releases. Data from these samples represent the potential exposure risk to receptors across the entire DU. The primary concerns are human receptors who have access to the site for

cattle grazing operations and recreational purposes. Ecological receptors may be present; however, there is no sensitive habitat at the MRS, and the constructed pond is poor quality habitat due to infilling with soil from the surrounding hills. Both human and ecological PALs are listed in **Worksheet #15**. The selection process for the location of DUs and collection of incremental samples for MC analysis is outlined in **Worksheet #17**.

The decision rules for this RI are:

- *Earthen Berm: If XRF samples along the DU boundary exceed the human health screening criterion for lead (**Worksheet #15**), then: step-out samples will be collected and analyzed with XRF until exceedances are no longer observed; the DU boundary will be revised; and ISM samples will be collected from the revised DU.*
- *Earthen Berm: If XRF samples along the DU boundary do not exceed the human health screening criterion for lead (**Worksheet #15**), then: ISM samples will be collected from the initial DU.*
- *Backstop Area: If XRF samples along the DU boundary exceed the human health screening criterion for lead (**Worksheet #15**), then: step-out samples will be collected and analyzed with XRF until exceedances are no longer observed; the DU boundary will be revised; and ISM samples will be collected from the revised DU.*
- *Backstop Area: If XRF samples along the DU boundary do not exceed the human health screening criterion for lead (**Worksheet #15**), then: the DU boundary will be revised to contour the area of exceedances; ISM samples will be collected from the revised DU.*
- *Earthen Berm, Constructed Pond, & Backstop Area: If the ISM MC concentrations are less than the PALs (**Worksheet #15**), then: there is no unacceptable risk of MC exposure to receptors; the assessment will be considered complete; and the MRS will be recommended for NFA.*
- *Earthen Berm, Constructed Pond, & Backstop Area: If the ISM MC concentrations exceed the PALs (**Worksheet #15**), then: MC concentrations pose a potential risk to receptors; a Human Health Risk Assessment (HHRA) and/or (as applicable) Screening Level Ecological Risk Assessment (SLERA) will be conducted; the DU will be retained for evaluation in the Feasibility Study if unacceptable risks are identified.*
    - *The HHRA follows USEPA Risk Assessment Guidance for Superfund (RAGS) and subsequent RAGS guidance in accordance with CERCLA (USEPA, 1989; 1991; 2001; 2004; and 2009). In general, the HHRA addresses these five major steps: Data Evaluation, Identification of COPCs, Exposure Assessment, Toxicity Assessment, and Risk Characterization.*
    - *In general, a SLERA will follow the first two steps of the USEPA eight-step ecological risk assessment process (USEPA, 1997)*
- *Earthen Berm, Constructed Pond, & Backstop Area: If laboratory analysis of a discrete 12- to 18-inch soil sample shows MC above PALs, then the laboratory will analyze the 24- to 30-inch contingency sample for vertical delineation of MC. (Note: discrete samples collected below the surface interval are for MC delineation purposes.)*
- *Earthen Berm, Constructed Pond, & Backstop Area: If laboratory analysis of ISM samples from a DU shows lead above the human health PAL, then the laboratory will analyze the respective discrete contingency sample for TCLP lead. (Note: TCLP data will be used during alternative evaluation during the Feasibility Study.)*

Step 6: Specify Performance or Acceptance Criteria

This step is to specify the decision-maker's acceptable limits on decision errors, which are used to establish appropriate performance goals for limiting uncertainty in the environmental data. These

acceptable limits on decision errors allow decision-makers to generate resource-effective sampling designs while limiting uncertainties in the collected data. Decision errors are associated with both field sampling and laboratory analyses.

The baseline condition (i.e., null hypothesis) for MC sampling is that MC is present. The false negative decision error would be deciding that MC is not present when it actually is or deciding that the extent of MC has been defined when it actually has not. This type of decision error is controlled by having a high degree of confidence that the sample locations selected will identify a MC if present, and that the analysis selected is sufficient to detect selected analytes in the sampled media, the detection limits are adequate to ensure an accurate quantification of the MC, and there is a high degree of confidence that the dataset is of sufficient quality and completeness.

The following mechanisms are incorporated into the sampling design to address the above criteria. MC samples will be collected in areas most likely to have an MC release. Procedures are in place for minimizing field sampling decision errors. These procedures include adhering to the planning documents and SOPs and using proper sampling techniques (**Worksheet #17**). If the total percent relative standard deviation (RSD) (total error) between three field replicates from the same DU meets the measurement performance criteria listed in **Worksheet #12-1**, then the sampling design and execution are adequate, and the distribution of replicate results can be assumed to be approximately normal. **Worksheets #12 and #28** specify analytical performance and acceptance criteria.

There are several types of decision errors that may stem from laboratory analysis. The data can be biased high (false positive), biased low (false negative), or completely invalid (rejected). The level of error associated with the laboratory data will be minimized by adherence to analytical methods that produce precise, high-quality data and verified through the data validation process. As part of the data validation process, the project chemist will assess data usability (**Worksheet #37**).

Step 7: Develop the Design

This step is used to produce the most resource-efficient sampling design that will meet the DQOs. The sampling design for the three DUs and background reference area in the Williston LTA MRS includes a combination of statistical and judgmental sampling and is described below. Details on sample design are presented in **Worksheet #17**.

- Collect discrete samples and perform real-time analysis by XRF for evaluating extent of MC at the Berm and Backstop Area DUs. Step-out samples may be needed to bound the extent of MC. XRF may not be suitable for use on moist soil from the Constructed Pond.
- Collect incremental samples in triplicate from the Berm, Constructed Pond, and Backstop Area DUs as well as a background location.
- Collect discrete subsurface samples at select Berm and Backstop Area DU locations where XRF results exceed human health criterion for lead.
- Collect discrete subsurface samples at two randomly selected locations within the Constructed Pond DU.
- Submit incremental and discrete subsurface samples to the laboratory for metals analysis using USEPA SW-846 Method 6020B. Incremental and discrete samples from the Constructed Pond DU will also be analyzed by the laboratory for explosives using USEPA SW-846 Method 8330B.
- Visually assess the hillside backstops for bulk bullets.

QAPP Worksheet #12-1: Measurement Performance Criteria – Aqueous and Solid - 6020

(UFP-QAPP Manual Section 2.6.2; EPA 2106-G-05 Section 2.2.6)

Matrix: Discrete/Incremental Soil/Aqueous Equipment Blank (EQB)
Analytical Group or Method: Metals 6020B – GCAL
Concentration Level: Low

Data Quality Indicator (DQI)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision (overall)	Field Duplicates [Discrete Soil]	Relative percent difference (RPD) <30% when detects are at least 5x LOQ, or within ±4x the LOQ for results <5x LOQ
Precision (overall)	Field Triplicates [Incremental Soil]	RSD <30% when detects are at least 5x LOQ, or average deviation within ±4x the LOQ for results <5x LOQ
Accuracy/Bias (overall)	Field Blanks (aqueous only; e.g., equipment and rinsate blanks)	No results greater than LOD
Precision and Accuracy-overall	Method Blank	The absolute values of all analytes must be < ½ LOQ or < 1/10th the amount measured in any sample
Analytical Accuracy/Bias (laboratory)	Laboratory Control Spike (LCS)	Analyte-specific See DOD QSM 5.1 Table C-5, C-6 and C-12
Analytical Precision	Laboratory Control Sample Duplicates (LCSD)	RPD ≤20%
Analytical Accuracy/Bias	Surrogate Recovery	Analyte-specific % Recovery
Analytical Accuracy/Bias (matrix interference)	Matrix Spike Pair (MS/MSD)	Analyte-specific % Recovery, same as LCS values. RPD of all analytes ≤20%.
Analytical Accuracy/Bias (laboratory)	Serial Dilution Test	Five-fold dilution must agree within ± 10% of the original measurement. Only applicable for samples with concentrations > 50 X LOQ (prior to dilution).
Analytical Accuracy/Bias (laboratory)	Post Digestion Spike	% Recovery = 80%-120%
Analytical Accuracy (laboratory)	Internal Standards	Response within 30%-120% of intensity in calibration blank

QAPP Worksheet #12-2: Measurement Performance Criteria – Aqueous and Solid - ASTM D422

(UFP-QAPP Manual Section 2.6.2; EPA 2106-G-05 Section 2.2.6)

Matrix: Toxicity Characteristic Leaching Procedure (TCLP) Soil
Analytical Group or Method: Metals (Lead), 6020B– GCAL
Concentration Level: Low

Data Quality Indicator (DQI)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision (overall)	Field Duplicates	RPD <30% when detects are at least 5x LOQ, or within ±4x the LOQ for results <5x LOQ
Accuracy/Bias (overall)	Field Blanks (aqueous only; e.g., equipment and rinsate blanks)	No results greater than LOD
Precision and Accuracy-overall	Method Blank	The absolute values of all analytes must be < ½ LOQ or < 1/10th the amount measured in any sample
Analytical Accuracy/Bias (laboratory)	Laboratory Control Spike (LCS)	Analyte-specific See DOD QSM 5.1 Table C-5, C-6 and C-12
Analytical Precision	Laboratory Control Sample Duplicates (LCSD)	RPD ≤20%
Analytical Accuracy/Bias (matrix interference)	Matrix Spike Pair (MS/MSD)	Analyte-specific % Recovery, same as LCS values. RPD of all analytes ≤20%.
Analytical Accuracy/Bias (laboratory)	Serial Dilution Test	Five-fold dilution must agree within ± 10% of the original measurement. Only applicable for samples with concentrations > 50 X LOQ (prior to dilution).
Analytical Accuracy/Bias (laboratory)	Post Digestion Spike	% Recovery = 80%-120%
Analytical Accuracy (laboratory)	Internal Standards	Response within 30%-120% of intensity in calibration blank

QAPP Worksheet #12-3: Measurement Performance Criteria –Solid – 8330B

(UFP-QAPP Manual Section 2.6.2; EPA 2106-G-05 Section 2.2.6)

Matrix: Discrete/Incremental Soil
Analytical Group or Method: Explosives 8330B – GCAL
Concentration Level: Low

Data Quality Indicator (DQI)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision (overall)	Field Duplicates [Discrete Soil]	Relative percent difference (RPD) <30% when detects are at least 5x LOQ, or within ±4x the LOQ for results <5x LOQ
Precision (overall)	Field Triplicates [Incremental Soil]	RSD <30% when detects are at least 5x LOQ, or average deviation within ±4x the LOQ for results <5x LOQ
Precision and Accuracy-overall	Method Blank	The absolute values of all analytes must be < ½ LOQ or < 1/10th the amount measured in any sample
Analytical Accuracy/Bias (laboratory)	Laboratory Control Spike (LCS)	Analyte-specific See DOD QSM 5.1 Table C-5, C-6 and C-12
Analytical Precision	Laboratory Control Sample Duplicates (LCSD)	RPD ≤20%
Analytical Accuracy/Bias	Surrogate Recovery	Analyte-specific % Recovery
Analytical Accuracy/Bias (matrix interference)	Matrix Spike Pair (MS/MSD)	Analyte-specific % Recovery, same as LCS values. RPD of all analytes ≤20%.

QAPP Worksheet #13 – Secondary Data Uses and Limitations

(UFP-QAPP Manual Section 2.7; EPA 2106-G-05 Chapter 3)

Data Type	Data Source	Data Uses Relative to the Current Project	Factors Affecting the Reliability of Data and Limitations on Data Use
Previous Analytical Data	Preliminary Assessment (PA) Report for Williston LTA (NDARNG, 2013)	Soil data has been used to inform the sampling approach and design.	Data collection was limited in scope and was not collected using the same methods planned for the RI. PA data will not be used to supplement risk evaluations.
Historical Site Use	Operational Range Assessment, Phase I Qualitative Assessment Report, Williston LTA, ND (Earth Resources Technology [ERT], 2008)	Location of MRS. Types of munitions used.	No known limitation.
	PA Narrative Report, Garrison Dam and Lake Sakakawea, Riverdale, ND (EA Engineering, Science, and Technology [EA], 1993)		

QAPP Worksheets #14 & #16 – Project Tasks and Schedule

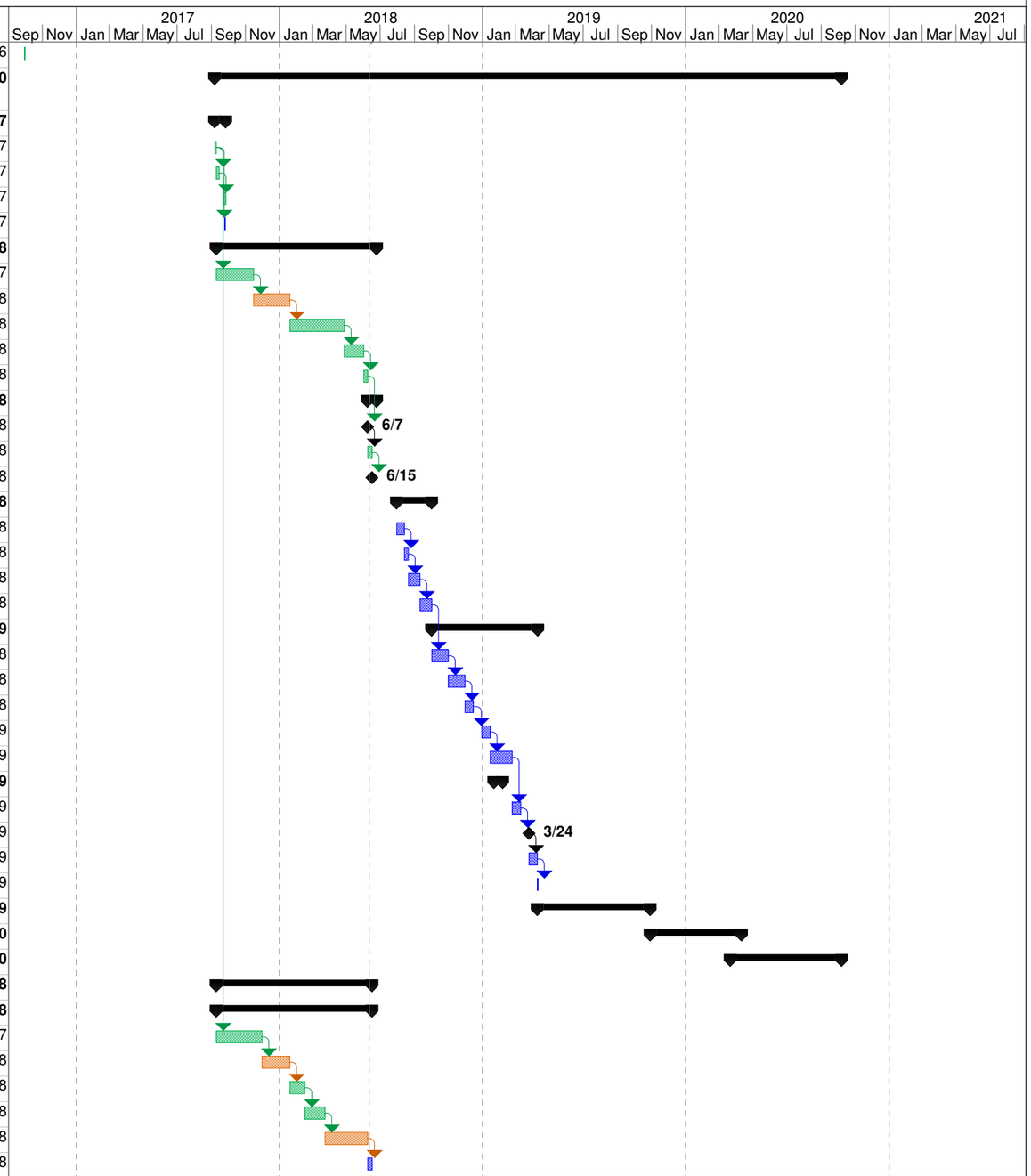
(UFP-QAPP Manual Section 2.8.2; EPA 2106-G-05 Section 2.2.4)

Activity	Responsible Party	Planned Start Date	Planned Completion Date	Deliverable(s)	Deliverable Due Date
Mobilization/ Demobilization	Field Team Leader	August 2018	August 2018	Field documentation	N/A
Soil sampling	Field Team Leader	August 2018	August 2018	Field notes, trip report	N/A
Analysis	GCAL	August 2018	September 2018	Report of Analyses/Data Package	28 days after samples arrive at laboratory
Validation	Project Chemist	September 2018	October 2018	Validation Summary Report	28 days after Analysis/Data Packages received
Summarize Data	Project Manager	September 2018	October 2018	Draft RI Report	TBD

The Schedule provided below is a detailed schedule broken down by each subtask that will occur for the activities associated with the RI through Decision Document for Williston LTA. The timeframes for post-RI documents are somewhat speculative.

Detailed Project Schedule & Milestones
Remedial Investigation through Decision Document for Five Army National Guard Munitions Response Sites

ID	Task Name	Duration	Start	Finish
1	**Notice to Proceed**	1 day	Thu 9/29/16	Thu 9/29/16
2	**Task 5: Remedial Investigation, Feasibility Study, Proposed Plan, and Record of Decision Document for Williston Local Training Area, NDHQ-008-R-01**	**1127 days**	**Wed 9/6/17**	**Tue 10/6/20**
3	**TPP1/Kick-off Meeting/Site Visit**	**20 days**	**Wed 9/6/17**	**Mon 9/25/17**
4	Kickoff Meeting	3 days	Wed 9/6/17	Fri 9/8/17
5	Prepare and Submit Draft Meeting Notes	5 days	Sat 9/9/17	Wed 9/13/17
6	Prepare and Submit Final Meeting Notes	5 days	Thu 9/21/17	Mon 9/25/17
7	Notify COR that Rights of Entry (ROE) are required and obtain ROEs (Not Applicable)	1 day	Sun 9/24/17	Sun 9/24/17
8	**Work Plan/UFP-QAPP/SSHP for Williston Local Training Area, ND**	**288 days**	**Sat 9/9/17**	**Sat 6/23/18**
9	Prepare and Submit Draft Work Plan for Williston Local Training Area	67 days	Sat 9/9/17	Tue 11/14/17
10	Army Review	47 days	Wed 11/15/17	Thu 1/18/18
11	Prepare and Submit Responses to Comments on the Draft Work Plan for Williston Local Training Area	98 days	Fri 1/19/18	Thu 4/26/18
12	Prepare and Submit Draft Final Work Plan for Williston Local Training Area	35 days	Fri 4/27/18	Thu 5/31/18
13	Regulatory Agency Review	5 days	Fri 6/1/18	Thu 6/7/18
14	**TPP2 Meeting**	**16 days**	**Fri 6/8/18**	**Sat 6/23/18**
18	Prepare and Submit Responses to Comments for Williston Local Training Area	0 days	Thu 6/7/18	Thu 6/7/18
19	Prepare and Submit Final Work Plan for Williston Local Training Area	8 days	Fri 6/8/18	Fri 6/15/18
20	Regulatory Agency Approval/Concurrence of Final Work Plan for Williston Local Training Area	0 days	Fri 6/15/18	Fri 6/15/18
21	**Field Investigation**	**63 days**	**Mon 7/30/18**	**Sun 9/30/18**
22	Coordination/Preparation for Field Work	14 days	Mon 7/30/18	Sun 8/12/18
23	Field Work (XRF with discrete and incremental sampling)	7 days	Mon 8/13/18	Sun 8/19/18
24	Laboratory Analysis	21 days	Mon 8/20/18	Sun 9/9/18
25	Data Validation	21 days	Mon 9/10/18	Sun 9/30/18
26	**Remedial Investigation (RI) including MRSPP Update for Williston Local Training Area, ND**	**191 days**	**Mon 10/1/18**	**Tue 4/9/19**
27	Prepare and Submit Draft RI for Williston LTA MRS	30 days	Mon 10/1/18	Tue 10/30/18
28	Army Review	30 days	Wed 10/31/18	Thu 11/29/18
29	Prepare and Submit Responses to Comments for Williston LTA MRS	15 days	Fri 11/30/18	Fri 12/14/18
30	Prepare and Submit Draft Final RI for Williston LTA MRS	15 days	Sun 12/30/18	Sun 1/13/19
31	Regulatory Agency Review	30 days	Mon 1/14/19	Fri 2/22/19
32	**TPP3 Meeting**	**16 days**	**Mon 1/21/19**	**Tue 2/5/19**
36	Prepare and Submit Responses to Comments on Draft Final for Williston LTA MRS	15 days	Sat 2/23/19	Sat 3/9/19
37	Prepare and Submit Final RI for Williston LTA MRS	0 days	Sun 3/24/19	Sun 3/24/19
38	Regulatory Agency Approval/Concurrence of Final RI for Williston LTA MRS	15 days	Mon 3/25/19	Mon 4/8/19
39	ERIS and SDSFIE Submittals	1 day	Tue 4/9/19	Tue 4/9/19
40	**Feasibility Study (FS) including MRSPP Update (if applicable) for Williston Local Training Area, ND**	**203 days**	**Tue 4/9/19**	**Mon 10/28/19**
53	**Proposed Plan including MRSPP Update (if applicable) for Williston Local Training Area, ND**	**164 days**	**Tue 10/29/19**	**Thu 4/9/20**
64	**Record of Decision including MRSPP Update (if applicable) for Williston Local Training Area, ND**	**200 days**	**Sat 3/21/20**	**Tue 10/6/20**
73	**Task 9: Community Relations Plans (CRP)**	**280 days**	**Sat 9/9/17**	**Fri 6/15/18**
74	**Williston Local Training Area, ND - CRP**	**280 days**	**Sat 9/9/17**	**Fri 6/15/18**
75	Prepare and Submit Draft CRP	82 days	Sat 9/9/17	Wed 11/29/17
76	Army Review	36 days	Thu 11/30/17	Thu 1/18/18
77	Prepare and Submit Responses to Comments on Draft CRP	27 days	Fri 1/19/18	Wed 2/14/18
78	Prepare and Submit Final CRP	36 days	Thu 2/15/18	Thu 3/22/18
79	Regulatory Agency Review	77 days	Fri 3/23/18	Thu 6/7/18
80	Revise Final CRP	8 days	Fri 6/8/18	Fri 6/15/18



Project: RI-DD Five ARNG
Date: Mon 6/11/18

Task | Milestone | Summary | Army or Regulatory Review | Completed Task

QAPP Worksheet #15 – Project Action Limits and Laboratory-Specific Detection/Quantitation Limits

(UFP-QAPP Manual Section 2.6.2.3; EPA 2106-G-05 Section 2.2.6)

Matrix: Discrete/Incremental Soil
Analytical Method: Metals (Total) by USEPA SW-846 Method 6020B
Concentration Level: Low

Analyte	CAS #	USEPA Residential Soil RSL (mg/kg)(1)	Ecological Soil Screening Value (mg/kg)(2)	PAL (mg/kg)	PQL Goal (mg/kg)	LCS Lower Control Limit (%)	LCS Upper Control Limit (%)	Laboratory-specific DL (mg/Kg)	Laboratory-specific LOD (mg/Kg)	Laboratory-specific LOQ (mg/Kg)
Antimony	7440-36-0	31	0.27	0.27	0.027	72	124	0.020	0.040	0.080
Copper	7440-50-8	3,100	28	28	2.8	84	119	0.010	0.020	0.040
Lead	7439-92-1	400	11	11	1.1	84	118	0.010	0.020	0.040
Zinc	7440-24-6	23,000	46	46	4.6	82	119	0.20	0.40	0.80

NA = Not Available; PAL= Project Action Level; LCS = Laboratory Control Spike; LOD = Limit of Detection; LOQ = Limit of Quantitation; PQL = Project Quantitation Limit
PQLs are (1/10) regulatory standard listed.
Screening Level References:
(1) USEPA Residential Soil RSL Value (July 2017), protective of a target hazard quotient of 0.1 and a target cancer risk of $1x10^{-6}$
(2) USEPA Region 4 Soil Screening Values (USEPA, 2005a&b and 2007a&b)
Screening values will be reviewed and updated at the time the RI report is written.

Matrix: Discrete TCLP Soil
Analytical Method: TCLP Metals (Lead) by USEPA SW-846 Method 1311/6020B
Concentration Level: Low

Analyte	CAS #	PAL (mg/L)[a]	PQL Goal (mg/L)	LCS Lower Control Limit (%)	LCS Upper Control Limit (%)	Laboratory-specific DL (ug/L)	Laboratory-specific LOD (ug/L)	Laboratory-specific LOQ (ug/L)
Lead	7439-92-1	5.0	5.0	80	120	0.00025	0.0010	0.50

NA = Not Available; PAL= Project Action Level; LCS = Laboratory Control Spike; LOD = Limit of Detection; LOQ = Limit of Quantitation; PQL = Project Quantitation Limit
[a] 40 CRF 261.24 Toxicity Characteristic Table 7-1

Matrix: Discrete/Incremental Soil (Constructed Pond DU)
Analytical Method: Explosives by USEPA SW-846 Method 8330B
Concentration Level: Low

Analyte	CAS #	USEPA Residential Soil RSL (mg/kg)[1]	Ecological Soil Screening Value (mg/kg)[2]	PAL (mg/kg)	PQL Goal (mg/kg)	LCS Lower Control Limit (%)	LCS Upper Control Limit (%)	Laboratory-specific DL (mg/Kg)	Laboratory-specific LOD (mg/Kg)	Laboratory-specific LOQ (mg/Kg)
1,3,5-Trinitrobenzene	99-35-4	220	10	10	0.010	80	116	0.042	0.100	0.200
1,3-Dinitrobenzene	99-65-0	63	0.073	0.073	0.073	73	119	0.077	0.100	0.200
2,4,6-Trinitrotoluene	118-96-7	3.6	7.6	3.6	0.36	71	120	0.051	0.100	0.200
2,4-Dinitrotoluene	121-14-2	13	6	6	0.6	75	121	0.099	0.100	0.200
2,6-Dinitrotoluene	606-20-2	1.9	4.1	1.9	0.19	79	117	0.061	0.100	0.200
2-Amino-4,6-dinitrotoluene	35572-78-2	15	14	14	1.4	71	123	0.098	0.100	0.200
2-Nitrotoluene	88-72-2	7	0.19	0.19	0.019	70	124	0.064	0.100	0.200
3,5-Dinitroaniline	618-87-1	NA	NA	NA	NA	86	118	0.083	0.100	0.200
3-Nitrotoluene	99-08-1	63	0.13	0.13	0.013	67	129	0.125	0.150	0.200
4-Amino-2,6-dinitrotoluene	19406-51-0	15	12	12	0.12	64	127	0.077	0.100	0.200
4-Nitrotoluene	99-99-0	25	0.14	0.14	0.014	71	124	0.077	0.100	0.200
RDX	121-82-4	23	2.3	2.3	0.23	67	129	0.018	0.100	0.200
Nitrobenzene	98-95-3	13	2.2	2.2	0.22	67	129	0.036	0.100	0.200
Nitroglycerin	55-63-0	63	13	13	1.3	73	124	0.074	0.100	0.200
HMX	2691-41-0	390	16	16	1.6	74	124	0.026	0.100	0.200
PETN	78-11-5	13	100	13	1.3	72	128	0.122	0.150	0.200
Tetryl	479-45-8	16	1.5	1.5	0.15	68	135	0.041	0.100	0.200

NA = Not Available; PAL= Project Action Level; LCS = Laboratory Control Spike; LOD = Limit of Detection; LOQ = Limit of Quantitation; PQL = Project Quantitation Limit
PQLs are (1/10) regulatory standard listed.
Screening Level References:
[1] USEPA Residential Soil RSL Value (July 2017), protective of a target hazard quotient of 0.1 and a target cancer risk of $1x10^{-6}$
[2] USEPA Region 4 Soil Screening Values (USEPA, 2015)
Screening values will be reviewed and updated at the time the RI report is written.

QAPP Worksheet #17 – Sampling Design and Rationale

(UFP-QAPP Manual Section 3.1.1; EPA 2106-G-05 Section 2.3.1)

The sampling approach of the RI is designed to characterize the nature and extent of MC contamination in the soil berm, constructed pond, and backstop area that is associated with historical training activities conducted at the firing range at Williston LTA. The DQOs for the MC sampling approach are presented in **Worksheet #11**. The sampling design rationale for the MRS is based on historical use, range layout, previous sampling results, and the CSM discussed in **Worksheet #10**. A phased approach that includes assessing the extent of MC contamination in the field using XRF analysis followed by laboratory analysis of soil samples collected using ISM will be used to accomplish project goals.

Based on the findings of the 2013 PA and 2008 Phase I report, potential MC are limited to small arms metals: Sb, Cu, Pb, and Zn. All soil samples collected for laboratory analysis will be sent to GCAL Analytical Laboratories, LLC in Louisiana for analysis of target small arms metals and select samples for waste characterization parameters. At the time of collection, the general characteristics of soil samples (both XRF and ISM) will be described: grain size, organic content, color, presence of bullets or bullet fragments, and moisture. There is also some concern for residual explosives in the constructed pond.

Three distinct DUs have been identified as associated with the former firing range (**Figure 17-1**). The Berm DU is approximately 0.053 acres; the Constructed Pond DU is roughly 0.073 acres; and the Backstop Area DU is around 0.43 acres. **Figure 17-2** shows the initial DU and the sampling plan for the Berm DU, **Figure 17-3** presents the initial DU and the sampling plan for the Constructed Pond DU, and **Figure 17-4** depicts the initial DU and the sampling plan for the Backstop Area DU. Portions of the Backstop Area DU are outside of the original MRS boundary because the natural hillsides used as backstops were not included in the original range footprint. This boundary will be better delineated during the RI.

Field staff will follow the safety procedures and guidance outlined in the SSHP (Attachment B of the Work Plan). Although the MRS is a former small arms range with no evidence of MEC, unexploded ordnance avoidance support will be provided by USACE during field work. In addition, AECOM field sampling personnel are experienced in military munitions work and know the "3Rs" for MEC safety: Recognize, Retreat, and Report. Should any material be discovered that may pose an explosive hazard, field staff will follow the guidance of USACE unexploded ordnance personnel and the guidelines in Section 11.9 of the SSHP (Attachment B of the Work Plan).

Step 1 – X-ray Fluorescence Screening:

With the exception of the Constructed Pond DU, Each initial DU will be screened for lead in the field using XRF. A grid will be laid out across the DU and discrete samples taken from 0 to 6 inches bgs at each grid node. An approximate 11 x 10 foot grid will be sampled at the Berm DU (approximately 34 samples; **Figure 17-2**). The Backstop Area DU will be sampled on an approximate 26 x 23 foot grid (approximately 40 samples; **Figure 17-4**). XRF analysis will not be used at the Constructed Pond DU since soil is likely too moist for reliable results.

Each sample will be collected using a new disposable sampling implement, placed in a clear plastic zip-top bag, and disaggregated/homogenized in the field by mechanical methods prior to analysis (**SOP MC-6** and **Section 5.4** of **SOP MC-5 [Attachment A]**). Samples will be analyzed for lead by XRF following the guidelines of USEPA Method 6200 and **SOP MC-5** (**Attachment A**). Lead concentrations will be recorded as the concentration measured and the error of the reading as given by the XRF analyzer. Field

notes will document sample handling and preparation following **Section 3.5.1 of SOP MC-3 (Attachment A)**.

Soil moisture can potentially interfere with XRF analysis (>20% moisture). Sampling will be scheduled during a distinctly dry season. An experienced sampling team will determine the applicability of XRF use in the field with the assistance of a soil moisture probe. If a soil sample has a moisture content of approximately 20% or less, XRF will be used to analyze the sample for lead. If moisture content is greater than 20%, the sample will be dried in the field. Samples to be dried will be placed into disposable aluminum containers and warmed over a low temperature hot plate until moisture is at or below 20%. Dried samples will be placed back into clear plastic zip-top bags and analyzed for lead by XRF.

The results of this analysis will characterize the lateral extent of contamination in surface soil (0 to 6 inches bgs). The initial DU boundary will be refined based on the distribution of XRF results for lead that exceed the human health screening criterion (**Worksheet #15**). Should samples taken along the boundary of the initial DU (± the error of the reading) exceed the human health screening criterion for lead, step-out samples will be taken along the same grid pattern as the DU until exceedances are no longer encountered. This may result in enlarging the DU boundary which will be carried forward to Step 2 – ISM Sampling. **Figures 17-2 and 17-4** depict example sampling patterns for the Berm and Backstop Area (respectively) should step outs be required. If no exceedances are found along the initial Berm DU boundary, the initial DU will be used during Step 2. If no exceedances are found along the initial Backstop Area DU boundary, the boundary will be revised to contour the area of contamination; the revised boundary will be used during Step 2.

Additionally, a discrete soil sample will be collected from the location with the highest XRF lead result for waste characterization analysis (e.g., toxicity characteristic leaching procedure [TCLP]) for lead. These discrete samples will be held at the laboratory and analyzed only if the laboratory results from the respective ISM sample exceed the human health screening criterion for lead. This data will be used in alternative evaluation during the Feasibility Study.

Step 2 – ISM Sampling:

Once a DU is confirmed, a 30- to 50-part incremental sample will be collected in triplicate from surface soil using ISM and analyzed for metals MC (Sb, Cu, Pb, and Zn) by the laboratory. Constructed Pond DU samples will also be analyzed for explosives MC by the laboratory. The location of increments within a respective DU will be determined using a systematic random approach. Since XRF will not be used on the Constructed Pond DU, an approximate 10 x 10 foot grid (approximately 30 samples; **Figure 17-3**) will be used.

Soil increments will be collected from depths of 0 to 6 inches bgs using a standard stainless steel soil probe. Each increment will be the same volume/mass and contribute to the ISM composite equally. At each DU, incremental samples will be collected in 100 percent triplicate; the number of QC samples will conform to **Worksheet #20**. Sample collection will be in accordance with Interstate Technology Regulatory Council (ITRC) guidance (ITRC, 2012) and **SOP MC-4** (**Attachment A**). All samples collected by ISM will be submitted to the laboratory for analysis as listed in **Worksheet#15**.

Because ISM requires that uniform, cylindrical samples be collected as increments, so as not to bias the IS in any way, the use of single-use disposable sampling scoops is precluded. Other methods of disposable sampling cores for ISM, such as dedicated PVC piping or acetate sleeves, result in an undesirable amount of plastic waste following sample collection and still may require additional decontamination and QC sampling. Per ITRC guidance, sampling instruments are not required to be

decontaminated between increments or replicate samples within a decision unit as the media are of the same population; soil probes will be decontaminated between decision units.

During field collection, the general characteristics of soil samples will be described by qualified field personnel using the Unified Soil Classification System to qualitatively document the physical characteristics of soil. This qualitative data will be used in support of potential future remedial alternative evaluation during the Feasibility Study.

In addition to investigative samples, background reference samples will be collected in 100 percent triplicate using ISM from an area not affected by historical training activities. The sampling area will be representative of undisturbed media and of an appropriate size to adequately characterize background concentrations and be comparable to investigative samples. The proposed location for background reference sample collection is roughly based on the location of the PA background sample data and shown on **Figure 17-1**. The results of all ISM samples will be used in the risk assessment in the RI report.

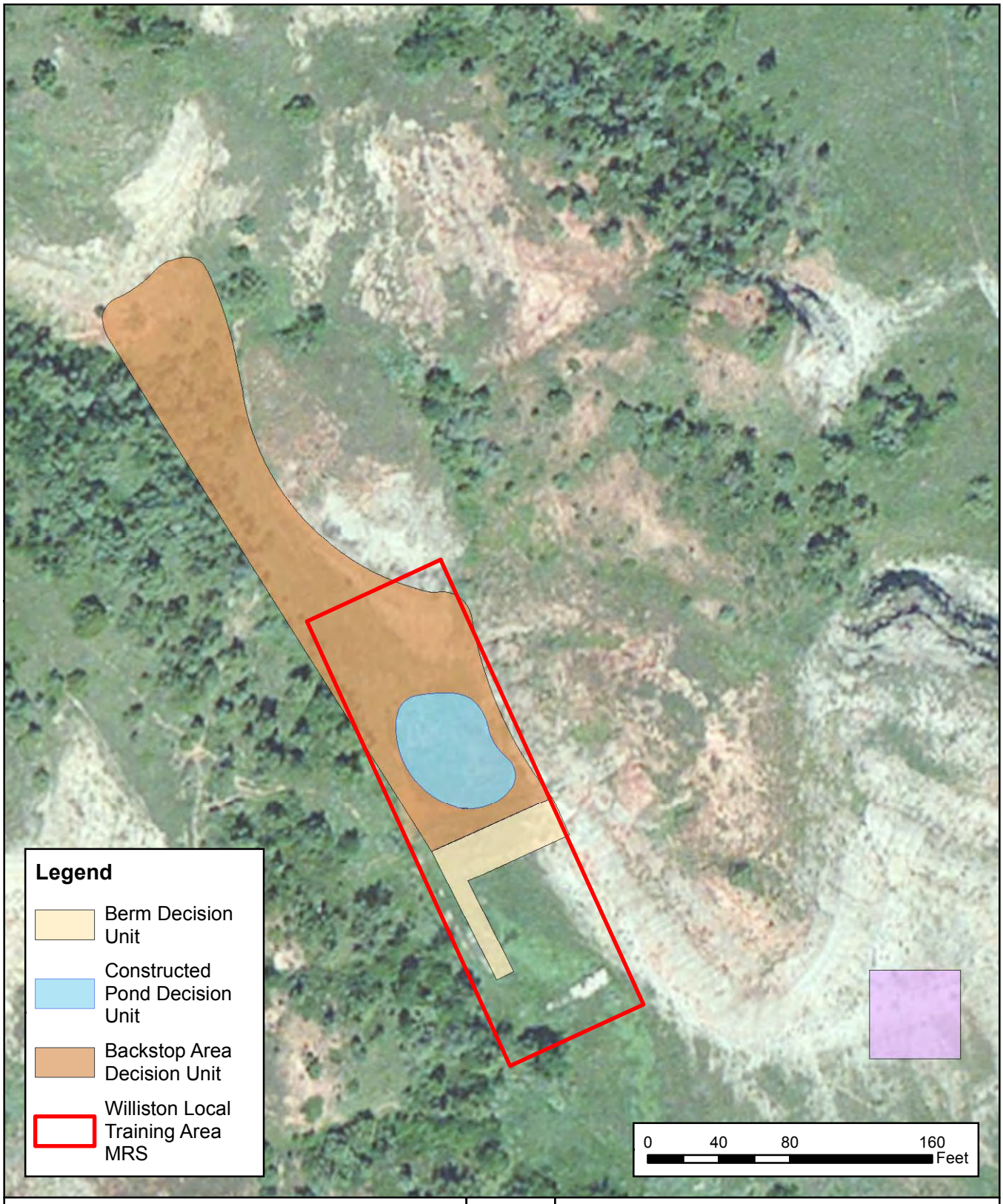
Step 3 – Discrete Subsurface Sampling:

The vertical extent of MC contamination will be characterized by collecting up to 8 discrete subsurface soil samples from 12 to 18 inches bgs where select surface soil XRF readings (± the error of the reading) exceed the human health screening criterion for lead. If no exceedances are found in surface soil, subsurface sampling will not occur. Sampling locations will be determined in the field and selected to provide the best coverage and resolution of potential subsurface MC contamination. Samples will be collected using a hand auger to expose the 12 to 18 inch bgs zone; once exposed, a new disposable sampling implement will be used to collect a sample from 12 to 18 inches bgs by hand and placed into the appropriate laboratory supplied bottleware.

Subsurface samples will be analyzed by both XRF and laboratory analytical methods for metals MC. Discrete samples collected from the Constructed Pond DU will also be analyzed for explosives MC by the laboratory. The results of the subsurface XRF analysis will be used to inform the sampling team if deeper samples are needed from 24 to 30 inches bgs to bound the extent of contamination. Should XRF results in the 12 to 18 inches bgs sample exceed the human health screening criterion for lead, a contingent sample will be collected from 24 to 30 inches bgs using the same methods. This deeper sample will be held at the laboratory and analyzed only if the laboratory results from the sample above exceed the human health screening criterion for lead and background concentrations. In anticipation of the end use of data (i.e., soil removal volume estimates) it is unlikely that resolution finer than 12 inches vertically within the soil profile is needed as most soil removal equipment will excavate soil in 1-foot lifts.

Samples will be collected using the same methodology as Step 1 following exposure of the sampling zone by hand auger. Samples will subsequently be sent to the laboratory for analysis of metals MC (**Worksheet #15**). The results of all discrete subsurface samples will be used to confirm the extent of contamination at the MRS and not used in the assessment of risk.

All soil removed will be returned to the level found and the ground surface returned to level. All non-dedicated sampling tools will be decontaminated between samples using biodegradable detergent and distilled water. The volume of water generated during decontamination procedures will be minimized by the use of spray bottles (< 1 liter per DU is anticipated). This minor volume of decontamination water will be discharged to the ground at the respective sampling location (the DU). Investigative derived waste (IDW) is not anticipated to be generated during sampling activities.



CLIENT	Army National Guard			
PROJECT	RI through DD for Williston LTA, ND MRS			
REVISION NO	0	GIS BY	MS	11/9/2017
SCALE	1:960	CHK BY	JW	11/9/2017
SOURCE	ARNG; State of North Dakota, ESRI & Partners	PM	LS	11/9/2017

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Williston Local Training Area RI Approach

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Figure 17-1

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CLIENT	Army National Guard			
PROJECT	RI through DD for Williston LTA, ND MRS			
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SCALE	1:360	CHK BY	JL	11/8/2017
SOURCE	ARNG; State of North Dakota, ESRI & Partners	PM	LS	11/8/2017

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Williston Local Training Area Berm Sampling Design

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Figure 17-2

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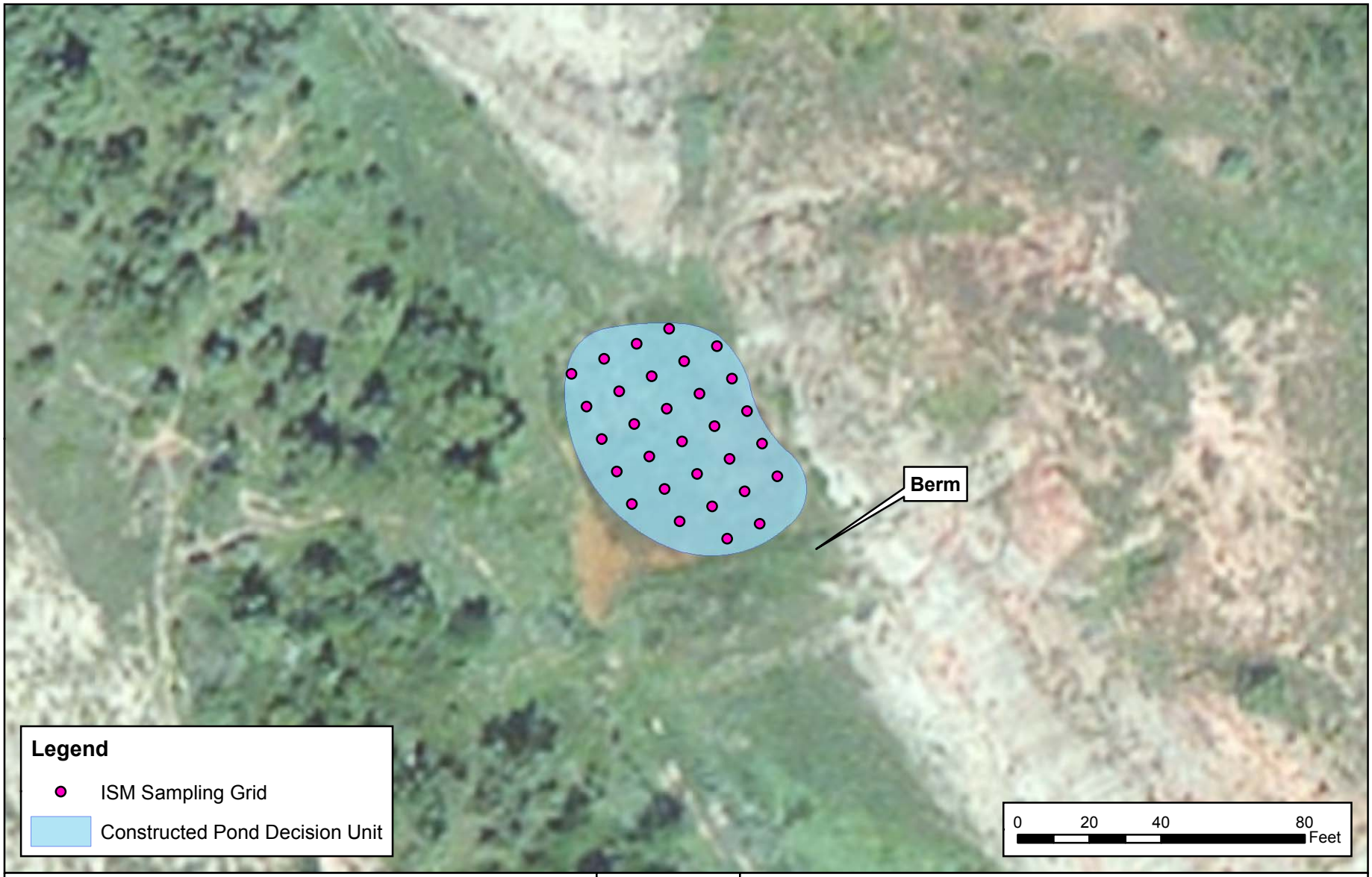

CLIENT	Army National Guard			
PROJECT	RI through DD for Williston LTA, ND MRS			
REVISION NO	0	GIS BY	MS	11/9/2017
SCALE	1:480	CHK BY	JL	11/9/2017
SOURCE	ARNG; State of North Dakota, ESRI & Partners	PM	LS	11/9/2017

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Williston Local Training Area Constructed Pond Sampling Design

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Figure 17-3

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CLIENT	Army National Guard			
PROJECT	RI through DD for Williston LTA, ND MRS			
REVISION NO	0	GIS BY	MS	11/8/2017
SCALE	1:720	CHK BY	JW	11/8/2017
SOURCE ARNG; State of North Dakota, ESRI & Partners		PM	LS	11/8/2017

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Williston Local Training Area Backstop Area Sampling Design

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Figure 17-4

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QAPP Worksheet #18 – Sampling Locations and Methods

(UFP-QAPP Manual Sections 3.1.1 and 3.1.2; EPA 2106-G-05 Sections 2.3.1 and 2.3.2)

Sample locations will be determined in the field based on XRF results. The type of sample collected will be determined based on the rational presented in **Worksheet #17**. Samples will be analyzed for select target metals (**Worksheet #15**) and waste characterization parameters (TCLP Lead). Sample identification codes are explained below.

Sample ID [1]	Matrix	Depth (inches bgs)	Analytical Group	Number of Samples/ Sample Type	Sampling SOP Reference	Comments
WIL02X01A	Surface soil	0-6	Lead by XRF	Discrete Berm: approx. 34 Backstop Area: approx. 40	Worksheet #21 SOP MC-5	None
			TCLP Lead	Discrete: 1		
WIL02IS01	Surface soil	0-6	Target metals; explosives (Constructed Pond DU only)	Incremental in triplicate: 1 incremental sample per DU and background	Worksheet #21 SOP MC-4	None
WIL02DA01A	Subsurface soil	12-18	Target metals; explosives (Constructed Pond DU only)	Discrete: up to 8	Worksheet #21 SOP MC-6	None
WIL02DB01A	Subsurface soil	24-30	Target metals; explosives (Constructed Pond DU only)	Discrete: up to 8	Worksheet #21 SOP MC-6	Analysis contingent on 12-18 inches bgs sample results

[1] Sample identification codes are explained on the next page.

Sample Identification Codes:

Discrete XRF Samples: Example sample identification: WIL02X01A

WIL = *Three-character MRS identifier for the Williston LTA MRS*.

01 = *Decision Unit*; The valid location codes are:
- 01 for the Berm decision unit
- 02 for the Constructed Pond decision unit (TCLP Lead sample only)
- 03 for the Backstop Area decision unit

X = *One-character sampling method*: The valid sampling method code is:
- X for XRF soil sample

02 = *Sample location*; The valid XRF sample codes are:
- 01 – 50 for each discrete sample location

A = *XRF replicate reading*; The valid XRF reading codes are:
- A – D for each of four replicate sample readings
- E for discrete TCLP Lead sample

Incremental Soil Samples: Example sample identification: WIL02IS01

WIL = *Three-character MRS identifier for the Williston LTA MRS*.

01 = *Decision Unit*; The valid location codes are:
- 01 for the Berm decision unit
- 02 for the Constructed Pond decision unit
- 03 for the Backstop Area decision unit
- 04 for the Background incremental sample

IS = *Two-character sampling method*: The valid sampling method code is:
- IS for incremental surface soil sample

02 = *Sample code*; The valid IS sample codes are:
- 00 = equipment blank
- 01 = primary sample
- 02 = duplicate sample
- 03 = triplicate sample

Discrete Subsurface Samples: Example sample identification: WIL02DA01A

WIL = *Three-character MRS identifier for the Williston LTA MRS*.

01 = *Decision Unit*; The valid location codes are:
- 01 for the Berm decision unit
- 02 for the Constructed Pond decision unit
- 03 for the Backstop Area decision unit

DA = *Two-character sampling depth code*: The valid depth codes are:
- DA = 12-18 inches bgs
- DB = 24-30 inches bgs

02 = *Sample location*; The valid sample location codes are:
- 01 – 08 for each discrete sample location

A = *Discrete QC sample codes*; The valid QC codes are:
- A = primary sample
- B = duplicate sample

For MS/MSD analysis, sample labels and COCs will be marked with "Use also for MS/MSD" because additional soil volume is not needed. If IDW is generated, a sample method code of IDW will be used. No dashes will be used in any sample identification codes.

QAPP Worksheets #19 & #30 – Sample Containers, Preservation, and Hold Times

(UFP-QAPP Manual Section 3.1.2.2; EPA 2106-G-05 Section 2.3.2)

Laboratory: Gulf Coast Analytical Laboratory

Required Accreditations/ Certifications: ELAP/ DoD

Sample Delivery Method: FedEx

Analyte/ Analyte Group	Matrix	Method/ SOP	ELAP Expiration Date	Container(s) (number, size & type per sample)	Preservation	Preparation Holding Time	Analytical Holding Time	Data Package Turnaround
Metals	Discrete Soil	EPA 6020B/MET-004, MET-021	12/31/2018	(1) 4 oz glass jar	≤6ºC	NA	6 months	28 days
Metals	ISM Soil	EPA 6020B/MET-004, MET-021	12/31/2018	(1) Large Poly Bag	≤6ºC	NA	6 months	28 days
Explosives	Discrete Soil	EPA 8330B/EXT-080, EXT-082 and HPLC-008	ELAP-12/31/2018 NELAP-6/30/2018	(1) 8 oz glass (amber) jar Teflon-lined cap	Cool, 0-6ºC	14 days to extraction	40 days from extraction to analysis	28 Days
Explosives	ISM Soil	EPA 8330B/EXT-080, EXT-082 and HPLC-008	ELAP-12/31/2018 NELAP-6/30/2018	(1) Large Poly Bag	Cool, 0-6ºC	14 days to extraction	40 days from extraction to analysis	28 Days
Metals	Water (EQB Only)	EPA 6020B/MET-020, MET-021	12/31/2018	125 ml HDPE	HNO3 to pH <2, ≤6ºC	NA	6 months	28 Days
TCLP – Lead	Soil	EPA 1311/6020B, EXT-026, MET-004, MET-021,	12/31/2018	(1) 16 oz glass jar	≤6ºC	Lead- 6 months	Lead- 6 months	28 Days

QAPP Worksheet #20 – Field QC Summary

(UFP-QAPP Manual Sections 3.1.1 and 3.1.2; EPA 2106-G-05 Section 2.3.5)

The number of surface soil samples collected will be determined in the field based XRF results. QC samples (duplicates) will be collected at a rate of 10%. Matrix spike and matrix spike duplicate samples will be collected at a rate of once per mobilization. Incremental samples will be collected in triplicate.

Matrix	Analyte/ Analytical Group	Field Samples	Field Duplicates/ Triplicates	Matrix Spikes	Matrix Spike Duplicates	Equipment Blanks	Total # Analyses [a]
XRF Surface Soil	Lead by XRF	Berm: approx. 34 Backstop Area: approx. 40	Each sample analyzed four times 1 Precision measurement per DU sampled per day [b]	NA	NA	NA	Berm: approx. 136 Backstop Area: approx. 160
ISM Surface Soil	Metals and Explosives (Constructed Pond DU)	1 incremental sample per DU and background	Incremental: collect 100% in triplicate	5% per mobilization	5% per mobilization	5% per mobilization	≤ 15
Discrete Subsurface Soil	Metals and Explosives (Constructed Pond DU)	≤ 8	Discrete: 10% per mobilization	5% per mobilization	5% per mobilization	NA	≤ 10

[a] Estimated; does not include potential step outs.

[b] Seven replicate readings, calculate RSD (RSD ≤ 20%). See SOP MC-5.

QAPP Worksheet #21 – Field MC Sampling SOPs

(UFP-QAPP Manual Section 3.1.2; EPA 2106-G-05 Section 2.3.2)

The field survey and sampling will be conducted in accordance with AECOM SOPs provided in **Attachment A** of this UFP-QAPP.

SOP	Title, Revision, Date, and URL (if applicable)	Originating Organization	SOP Option or Equipment Type (if SOP provides different options)	Modified for Project? Y/N	Comments
MC-1	Quality Control Process	AECOM	N/A	Y	None
MC-2	Decontamination	AECOM	N/A	N	None
MC-3	Sampling, Handling, Documentation, and Tracking [a]	AECOM	N/A	N	None
MC-4	Incremental Soil Sampling	AECOM	N/A	N	None
MC-5	Field XRF Screening	AECOM	N/A	N	None
MC-6	Surface and Subsurface Sampling	AECOM	N/A	N	None

[a] Example Field Forms are provided in **Attachment B** of this UFP-QAPP.

QAPP Worksheet #22 – Field Equipment Calibration, Maintenance, Testing, and Inspection

(UFP-QAPP Manual Section 3.1.2.4; EPA 2106-G-05 Section 2.3.6)

Soil sampling will not use field equipment requiring in field calibration. XRF analyzers are factory calibrated. Calibration checks will be performed in the field on certified reference material.

Field Equipment	Activity	SOP Reference	Title or Position of Responsible Person	Frequency	Acceptance Criteria	Corrective Action
XRF Analyzer	Soil screening	MC-5	Field Task Leader	Minimum 2x daily	± 20% Expected concentration	Obtain replacement unit if repeated calibration check failure.

QAPP Worksheet #23 – Analytical SOPs

(UFP-QAPP Manual Section 3.2.1; EPA 2106-G-05 Section 2.3.4)

SOP	Title, Revision, Date, and URL (if applicable)	Definitive or Screening Data	Matrix/Analytical Group	SOP Option or Equipment Type	Modified for Project? Y/N
MET-020 MET-021	Acid Digestion of Aqueous Samples for Metals Analysis/Metals Analysis by ICP-MS, EPA 6020B	Definitive	Water/Metals	ICP-MS	N
MET-004 MET-021	Acid Digestion of Solid Samples for Metals Analysis/Metals Analysis by ICP-MS, EPA 6020B	Definitive	Solid/Metals	ICP-MS	N
EXT-026 MET-020 MET-021	TCLP/SPLP Non-Volatile Extraction/ Acid Digestion of Aqueous Samples for Metals Analysis/ Metals Analysis by ICP-MS, EPA 6020B/	Definitive	Waste/TCLP Metals	ICP-MS	N
WL-054 WL-086 WL-051	SOP for Reactive Cyanide & Sulfide Preparation, SW-846 7.3.3.2/7.3.4.2 SOP for Cyanide, Total and Ammendable, EPA 335.4/9012B SOP for Sulfide by Titration & Hydrogen Sulfide (Calculation), EPA 9030B/9034	Definitive	Waste/ Reactive Cyanide & Sulfide	Lachet 8000 Series	N
EXT-032	pH in Solid and Waste Samples	Definitive	Waste/EPA 9045D	Orion 720A pH Meter	N
HPLC-008	Analysis of Nitroaromatics and Nitramines by HPLC, 10/16/17, Revision 04.1	Definitive	Solid/Explosives	Agilent Series 1290, Restek Raptor ARC-18 100 mm x 3.0 mm, 2.7 µm (Primary Column), Restek Raptor Biphenyl 150 mm x 4.6 mm, 2.7 µm (Confirmation Column), Agilent MWD G1365B	N

QAPP Worksheet #24 – Analytical Instrument Calibration

(UFP-QAPP Manual Section 3.2.2; EPA 2106-G-05 Section 2.3.6)

Instrument	Calibration Range	Frequency	Acceptance Criteria	Corrective Action (CA)	Title/Position Responsible for Corrective Action	SOP Reference
ICP-MS; Metals	Per EPA 6020B and Worksheet #28	Prior to analyzing samples per EPA 6020B	Per calibration criteria per EPA 6020B and Worksheet #28	Inspect system; correct problem; rerun calibration and affected samples.	Analyst, Supervisor	MET-021
HPLC	Calibration verification (CCV)	Daily, before sample analysis, every 10 samples and to close the analytical batch	All targets ≤ 20%D	Repeat initial calibration and reanalyze since the last successful calibration verification	Analyst, Supervisor, QA Manager	HPLC-008
HPLC	Minimum five-point initial calibration for all analytes (ICAL)	Initial calibration prior to sample analysis	RSD ≤ 20%, linear or quadratic curve fit with COD ≥ 0.99	Repeat calibration if criterion is not met	Analyst, Supervisor, QA Manager	HPLC-008
HPLC	Second source calibration verification ICV	Once after each initial calibration	All analytes within ± 20% of expected value	Remake standard, recalibrate if necessary	Analyst, Supervisor, QA Manager	HPLC-008
HPLC	Confirmation of positive results (second column or second detector)	All samples and QC	Detections agree within 40%	Report the higher concentration and include a narrative unless matrix interference is creating a high bias	Analyst, Supervisor, QA Manager	HPLC-008
HPLC	Retention time window position establishment for each analyte and surrogate	Set using mid-point of ICAL or at first CCV of the day if ICAL is not performed	NA	NA	Analyst, Supervisor, QA Manager	HPLC-008
HPLC	LOQ verification	Quarterly	LOQ is within laboratory control limits	Perform instrument maintenance and repeat failed LOD or LOQ study passing two consecutive tests or perform new DL study	Analyst, Supervisor, QA Manager	HPLC-008

QAPP Worksheet #25 – Analytical Instrument and Equipment Maintenance, Testing, and Inspection

(UFP-QAPP Manual Section 3.2.3; EPA 2106-G-05 Section 2.3.6)

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Title/Position Responsible for Corrective Action	SOP Reference
Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)	Change pump tubing, clean nebulizer, change torch, clean sample cone/skimmer cone	Metals - EPA 6020B	Monitor instrument performance via Continuing Calibration Verification and CC Blank	As needed	No maintenance is required as long as instrument QC meets DOD criteria	Change pump tubing, change torch and window, clean filters; recalibrate and reanalyzed affected data	Analyst, Supervisor	MET-021
HPLC	Clean, check all lines and frits for clogs, check and maintain flow pressure, change column	Explosives	Monitor Instrument performance using CCV and retention times	As needed	Calibration criteria met	Clean and replace items as needed; call for service if required	Analyst, Supervisor, QA Manager	HPLC-008

QAPP Worksheets #26 & #27 – Sample Handling, Custody, and Disposal

(UFP-QAPP Manual Section 3.3; EPA 2106-G-05 Section 2.3.3)

Sampling Organization: AECOM

Laboratory: GCAL

Method of Sample Delivery (shipper/carrier): FedEx and/or courier

Number of Days from Reporting until Sample Disposal: 30 days

Activity	Organization and Title or Position of Person Responsible for the Activity	SOP Reference
Sample labeling	AECOM Field Team	MC-3
Chain of Custody (COC) form completion	AECOM Field Team	
Packaging	AECOM Field Team	
Shipping coordination	AECOM Field Team	
Sample receipt, inspection, & log-in	GCAL Sample Custodians	SAD-001 SAD-002 GEN-009
Sample custody and storage	GCAL Sample Custodians	
Sample disposal	GCAL Sample Custodians	

QAPP Worksheet #28 – Analytical Quality Control and Corrective Action

(UFP-QAPP Manual Section 3.4 and Tables 4, 5, and 6; EPA 2106-G-05 Section 2.3.5)

Matrix: Discrete Soil and ISM Soil
Analytical Group: Explosives
Analytical Method: EPA 8330B
SOP Reference: HPLC-008

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Soil Drying Procedure	Each sample, LCS, and Method Blank. The appropriateness of the drying step is determined by each project.	Laboratory must have a procedure to determine when the sample is dry to constant mass. Entire sample must be air dried at room temperature.	NA.	Flagging is not appropriate.	Commercial PT samples must reflect the grinding, extraction, and analysis steps as a minimum. Record date, time, and ambient temperature on a daily basis while drying samples. If a laboratory utilizes a self-spiked LCS, the fortification must be performed prior to any preparation steps performed (drying, grinding, etc.) Drying may introduce a bias and is not recommended for certain compounds. Drying should be performed in the laboratory, not the field. Commercial PT samples must reflect the grinding, extraction, and analysis steps as a minimum. LCS reference material is not required to be air dried if the vendor specifies that drying is not required. LCS and Blank matrix can be Ottawa sand, clean soil, or other vendor provided clean matrix.

Matrix: Discrete Soil and ISM Soil
Analytical Group: Explosives
Analytical Method: EPA 8330B
SOP Reference: HPLC-008

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Soil Sieving Procedure	Each sample, LCS, and Method Blank. The appropriateness of the drying step is determined by each project.	Weigh entire sample. Sieve entire sample with a 10 mesh sieve. Breakup pieces of soil (especially clay) with gloved hands. Collect and weigh any portion unable to pass through the sieve.	NA.	Flagging is not appropriate.	Do not include vegetation or debris in the portion of the sample that passes through the sieve unless that is a project specific requirement. Projects may require an alternate sieve size.
Soil Grinding Procedure	Initial demonstration at start up and any time major equipment is changed or when a reduction in the number or time of grinding cycles occurs. Each required sample, LCS, Blank, and Matrix Spike sample. The appropriateness of the grinding step is determined by each project.	**Initial demonstration of grinding equipment**: The laboratory must initially demonstrate that the grinding procedure is capable of reducing the particle size to < 75 µm by passing representative portions of ground sample through a 200 mesh sieve (ASTM E11).	NA.	Flagging is not appropriate.	Grinding and sieving is an iterative process, so cycles and duration can be varied to reduce heat if all samples are treated the same. Grinding may introduce a bias and is not recommended for certain compounds. Each sample, LCS, and Method Blank must use the same grinding process (i.e., same time intervals and number of grinding cycles).

Matrix: Discrete Soil and ISM Soil
Analytical Group: Explosives
Analytical Method: EPA 8330B
SOP Reference: HPLC-008

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Grinding Blanks	One per batch of samples. The Grinding Blank must be processed: after the LCS (if ground), or after a client identified sample with known contamination, or at the end of the batch.	No reported analytes must be detected > 1/2 LOQ.	Blank results must be reported and the affected samples must be flagged accordingly if blank criteria are not met. If required, re-prep and reanalyze Method Blank and all QC samples and field samples processed with the contaminated blank.	If any individual Grinding blank is found to exceed the acceptance criteria, apply B-flag to the samples following that blank.	At least one Grinding Blank per batch must be analyzed. For batch preparation, the Grinding Blank and the Method Blank can be one in the same. A Grinding Blank using clean solid matrix (such as Ottawa sand) must be prepared (e.g., ground and subsampled) and analyzed in the same manner as the sample. If cross-contamination is a concern, then more than one Grinding Blank per batch may be necessary.
Soil Subsampling Process	Each sample, LCS, blank, and Matrix Spike sample. All sample types must be subsampled, including those that were not initially dried, ground, or sieved.	Entire sample is mixed and spread out evenly on a large flat surface (e.g., baking tray), and 30 or more randomly located increments are removed from the entire depth and breadth to obtain the appropriate subsample size.	NA.	Flagging is not appropriate.	The total subsample weight collected can vary based on the requirements of the extraction process.

Matrix: Discrete Soil and ISM Soil
Analytical Group: Explosives
Analytical Method: EPA 8330B
SOP Reference: HPLC-008

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Soil Sample Triplicate	At the subsampling step, performed on one sample per batch. Cannot be performed on any sample identified as a blank (e.g., Field Blank, Method Blank, Grinding Blank).	The RSD for results above the LOQ must not exceed 20%.	Examine the project-specific requirements. Contact the client as to additional measures to be taken.	If reported per the client, apply J-flag to all samples within that batch if acceptance criteria are not met and explain in the Case Narrative.	Sample triplicates are randomly selected unless the project specifies the sample to be used.
Aqueous Sample Preparation	Each sample and associated batch QC samples.	Solid phase extraction (SPE) using resin-based solid phase disks or cartridges are required.	NA.	Flagging is not appropriate.	The salting-out procedure is not permitted.
Ion Transitions (Parent>Product)	Prior to method implementation.	The chemical derivation of the ion transitions must be documented.	NA.	Flagging is not appropriate.	NA.
Initial Calibration (ICAL) for all analytes (including surrogates)	At instrument setup and after ICV or CCV failure, prior to sample analysis.	ICAL must meet one of the three options below: Option 1: RSD for each analyte ≤ 15%; Option 2: linear least squares regression for each analyte: r2 ≥ 0.99; Option 3: non-linear least squares regression (quadratic) for each analyte: r2 ≥ 0.99.	Correct problem, then repeat ICAL.	Flagging is not appropriate.	Minimum 5 levels for linear and 6 levels for quadratic. No samples shall be analyzed until ICAL has passed.
Initial Calibration Verification (ICV)	Once after each ICAL, analysis of a second source standard prior to sample analysis.	All reported analyte(s) and surrogates within ± 20% of true value.	Correct problem. Rerun ICV. If that fails, repeat ICAL.	Flagging is not appropriate.	No samples shall be analyzed until calibration has been verified with a second source.

Matrix: Discrete Soil and ISM Soil
Analytical Group: Explosives
Analytical Method: EPA 8330B
SOP Reference: HPLC-008

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Continuing Calibration Verification (CCV)	Before sample analysis, after every 10 field samples, and at the end of the analysis sequence.	All reported analytes and surrogates within ± 20% of the true value.	Immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails or if two consecutive CCVs cannot be run, perform corrective action(s) and repeat CCV and all associated samples since last successful CCV. Alternately, recalibrate if necessary; then reanalyze all associated samples since the last acceptable CCV.	If reanalysis cannot be performed, data must be qualified and explained in the Case Narrative. Apply Q-flag to all results for the specific analyte(s) in all samples since the last acceptable calibration verification.	Results may not be reported without valid CCVs. Flagging is only appropriate in cases where the samples cannot be reanalyzed.
Internal Standards (IS)	If employed, every field sample, standard and QC sample.	Retention time within ± 30 seconds from retention time of the midpoint standard in the ICAL; Internal standard signal (area or height) within -50% to +100% of ICAL midpoint standard. On days when ICAL is not performed, the daily initial CCV can be used.	Inspect instrumentation for malfunctions and correct problem. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	If corrective action fails in field samples, data must be qualified and explained in the Case Narrative. Apply Q-flag to analytes associated with the non-compliant IS. Flagging is not appropriate for failed standards.	NA.

Matrix: Discrete Soil and ISM Soil
Analytical Group: Explosives
Analytical Method: EPA 8330B
SOP Reference: HPLC-008

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Method Blank	One per preparatory batch	No analytes detected > ½ LOQ, 1/10 the concentration in any sample, or 1/10 the regulatory limit, whichever is higher.	Correct problem; re-prep and analyze any sample associated with a blank that fails criteria.	If reanalysis cannot be performed, data must be qualified and explained in the Case Narrative. Apply B flag to all results for the specific analyte(s) in all samples in the associated preparatory batch.	Results may not be reported without a valid Method Blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed. For batch preparation, the Grinding Blank and the Method Blank can be one in the same.
Laboratory Control Spike (LCS)	One LCS per preparatory batch	As specified in QSM 5.1 Table 37	Re-prep and analyze all associated samples unless recoveries are high with no detection of analytes.	If reanalysis cannot be performed, data must be qualified and explained in the Case Narrative. Apply Q flag to specific analyte(s) in all samples in the associated preparatory batch.	A solid reference material containing all reported analytes must be prepared (e.g., ground and subsampled) and analyzed in exactly the same manner as a field sample. A Standard Reference Material (SRM) that is used for a LCS can be ground as a single batch and subsampled repeatedly as long as the SRM is within expiration date. If a laboratory utilizes a self-spiked LCS, the fortification must be performed prior to any preparation steps performed, such as drying, grinding, and sieving. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.

Matrix: Discrete Soil and ISM Soil
Analytical Group: Explosives
Analytical Method: EPA 8330B
SOP Reference: HPLC-008

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Matrix Spike (MS)	One pair per batch (assuming sufficient volume exists) or as specified by client request.	For matrix evaluation, use LCS recovery criteria	Evaluate the data to determine if the failed criteria are due to sample matrix or laboratory error. Re-analyze if sufficient sample is available when appropriate.	For the specific analyte(s) in the parent sample, apply J-flag if acceptance criteria are not met and explain in the Case Narrative.	Analytes and surrogates are spiked into the MS and MSD after subsampling. For matrix evaluation only. If MS results are outside the limits, the data shall be evaluated to determine the source(s) of difference (i.e., matrix effect or analytical error).
Matrix Spike Duplicate (MSD)	One pair per batch (assuming sufficient volume exists) or as specified by client request.	RPD ≤ 20%	Evaluate the data to determine if the failed criteria are due to sample matrix or laboratory error. Re-analyze if sufficient sample is available when appropriate.	For the specific analyte(s) in the parent sample, apply J-flag if acceptance criteria are not met and explain in the Case Narrative.	Analytes and surrogates are spiked into the MS and MSD after subsampling. For matrix evaluation only. If MSD results are outside the limits, the data shall be evaluated to determine the source(s) of difference. For Sample/MD: %Recovery and RPD criteria only apply to analytes whose concentration in the sample is greater than or equal to the LOQ.
Surrogates	All field and QC samples	As specified in QSM 5.1 Table 37 when available else laboratory limits.	Correct problem; re-prep all failed samples for failed surrogates if sufficient sample is available.	Apply Q-flag to all associated analytes if acceptance criteria are not met and explain in the Case Narrative.	Alternative surrogates are recommended when there is obvious chromatographic interference.

Matrix: Discrete Soil and ISM Soil
Analytical Group: Explosives
Analytical Method: EPA 8330B
SOP Reference: HPLC-008

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Confirmation of Positive Reslts (second column)	All results > the DL must be confirmed.	Calibration and QC criteria are the same for the confirmation analysis as for initial or primary column analysis. Results between primary and second column RPD ≤ 40%.	Report from both columns.	Apply J-flag if RPD > 40%. Discuss in the Case Narrative.	Use of a UV detector with a UV diode array detector or vice versa is not considered a valid confirmation technique. Confirmation analysis is not needed if LC/MS or LC/MS/MS was used for the primary analysis. Secondary column – Must be capable of resolving (separating) all of the analytes of interest and must have a different retention time order relative to the primary column. Use project specific reporting requirements if available; otherwise, report from the primary column.

Matrix: Discrete Soil, ISM Soil, & Aqueous (EQB)
Analytical Group: Metals
Analytical Method: EPA 6020B
SOP Reference: MET-004, MET-020, MET-021

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Field Triplicate	1 per sample location	N/A	Use higher value in risk calculations and discuss in uncertainty analysis discussion, if warranted.	J-flag all outside control limits	RSD <30% when detects are ≥5x LOQ, or within ±4x LOQ for results <5x LOQ
Equipment Blank	1 per sampling location or equipment set	N/A	Clean equipment carefully or use disposable sampling equipment where possible.	Per data validation guidelines	No analytes detected > ½ LOQ

Matrix: Discrete Soil, ISM Soil, & Aqueous (EQB)
Analytical Group: Metals
Analytical Method: EPA 6020B
SOP Reference: MET-004, MET-020, MET-021

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Linear Dynamic Range (LDR) or High-level Check Standard	Every 6 months and with major maintenance	90-110% recovery	Perform maintenance and/or reanalyze at lower concentration	Flagging is not appropriate.	Data cannot be reported above the calibration range without an established/passing high-level check standard.
Tuning	Daily	Resolution < 0.9 amu full at 5% peak height, mass calibration cannot drift more than 0.1 amu; RSD ≤ 5% with 5 replicates	Instrument maintenance, do not continue with calibration	Flagging is not appropriate.	No samples shall be analyzed without a valid tune.
Initial Calibration (ICAL)	Daily ICAL prior to sample analysis.	Correlation coefficient ≥ 0.99	Recalibrate and/or perform necessary equipment maintenance	Flagging is not appropriate.	Minimum one high standard and a calibration blank. No samples shall be analyzed until ICAL has passed.
Initial Calibration Verification (ICV)	Once after each ICAL	All reported analytes within ± 10% of the expected value.	Correct problem. Rerun ICV. If that fails, repeat ICAL	Flagging is not appropriate.	No samples shall be analyzed until calibration has been verified with a second source.
Continuing Calibration Verification (CCV)	After every 10 field samples and at the end of the analysis sequence.	All reported analytes within ± 10% of the expected value.	Repeat initial calibration and reanalyze all samples analyzed since the last successful calibration verification	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Results may not be reported without a valid CCV.
Low-level Calibration Check Standard (Low Level ICV)	Daily following calibration	80-120% recovery	Recalibrate and/or perform necessary equipment maintenance	Flagging is not appropriate.	No samples shall be analyzed without a valid low-level calibration check standard. Low-level calibration check standard should be less than or equal to the LOQ.

Matrix: Discrete Soil, ISM Soil, & Aqueous (EQB)
Analytical Group: Metals
Analytical Method: EPA 6020B
SOP Reference: MET-004, MET-020, MET-021

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Internal Standards (IS)	Every field sample and standard	IS intensity in the samples within 30-120% of intensity of the IS in the ICAL.	Reanalyze all samples with Internal Standard failures. If reanalysis confirms matrix interference, report sample and narrate.	Flagging is not appropriate.	Samples suffering from matrix effect should be diluted until criteria are met, or an alternate IS should be selected.
Method Blank (MB)	One per preparatory batch.	No analytes detected > ½ RL or > 1/10 the amount measured in any sample	Correct problem; reanalyzed any sample associated with a blank that fails criteria, except when the sample analysis results in a non-detect.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Results may not be reported without a valid method blank.
Initial and Continuing Calibration Blank (ICB/CCB)	Once with each ICAL after every 10 samples and at the end of an analytical sequence	The absolute values of all analytes must be < ½ LOQ or < 1/10th the amount measured in any sample	Determine source of possible contamination, perform maintenance and recalibrate	Flagging is not appropriate.	Results may not be reported without a valid calibration blank. For CCB, failures due to carryover may not require an ICAL.
Interference Check Solutions (ICS) (also called Spectral Interference Checks) ICS-A and ICS-AB	Daily after ICAL	ICS-A: Absolute value of concentration for all nonspiked project analytes <1/2 LOQ (unless they are a verified trace impurity from one of the spiked analytes) ICS-AB: Within ± 20% of true value	Correct problem; recalibrate instrument	"If corrective action fails, apply Q-flag to all results for specific analyte(s) in all samples associated with the failed ICS	All analytes must be within the LDR.
Laboratory Control Sample (LCS)	One per preparatory batch.	QC acceptance criteria specified by DOD QSM 5.1 Tables C-5 and C-6	Reanalyze and/or re-prep all associated samples unless recoveries are high with no detection of analytes.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Results may not be reported without a valid LCS.

Matrix: Discrete Soil, ISM Soil, & Aqueous (EQB)
Analytical Group: Metals
Analytical Method: EPA 6020B
SOP Reference: MET-004, MET-020, MET-021

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Matrix Spike (MS)	One per preparatory batch per matrix	QC acceptance criteria specified by DOD QSM 5.1 Tables C-5 and C-6	Evaluate the data to determine if the failed criteria are due to sample matrix or laboratory error. Re-prep if sufficient	Flagging is not appropriate.	If MS results are outside the limits, the data shall be evaluated to the source of difference, i.e., matrix effect or analytical error.
Matrix Spike Duplicate (MSD) or Matrix Duplicate (MD)	One per preparatory batch.	QC acceptance criteria specified by DOD QSM 5.1 Tables C-5 and C-6RPD of all analytes ≤ 20%	Evaluate the data to determine if the failed criteria are due to sample matrix or laboratory error. Re-prep if sufficient sample is available when appropriate	For the specific analyte(s) in the parent sample, apply J-flag if acceptance criteria are not met and explain in the Case Narrative	The data shall be evaluated to determine the source of difference.
Dilution Test	One per preparatory batch if MS or MSD fails.	Five-fold dilution must agree within ± 10% of the original measurement for samples with concentrations > 50 x LOQ	Perform Post Digestion Spike	For the specific analyte(s) in the parent sample, apply J-flag if acceptance criteria are not met and explain in the Case Narrative.	Only applicable for samples with concentrations > 50 X LOQ (prior to dilution). Use along with MS/MSD or PDS data to confirm matrix effects.
Post-Digestion Spike (PDS) Addition	One per preparatory batch if MS or MSD fails (using the same sample as used for the MS/MSD if possible)	Recovery within 80-120%.	Contact the client to determine if additional measures are required	For the specific analyte(s) in the parent sample, apply J-flag if acceptance criteria are not met and explain in the Case Narrative.	Criteria apply for samples with concentrations < 50 X LOQ prior to dilution.

Analytical Group: Metals (Lead)
Analytical Method: EPA 6020B
SOP Reference: MET-004, MET-020, MET-021

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Field Triplicate	1 per sample location	N/A	Use higher value in risk calculations and discuss in uncertainty analysis discussion, if warranted.	J-flag all outside control limits	RSD <30% when detects are ≥5x LOQ, or within ±4x LOQ for results <5x LOQ
Equipment Blank	1 per sampling location or equipment set	N/A	Clean equipment carefully or use disposable sampling equipment where possible.	Per data validation guidelines	No analytes detected > ½ LOQ
Linear Dynamic Range (LDR) or High-level Check Standard	Every 6 months and with major maintenance	90-110% recovery	Perform maintenance and/or reanalyze at lower concentration	Flagging is not appropriate.	Data cannot be reported above the calibration range without an established/passing high-level check standard.
Tuning	Daily	Resolution < 0.9 amu full at 5% peak height, mass calibration cannot drift more than 0.1 amu; RSD ≤ 5% with 5 replicates	Instrument maintenance, do not continue with calibration	Flagging is not appropriate.	No samples shall be analyzed without a valid tune.
Initial Calibration (ICAL)	Daily ICAL prior to sample analysis.	Correlation coefficient ≥ 0.99	Recalibrate and/or perform necessary equipment maintenance	Flagging is not appropriate.	Minimum one high standard and a calibration blank. No samples shall be analyzed until ICAL has passed.
Initial Calibration Verification (ICV)	Once after each ICAL	All reported analytes within ± 10% of the expected value.	Correct problem. Rerun ICV. If that fails, repeat ICAL	Flagging is not appropriate.	No samples shall be analyzed until calibration has been verified with a second source.
Continuing Calibration Verification (CCV)	After every 10 field samples and at the end of the analysis sequence.	All reported analytes within ± 10% of the expected value.	Repeat initial calibration and reanalyze all samples analyzed since the last successful calibration verification	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Results may not be reported without a valid CCV.

Analytical Group: Metals (Lead)
Analytical Method: EPA 6020B
SOP Reference: MET-004, MET-020, MET-021

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Low-level Calibration Check Standard (Low Level ICV)	Daily following calibration	80-120% recovery	Recalibrate and/or perform necessary equipment maintenance	Flagging is not appropriate.	No samples shall be analyzed without a valid low-level calibration check standard. Low-level calibration check standard should be less than or equal to the LOQ.
Internal Standards (IS)	Every field sample and standard	IS intensity in the samples within 30-120% of intensity of the IS in the ICAL.	Reanalyze all samples with Internal Standard failures. If reanalysis confirms matrix interference, report sample and narrate.	Flagging is not appropriate.	Samples suffering from matrix effect should be diluted until criteria are met, or an alternate IS should be selected.
Method Blank (MB)	One per preparatory batch.	No analytes detected > ½ RL or > 1/10 the amount measured in any sample	Correct problem; reanalyzed any sample associated with a blank that fails criteria, except when the sample analysis results in a non-detect.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Results may not be reported without a valid method blank.
Initial and Continuing Calibration Blank (ICB/CCB)	Once with each ICAL after every 10 samples and at the end of an analytical sequence	The absolute values of all analytes must be < ½ LOQ or < 1/10th the amount measured in any sample.	Determine source of possible contamination, perform maintenance and recalibrate	Flagging is not appropriate.	Results may not be reported without a valid calibration blank. For CCB, failures due to carryover may not require an ICAL.

Analytical Group: Metals (Lead)
Analytical Method: EPA 6020B
SOP Reference: MET-004, MET-020, MET-021

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Interference Check Solutions (ICS) (also called Spectral Interference Checks) ICS-A and ICS-AB	Daily after ICAL	ICS-A: Absolute value of concentration for all nonspiked project analytes <1/2 LOQ (unless they are a verified trace impurity from one of the spiked analytes) ICS-AB: Within ± 20% of true value	Correct problem; recalibrate instrument	If corrective action fails, apply Q-flag to all results for specific analyte(s) in all samples associated with the failed ICS.	All analytes must be within the LDR.
Laboratory Control Sample (LCS)	One per preparatory batch.	QC acceptance criteria specified by DOD QSM 5.1 Tables C-5 and C-6	Reanalyze and/or re-prep all associated samples unless recoveries are high with no detection of analytes.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative.	Results may not be reported without a valid LCS.
Matrix Spike (MS)	One per preparatory batch per matrix	For matrix evaluation use LCS recovery acceptance criteria.	Evaluate the data to determine if the failed criteria are due to sample matrix or laboratory error. Re-prep if sufficient	Flagging is not appropriate.	If MS results are outside the limits, the data shall be evaluated to the source of difference, i.e., matrix effect or analytical error.
Matrix Spike Duplicate (MSD) or Matrix Duplicate (MD)	One per preparatory batch.	QC acceptance criteria specified by DOD QSM 5.1 Tables C-5 and C-6 RPD of all analytes ≤20%	Evaluate the data to determine if the failed criteria are due to sample matrix or laboratory error. Re-prep if sufficient sample is available when appropriate	For the specific analyte(s) in the parent sample, apply J-flag if acceptance criteria are not met and explain in the Case Narrative.	The data shall be evaluated to determine the source of difference.
Dilution Test	One per preparatory batch if MS or MSD fails.	Five-fold dilution must agree within ± 10% of the original measurement for samples with concentrations > 50 x LOQ	Perform Post Digestion Spike	For the specific analyte(s) in the parent sample, apply J-flag if acceptance criteria are not met and explain in the Case Narrative.	Only applicable for samples with concentrations > 50 X LOQ (prior to dilution). Use along with MS/MSD or PDS data to confirm matrix effects.

Analytical Group: Metals (Lead)
Analytical Method: EPA 6020B
SOP Reference: MET-004, MET-020, MET-021

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Post-Digestion Spike (PDS) Addition	One per preparatory batch if MS or MSD fails (using the same sample as used for the MS/MSD if possible).	Recovery within 80-120%.	Contact the client to determine if additional measures are required	For the specific analyte(s) in the parent sample, apply J-flag if acceptance criteria are not met and explain in the Case Narrative.	Criteria apply for samples with concentrations < 50 X LOQ prior to dilution.

QAPP Worksheet #29 – Project Documents and Records

(UFP-QAPP Manual Section 3.5.1; EPA 2106-G-05 Section 2.2.8)

Sample Collection and Field Records:

Record	Generation	Verification	Storage location/archival
Field logbook or data collection sheets	Field Task Leader	Project Manager	Project File
Chain-of-Custody Forms	Field Task Leader	Project Manager	Project File
Air Bills	Field Task Leader	Project Manager	Project File
Contractor Daily QC Reports	Field Task Leader	Project Manager	Project File
Deviations	Field Task Leader	Project Manager	Project File
Corrective Action Reports	Field Task Leader	Project Manager	Project File
Correspondence	Field Task Leader	Project Manager	Project File
Task Hazard Assessment (THA) Form	Field Task Leader	Project Manager	Project File

Project Assessments:

Record	Generation	Verification	Storage location/archival
Field audit checklists	Not Planned	Not Planned	Not Planned
Data verification checklists	Staff Chemist	Project Chemist	Project File
Data validation report	Staff Chemist	Project Chemist	Project File
Data usability assessment report	Staff Chemist	Project Chemist	Project File

Laboratory Records:

Record	Generation	Verification	Storage location/archival
System Audits	NELAP/Laboratory	NELAP/Laboratory	Laboratory QA File
Performance Evaluation	NELAP/Laboratory	NELAP/Laboratory	Laboratory QA File

Laboratory Data Deliverables:

Record	Explosives	Metals
Narrative	X	X
COC	X	X
Summary Results	X	X
QC Results	X	X
Chromatograms	X	X

QAPP Worksheets #31, #32, #33 – Assessments and Corrective Action

(UFP-QAPP Manual Sections 4.1.1 and 4.1.2; EPA 2106-G-05 Sections 2.4 and 2.5.5)

Assessments:

Assessment Type	Responsible Party & Organization	Number/Frequency	Estimated Dates	Assessment Deliverable	Deliverable due date
ELAP Accreditation	A2LA	Annually	NA	Certification	NA
Data Review	Naoum Tavantzis, AECOM	Once	45 days after receipt of data	Validation Report	45 days after receipt of data
External Laboratory Audit	A2LA	Bi-annually	NA	Written Audit Report	NA
Internal Laboratory Audit	GCAL	Annually	NA	Written Audit Report	NA

Assessment Response and Corrective Action:

Assessment Type	Responsibility for responding to assessment findings	Assessment Response Documentation	Timeframe for Response	Responsibility for Implementing Corrective Action	Responsible for monitoring Corrective Action implementation
Readiness Review	Project Manager	Readiness Review Corrective Action Response	24 hours from receipt of Readiness Review Memorandum	As directed by PM	AECOM QAM
Field Sampling Technical Systems Audit (TSA)	Not Planned	Not Planned	Not Planned	Not Planned	Not Planned
On-site analytical TSA	Not Planned	Not Planned	Not Planned	Not Planned	Not Planned
PT samples	Laboratory QAM	Accreditation	Per Accrediting Authority	Laboratory Technical Director	Laboratory QAM
Management Reviews	AECOM Task Manager	QA Management Response	48 hours from receipt of QA Management Report	As assigned in QA Management Response	AECOM QAM
Field Audit	Not Planned	Not Planned	Not Planned	Not Planned	Not Planned
Laboratory Internal Audit	Laboratory Director or Manager	Corrective Action	48 hours after notification	Laboratory Director, Manager, and/or QA Manager	Laboratory QA Manager

QAPP Worksheet #34 – Data Verification and Validation Inputs

(UFP-QAPP Manual Section 5.2.1 and Table 9; EPA 2106-G-05 Section 2.5.1)

The validation will be based on a graded approach, with additional validation as necessary if problems are identified.

Item	Description	Verification (completeness)	Validation (conformance to specifications)
Planning Documents/Records			
1	Approved QAPP	X	
2	Contract	X	
3	Field SOPs	X	
4	Laboratory SOPs	X	
Field Records			
5	Field logbooks/ Daily Reports	X	X
6	Equipment calibration records (as applicable)	X	X
7	Chain-of-Custody Forms	X	X
8	Sampling diagrams/surveys	X	X
9	Relevant Correspondence	X	X
10	Change orders/deviations	X	X
11	Field audit reports (as applicable)	X	X
12	Photographs	X	X
13	Field corrective action reports	X	X
Analytical Data Package *			
14	Cover sheet (laboratory identifying information)	X	X
15	Case narrative	X	X
16	Internal laboratory chain-of-custody	X	X
17	Sample receipt records	X	X
18	Sample chronology (i.e. dates and times of receipt, preparation, & analysis)	X	
19	Communication records	X	X
20	LOD/LOQ establishment and verification	X	
21	Standards Traceability	X	
22	Instrument calibration records	X	
23	Definition of laboratory qualifiers	X	X
24	Results reporting forms	X	X
25	QC sample results	X	X
26	Corrective action reports	X	X
27	Raw data	X	X
28	Electronic data deliverable	X	X

* Compiled in accordance with the applicable sections of:
Department of Defense, 2017. Quality Systems Manual Version 5.1. January 2017.

QAPP Worksheet #35 – Data Verification Procedures

(UFP-QAPP Manual Section 5.2.2; EPA 2106-G-05 Section 2.5.1)

Records Reviewed	Requirement Documents	Process Description	Responsible Person, Organization
Chain of custody forms and shipping forms	Chain of Custody, Shipping Documents	Chain of custody forms and shipping documentation will be reviewed internally upon their completion and verified against the packed sample coolers they represent. The shipper's signature on the chain of custody should be initialed by the reviewer, a copy of the chain of custody retained in the site file, and the original and remaining copies taped inside the cooler for shipment.	Appropriate field investigation Task Leaders for the individual media
Review of field logbooks	Field Logbooks	Review for completeness and accuracy	Appropriate field investigation Task Leaders
Field sampling TSAs	Technical System Audit Reports	Assessment of field sampling process prior to start of, or as close to the start of sampling as possible. Internal technical reviews of the sampling process are conducted prior to acceptance of the method proposed.	QA Manager or designee
Field data validation TSAs	Technical System Audit Reports	Complete review and assessment of field data. Internal technical reviews and assessments of field data are conducted concurrently with and following data collection.	QA Manager or designee
Fixed laboratory analytical data review	Laboratory Data Package	Data controls are compared to this QAPP and DoD QSM v 5.0 Appendix A in a Three Tiered process using a minimum 100% peer review.	PM or QA Manager
Fixed laboratory TSAs	Laboratory Data Package	ELAP audit and internal quality audits	QA Manager
Fixed laboratory data verification/validation	Data Validation Reports	100% data verification/validation for investigative samples and field QC.	AECOM Project Chemist
Fixed laboratory data validation TSAs	Data Validation Reports	Calculate and assess laboratory DQIs.	QA Manager, or designee

QAPP Worksheet #36 – Data Validation Procedures

(UFP-QAPP Manual Section 5.2.2; EPA 2106-G-05 Section 2.5.1)

Data Validator: AECOM

Analytical Group/Method	Organic Data	Inorganic Data
Data deliverable requirements	Environmental Restoration Information System (ERIS), .csv	ERIS, .csv
Analytical specifications	WS #28 & Laboratory SOP	WS #28 and Laboratory SOP
Measurement performance criteria	WS #12, WS#15, and WS#28	WS #12, WS#15, and WS#28
Percent of data packages to be validated	100%	100%
Percent of raw data reviewed	100%	100%
Percent of results to be recalculated	0%	0
Validation procedure	*National Functional Guidelines for Organic Superfund Data Review* (EPA, 2017)	*National Functional Guidelines for Inorganic Superfund Data Review* (EPA, 2017)
Validation code	Per Guidelines	Per Guidelines
Electronic validation program/version	N/A	N/A

QAPP Worksheet #37 – Data Usability Assessment

(UFP-QAPP Manual Section 5.2.3 and Table 12; EPA 2106-G-05 Sections 2.5.2 – 2.5.4)

The Data Usability Assessment (DUA) is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment will determine whether project execution and the resulting data meet project DQOs (**Worksheet #11**). Both sampling and analytical activities will be considered with the ultimate goal to assess whether the final, qualified results support the decisions to be made with the data.

The following personnel are responsible for participating in the data usability assessment:

- AECOM Project Manager: Laurie Stenberg
- AECOM Project Chemist: Naoum Tavantzis
- AECOM Risk Assessor: Gretchen Welshofer
- AECOM Field Task Leader: Jennifer Li

The DUA will be documented as a discussion within the Remedial Investigation (RI) report and refer to the Data Validation Report that will appear in an appendix of the RI report. The Data Validation Report will follow the specifications given in **Worksheet #36**.

The following sections summarize the processes used to determine whether the collected data are of the right type, quality, and quantity to support the environmental decision-making for the project, and describes how data quality issues will be addressed and how limitations on the use of the data will be handled.

Step 1	**Review the project's objectives and sampling design.** The key components established in the DQOs (**Worksheet #11**) will be reviewed to ensure that they are still applicable. Also, the sampling design and how it was implemented in the field will be reviewed for consistency with the stated objectives. For example, at this step in the DUA will: • Reevaluate whether comparison criteria (i.e., PALs; **Worksheet #15**) were updated since UFP-QAPP generation and if laboratory quantitation limits (QLs) were sensitive enough for those changes (e.g., QLs remain lower than new criteria). Project data must meet the measurement performance criteria for sensitivity and project QLs specified in **Worksheets #15 & 28**. • Discuss the limitations and impact on the use of project data if validation reports indicate that project specific sensitivity goals or QLs were not achieved for a specific sampling or laboratory group, data set or sample delivery group (SDG), matrix, analytical group, or concentration level.
Step 2	**Review the data verification and data validation outputs** All available Quality Assurance (QA) reports, including both field and laboratory generated forms, will be reviewed for deviations from planned activities identified in Step 1 (e.g., number and locations of samples, holding time exceedances, damaged samples, non-compliant PT sample results, and SOP deviations) and determine their impacts on the data usability. Validated data will be summarized and/or compiled to identify patterns, trends, and anomalies as they related to the Data Quality Indicators (DQIs) precision, accuracy/bias, representativeness, comparability, and completeness (PARCC). Descriptions of each DQI and examples of how each may be incorporated into the usability report follows.

Step 2 (cont.)	**Precision** Precision is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. Precision is usually expressed as standard deviation, variance, percent difference, or range, in either absolute or relative terms. QC measures for precision include field duplicates, laboratory duplicates, MSDs, analytical replicates, and surrogates. To meet the needs of the data users, project data must meet the measurement performance criteria for precision specified in **Worksheet #12** of this QAPP. Precision errors may be the result of one or more of the following: field instrument variation, analytical measurement variation, poor sampling technique, sample transport problems, or spatial variation (heterogeneous sample matrices). To identify the cause of imprecision, the field sampling design rationale and sampling techniques will be evaluated by the reviewer, and both field and analytical duplicate/replicate sample results will be compared. For example, if poor precision is indicated in both the field and analytical duplicates/replicates, then the laboratory may be the source of error. If poor precision is limited to the field duplicate/replicate results, then the sampling technique, field instrument variation, sample transport, medium inhomogeneity, or spatial variability may be the source of error. If data validation reports indicate that analytical imprecision exists for a particular data set or SDG, then the impact of that imprecision on usability will be discussed in the usability report.
Step 2 (cont.)	**Accuracy/Bias** Accuracy is the degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) due to sampling and analytical operations. Examples of QC measures for accuracy include Matrix Spikes, Laboratory Control Samples, and equipment blanks. A measurement is accurate when the reported value does not differ from the true value or known concentration of the spike or standard. To meet the needs of the data users, project data must meet the measurement performance criteria for accuracy/bias specified in **Worksheet #12** of this QAPP. The usability report will: • Discuss and compare data on contamination and accuracy/bias (when bias is observable) for each matrix, analytical group, and concentration level. • Describe the limitations on the use of project data if extensive contamination, inaccuracy, or bias exists or when inaccuracy is limited to a specific sampling or laboratory group, data set or SDG, matrix, analytical group, or concentration level. • Discuss the impact of any qualitative and quantitative trends in bias on the sample data.
Step 2 (cont.)	**Representativeness** Representativeness is the measure of the degree to which data accurately and precisely represent a characteristic of a population, a parameter variation at a sampling point, a process condition, or an environmental condition. It is achieved through a well-designed sampling program and by using standardized sampling strategies, techniques, and analytical procedures. To meet the needs of the data users, project data must meet the measurement performance criteria for sample representativeness specified in **Worksheet #12** of this QAPP. **Worksheet #28 & 35** discusses how the QA/QC activities (e.g., review of sampling design and SOPs, field sampling TSAs, analysis audits, etc.) and QC sample data will be reviewed to assess sample representativeness. For example, if field duplicate precision checks indicate potential spatial variability, additional scoping meetings and subsequent resampling may be needed to collect data that are more representative of a nonhomogeneous site. The usability report will: • Discuss the impact of field duplicate and triplicate imprecision on site representativeness. For example, when data variability is high among field replicate data sets (i.e., high relative standard deviation) calculation of the 95% upper confidence limit (UCL) of the population mean is more likely to overestimate the true mean of the DU and therefore achieve better statistical coverage (ITRC, 2012). • Discuss the impact of laboratory and field sampling methods on sampling results and how they reflect site conditions. • Discuss the effect of site heterogeneity on sampling results in light of sampling methods used. • Describe the limitations on the use of project data when sampling results are nonrepresentative for all data or for a specific sampling, group, data set or SDG, matrix, analytical group, or concentration level.

Step 2 (cont.)	**Comparability** Comparability is the degree to which different methods, data sets, and decisions agree or can be represented as similar. Comparability describes the confidence (expressed qualitatively or quantitatively) that two data sets can contribute to a common analysis and interpolation. The results of this study will be used as a benchmark for determining comparability for data collected during any future sampling events using the same or similar sampling and analytical SOPs. At this time, data will not be compared to other datasets or data using different sampling or analytical SOPs. To ensure future comparability of data generated for the site, standard sample collection procedures and approved analytical methods will be employed. Sample analyses will be performed by the laboratory using approved methods and procedures. Comparability criteria will be considered met for the project if, based on data reviewed, the sample collection and analytical procedures are determined to have been followed, or defined to show that variations did not affect the values reported. Deviations to sampling scope will be documented in sampling nonconformance reports which may contain some of the discussion of comparability. The usability report will describe the limitations on the use of project data when project-required data comparability is not achieved for the overall project or is limited to a specific sampling or laboratory group, data set or SDG, matrix, analytical group, or concentration level.
Step 2 (cont.)	**Completeness** Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under correct, normal circumstances. To meet the needs of the data users, project data must meet the measurement performance criteria for data completeness. Completeness criteria will be considered met if 90% of planned ISM increments are collected and 100% of all other planned sample data are collected. As applicable, the usability report may also: • Describe how the amount of valid data will be determined as a percentage of the number of valid measurements for each matrix, analytical group, and concentration level. • Describe how critical data was assessed for completeness when certain sample locations or analytes and matrices are more critical than others in making project decisions. • Evaluate the impact of missing information. Ensure that enough information was obtained for the data to be usable to meet the DQOs (**Worksheet #11**).
Step 3	**Verify the assumptions of the selected statistical method** The use of statistical methods for data assessment will likely be limited to estimating a 95% UCL (or mean as appropriate for the analyte) for the assessment of risks. ISM incorporates mechanical methods of achieving appropriate coverage of a DU. By applying an informed field program, ISM is designed to capture the true population distribution. In accordance with ITRC ISM guidance, the 95% UCL will be calculated as either the Student's-t UCL or Chebyshev UCL as appropriate for the observed data. Discretely collected data will be collected to confirm the extent of potential MC contamination at each DU. Statistical analysis will not be used on discrete data.
Step 4	**Implement the statistical method** Where statistical methods are used, the underlying assumptions will be assessed during the DUA. The consequences of selecting the incorrect alternative will be discussed and uncertainty tolerances will be considered.
Step 5	**Document data usability and draw conclusions** The DUA will determine and document whether the data can be used as intended given any deviations and corrective actions that may have occurred. Limitations on data use will be considered and discussed as appropriate and the performance of the sampling design assessed. Conclusions will be drawn taking any data limitations into consideration and documented in the RI report.

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Attachment A

AECOM Standard Operating Procedures

Field Sampling SOP MC-1
Quality Control Process

1.1 THREE-PHASE CONTROL PROCESS

The Quality Control (QC) personnel are responsible for verifying compliance with project requirements through implementation of the three-phase control process. This process ensures that project activities comply with the approved plans and procedures.

Elements of the three-phase control process are: (1) Preparatory Phase, (2) Initial Phase, and (3) Follow-Up Phase. Each control phase is important for obtaining a quality product. However, the preparatory and initial inspections are particularly valuable in preventing problems. Production work is not to be performed on a definable feature of work until a successful preparatory and initial phase inspection has been completed and documented.

1.1.1 Preparatory Phase

Preparatory phase inspections are performed prior to beginning a definable feature of work. The purpose of the inspection is to review contracts, plans, specifications, SOPs, and other applicable documents and to verify that necessary resources (i.e., equipment and personnel), conditions, and controls are in place before work starts. This inspection phase is conducted with the people responsible for performing each definable feature of work to include managers, supervisors, and applicable subcontractors ensuring all involved know what is expected and understand their role. The client is invited to attend but is not required. The PM is responsible for ensuring that:

- Appropriate plans and procedures are developed, coordinated, and approved;
- Personnel required for the activity are identified and positions filled;
- Training has been identified and completed;
- Preliminary work and coordination have been completed;
- Equipment and materials required to perform the activity have been identified and are available; and
- Reviews have been performed.

The QC personnel are responsible for assisting the PM in conducting preparatory phase inspections and verifying the following conditions:

- Appropriate plans and procedures have been developed, approved, reviewed, and are available;
- Personnel identified are available and meet the requirements/qualifications for the position or waivers have been obtained;
- Required training has been performed, documented and acknowledged; and
- Preliminary work and coordination have been completed;

Deficiencies identified during preparatory phase inspections will be documented and corrective action taken prior to beginning work. The QC personnel will verify that corrective action has been complete and is appropriate before production work begins.

1.1.2 Initial Phase

Initial phase inspections are performed when a work process begins for each crew or team performing the definable feature of work. The purpose of the inspection is to:

- verify that the work to be performed will be in compliance with procedures and contract specifications,
- verify that equipment and personnel on site meet the requirements established during the preparatory phase,
- review acceptable level of workmanship for site personnel who will be conducting the definable feature of work,
- review preparatory phase inspection report, and
- resolve any differences of interpretation.

The initial phase is the first documented QC personnel field compliance inspection for a definable feature of work. Initial phase inspections may be repeated when acceptable levels of quality are not demonstrated or at the discretion of the QC personnel.

- Equipment is on-hand, functional, in specification, and appropriate for the job;
- Required personnel resources are on site and properly qualified to perform the definable feature of work in accordance with the preparatory phase;
- Material and supplies are on-hand and meet contract specifications;
- Level of quality expected is understood by workers;
- Compliance with procedures and specifications;
- Acceptable level of workmanship is being performed;
- Corrective action taken during the preparatory phase inspection has resolved the deficiency and prevents recurrence; and
- Quality issues and any differences of interpretation by workers are resolved.; and
- Briefing on the process improvement program and FCR process has been completed.

Deficiencies identified during initial phase inspections will be documented and corrective action taken. The QC personnel will verify that corrective action has been completed and is appropriate to prevent recurrence of the condition. When corrective action cannot be completed in a timely manner or the root cause is not known, immediate corrective action that fixes the deficiency may be taken, verified, and work continued pending root cause analysis and more appropriate corrective action.

1.1.3 Follow-up Phase

Follow-up phase inspections are performed after a work process has begun and periodically throughout the work process. The purpose of the inspection is to evaluate whether the process is being completed in accordance with agreed upon standards and to evaluate whether the level of quality meets QC acceptance criteria. The QC personnel are responsible for monitoring work processes and verifying continued compliance with WP and QC criteria requirements. Follow-up phase inspections are excellent opportunities to observe work processes and identify possible process improvements.

Deficiencies identified during follow-up phase inspections will be documented and corrective action will be taken. The QC personnel will verify that corrective action has been completed and is appropriate to prevent recurrence of the condition. When corrective action cannot be completed in a timely manner or the root cause is not known, immediate corrective action that fixes the deficiency may be taken, verified, and work continued pending root cause analysis and more appropriate corrective action.

1.2 NONCONFORMANCE/CORRECTIVE ACTION

Nonconformances shall be addressed via corrective action in a manner described in this QCP section.

1.2.1 Nonconformance Identification

Circumstances that prevent a work process to control the output from conforming to the contract requirements will be promptly identified, documented, investigated, and corrected appropriately. All project personnel have the responsibility, as part of their normal work duties, to promptly identify and report conditions adverse to quality. The status of NCRs will be maintained in a log and progress of their resolutions shall be documented and reviewed to ensure prompt attention to their conclusion.

1.2.2 Resolution, Corrective Action, and Verification

The appropriate level of management is responsible for evaluating the cause of a NCR and will recommend solutions for correcting the deficiency identified. Actions and technical justifications for an action proposed to resolve the NCR shall be reviewed and approved by personnel responsible for the technical aspect of the work.

Corrective action is the specific action or actions taken to correct the immediate situation and to reduce or prevent the likelihood of future occurrences. Examples of corrective action for the immediate situation include rerunning a portion of a test/operation that was not conducted in accordance with procedures, calibrating test equipment found to be out of calibration, rework of a specific activity, and rerunning any required tests. QC personnel will be responsible for verifying implementation of corrective action, monitoring the effectiveness of preventive action, and reporting any findings to the appropriate management level.

The QC personnel shall maintain an NCR log. The NCR log will be used to track and control each nonconforming condition. At a minimum the log will contain, the date each nonconforming condition was discovered, the NCR tracking number, a brief description of the condition, the location, the department/manager responsible for disposition, the recommended disposition, the NCR closure date, and status of all nonconformance reports. The NCR log status will be maintained in the project files and available on-site.

1.2.3 Material and Equipment Nonconformance

QC personnel ensure that the following requirements are implemented:

- Materials and/or equipment that do not conform to prescribed technical and/or quality requirements are tagged or otherwise identified, documented, and reported as nonconforming. The documentation shall include the following information:
  - Identification of the technical and quality requirement(s) with which the item is not in compliance.
  - Identification of the current status of the item (i.e., whether the item is on hold or whether its use is conditional).
- Nonconforming materials and equipment are segregated, when possible, from conforming materials and/or equipment to the extent necessary to preclude their inadvertent use and commingling.
- The status of nonconforming material and/or equipment and the progress of their resolution are documented and routinely reviewed to ensure prompt attention to conclusion.

1.2.4 Deficiency Reporting

Deficiencies and nonconforming conditions are very similar and are conditions that, once identified, must be resolved or corrected prior to acceptance of an item or product. A deficiency is a condition that can be corrected quickly by standard methods during the normal course of work. A deficiency usually is not systemic in nature.

It will be the responsibility of all project personnel to identify deficiencies and notify their supervisor or manager as soon as the conditions are identified. Determination of any deficiencies must be supported with objective evidence. Deficiencies will be evaluated, resolved, or corrected and may be considered as opportunities to improve the process (**Section 1.2.7**, Lessons Learned).

1.2.5 Preventive Action

Preventive action is the specific action or actions taken to prevent or reduce the likelihood of future occurrences of nonconformance. Examples of preventive actions are clarifying or refining procedures, allowing for additional training, and/or enhancing monitoring.

Preventive action measures will be selected to prevent or reduce the likelihood of future occurrences and will address root causes to the extent identifiable. Selected measures will be appropriate in relation to the seriousness of the nonconformance and will be realistic in terms of the resources required to implement them. Preventive action measures will be communicated with affected staff, and a record of preventive action taken shall be documented as part of the NCR and maintained for project record.

1.2.6 Trend and Root Cause Analysis

1.2.6.1 *Trend Analysis*

As necessary, the PM or designee, as a part of a periodic assessment, shall perform a Project trend analysis. QC personnel shall verify the implementation of any preventive actions resulting from the trend analysis.

This management assessment shall propose and initiate measures necessary to deal with any problems requiring preventive action. When preventive action necessitates a revision to the project procedures, the PM (or designee) shall issue an administrative FCR describing the necessary change. QC personnel shall verify implementation of the preventive action.

The operations project team reviews results from the following sources and performs a trend analysis, when sufficient information and data are available to ensure that the analysis is meaningful. A trend analysis should be conducted once at least every 6 months for projects of one year or longer duration.

The trend analysis of QC and/or QA audits, subcontractor/supplier surveillance reports and nonconformance will include the following information:

- Total number of audit findings and observations, surveillance reports, and NCRs for each area of the QCP.
- A summary of the root causes for the nonconformance consolidated for each area of the QCP.
- Trends that are developing or that have developed.

1.2.6.2 *Root Cause Analysis*

The operations project team appointed by the PM shall determine root cause of a severity level 1 nonconformance. The root cause determination will depend upon project specific factors impacting the product development, product conformity or process performance. The nonconformity may be classified using an event and causal factors following the root cause analysis. The root cause analysis shall identify corrective actions to prevent recurrence. The record of the root cause analysis and corrective action taken shall be maintained on file with QC personnel as a part of the project record.

1.2.6.3 *Preventive Action*

For the period under review, the project operations team shall determine the root cause(s) of potential repetitive nonconformities and evaluate the need for action to prevent their recurrence. The project operations team shall prepare a report identifying the nonconformities for each area of the project processes/procedures, a consolidated summary of root causes of the nonconformities, and a statement of trends that are developing or have developed, and submit the report to the PM. The PM shall provide appropriate actions to prevent recurrence of the adverse trends. The Project team and QC personnel shall verify implementation of the preventive actions and report the results to the PM. The record of trend analysis and preventive action taken shall be maintained on file by QC personnel as a part of the project record.

1.2.7 Lessons Learned

During the course of field activities, data or information may be discovered that could eliminate or reduce challenges and/or offer opportunities for quality and productivity improvements through value engineering. Lessons learned are documented and communicated as soon as possible to allow access by project personnel. These lessons learned are considered valuable tools in updating plans and procedures for subsequent field activities. Lessons learned will be reviewed and distributed by the AECOM Project Quality Manager (PQM) to other applicable AECOM Project locations.

1.2.8 Field Change Request Form Process

An FCR form is to be completed for initiating changes to an approved, documented process. Any field team member assigned to perform or supervise a task that recognizes the necessity for a change in the task is responsible for initiating, completing, and submitting the FCR for review and approval of appropriate field changes. The FCR process includes review and approval of the recommended change by the Field Team Lead, PQM, Health & Safety Officer (as appropriate), PM and appropriate Client Representatives prior to process alteration in the field and incorporation into a revised work plan element. The client may ask that the FCR be reviewed by appropriate regulatory personnel if it is deemed to be a significant change to a process or overall scope of work. When an FCR is approved, changes to procedures will be reviewed with project personnel during the morning meeting/safety briefing prior to implementation. FCRs will be numbered sequentially and will be maintained in the project files on-site. FCRs will be included as an appendix to the Final Report Supplement.

FCRs should be approved or disapproved in no more than one week.

Field Sampling SOP MC-2

Decontamination

2.1 PURPOSE AND SCOPE

This document defines the SOP for decontamination. This procedure is to be used together with the UFP-QAPP and the other SOPs. Health and safety procedures and equipment for the investigation are detailed in the SSHP. Applicable SOPs are listed below:

- SOP MC-4 Incremental Sampling
- SOP MC-5 Field XRF Screening
- SOP MC-6 Surface and Subsurface Soil Sampling

Site and/or Sample Cross-Contamination

The overall objective of a multimedia sampling program is to obtain samples that accurately depict the chemical, physical, and/or biological conditions at the sampling site. Extraneous contaminants can be brought onto the sampling location and/or introduced into the medium of interest during the sampling program (e.g. using sampling equipment that is not properly or fully decontaminated). Trace quantities of contaminants can consequently be captured in a sample and lead to false positive analytical results and, ultimately, to an incorrect assessment of the contaminant conditions associated with the site. Decontamination of sampling equipment (e.g., all non-disposable equipment that will come in direct contact with samples) and field support equipment (e.g., vehicles) is, therefore, required prior to, between, and after uses to ensure that sampling cross-contamination is prevented, and that on-site contaminants are not carried off-site.

2.2 EQUIPMENT DECONTAMINATION PROCEDURES

The following sections present equipment decontamination procedures and necessary equipment.

2.2.1 Equipment List

The following is a list of equipment that may be needed to perform decontamination:

- Brushes
- Wash tubs
- Buckets
- Scrapers, flat bladed
- Hot water - high-pressure sprayer
- Sponges or paper towels
- Alconox detergent (or equivalent)
- Potable tap water
- Laboratory-grade de-ionized water
- Garden-type water sprayers
- Appropriate Health and Safety equipment (i.e., nitrile gloves, safety glasses, etc.)
- Appropriate IDW containers

2.2.2 Decontamination

This section presents the procedures for decontamination of equipment.

2.2.2.1 *Sampling Equipment*

The following steps will be used to decontaminate sampling equipment:

- Personnel will dress in suitable safety equipment to reduce personal exposure as required by the SSHP.
- Gross contamination on equipment will be scraped off at the sampling or construction site.
- Equipment that cannot be damaged by water will be placed in a wash tub containing Alconox or low-sudsing non-phosphate detergent along with potable water and scrubbed with a bristle brush or similar utensil. Equipment will be rinsed with tap water in a second wash tub followed by a de-ionized water rinse.
- Equipment that may be damaged by water will be carefully wiped clean using a sponge and detergent water and rinsed with de-ionized water. Care will be taken to prevent equipment damage.

Following decontamination, equipment will be placed in a clean area or on clean plastic sheeting to prevent contact with contaminated soil. If the equipment is not used immediately after decontamination, the equipment will be covered or wrapped in plastic sheeting, foil, or heavy-duty trash bags to minimize potential contact with contaminants.

2.2.2.2 *Equipment Leaving the Site*

Vehicles used for activities in non-contaminated areas shall be cleaned on an as-needed basis, as determined by the site safety officer, using soap and water on the outside and vacuuming the inside. On-site cleaning will be required for very dirty vehicles leaving the area.

2.2.2.3 *Decontamination Solutions*

A decontamination solution should be capable of removing, or converting to a harmless substance, the contaminant of concern without harming the object being decontaminated. The preferred solution is a mixture of detergent and water, which is a relatively safe option compared to chemical decontaminants. A solution recommended for decontaminating consists of 1 to 1.5 tablespoons of Alconox per gallon of warm water. Skin surfaces should be decontaminated by washing with hand soap and water. The decontamination solution must be changed when it no longer foams or when it becomes extremely dirty. Rinse water must be changed when it becomes discolored, begins to foam, or when the decontamination solution cannot be removed.

2.2.2.4 *Responsible Authority*

Decontamination operations at each hazardous waste site shall be supervised by the site safety officer. The site safety officer is responsible for ensuring that all personnel follow decontamination procedures and that all contaminated equipment is adequately decontaminated. The site safety officer is also responsible for maintaining the decontamination zone and managing the wastes generated from the decontamination process.

Site activities should be conducted with the general goal of preventing the contamination of people and equipment. Bagging monitoring instruments, avoiding contact with obvious contamination, and employing dust suppression methods that would reduce the probability of becoming contaminated and, therefore, reduce the need and extent of decontamination. However, some type of decontamination will always be required on site. A sample personnel decontamination set-up guideline and a sample decontamination equipment and supplies list are included in the SSHP.

The Occupational Safety and Health Administration (OSHA) require that proper PPE must be worn when operating steam or pressure washing equipment. A rain suit, boots, hard hat, and a face shield are recommended to be worn. All personnel must be kept out of the path of steam or water spray.

2.2.2.5 *Wastewater*

Liquid wastewater from decontamination may be containerized, labeled, and stored for later disposal as required by project specific requirements. Liquid wastewater from decontamination may be discharged to ground on a project specific basis following acceptance from the project team and stakeholders.

2.2.3 Emergency Decontamination

Hazardous waste facilities should also have in place emergency decontamination procedures, in order to prevent the loss of life or severe injury to site personnel. In the case of threat to life, decontamination should be delayed until the victim is stabilized; however, decontamination should always be performed first, when practical, if it can be done without interfering with essential lifesaving techniques or first aid, or if a worker has been contaminated with an extremely toxic or corrosive material that could cause severe injury or loss of life. During an emergency, provisions must also be made for protecting medical personnel and disposing of contaminated clothing or equipment.

2.2.4 Documentation

Sampling personnel will be responsible for documenting the decontamination of sampling and drilling equipment. The documentation will be recorded with waterproof ink in the sampler's field notebook with consecutively numbered pages. The information entered in the field book concerning decontamination should include the following:

- Decontamination personnel
- Date and start and end times
- Decontamination observations
- Weather conditions
- IDW handling

Field Sampling SOP MC-3

Sampling, Handling, Documentation, and Tracking

3.1 PURPOSE

This document defines the SOP for sample handling, documentation, and tracking. This procedure is intended to be used together with the UFP-QAPP and other SOPs. Health and safety procedures and equipment for the investigation are detailed in the APP/SSHP. Applicable SOPs are listed below:

- SOP MC-4 Incremental Sampling
- SOP MC-5 Field XRF Screening
- SOP MC-6 Surface and Subsurface Soil Sampling

3.2 SAMPLE IDENTIFICATION

Samples collected during site activities will have discrete sample identification numbers. These numbers are necessary to identify and track each of the many samples collected for analysis during the life of this project. In addition, the sample identification numbers will be used in the database to identify and retrieve the analytical results received from the laboratory.

Each sample is identified by a unique code that indicates the site name, sample matrix/method, sample location, sample unit, and sequential sample number (for duplicate, triplicate, and equipment blanks). Sample identification codes are found in UFP-QAPP Worksheet #18.

The sampling locations, sample type, and sample sequence identifiers are established prior to field activities for each sample to be collected. On-site personnel will obtain assistance in defining any special sampling requirements from the Project Manager.

3.3 SAMPLE LABELING

Sample labels are filled out as completely as possible by a designated member of the sampling team prior to beginning field sampling activities each day. All sample labels are filled out using waterproof ink. At a minimum, each label will contain the following information:

- Sampler's company affiliation
- Site location
- Sample identification code (i.e., FPIS01)
- Date and time of sample collection
- Analyses required
- Method of preservation (if any) used
- Sample matrix (i.e., soil)
- Sampler's signature or initials

3.4 SAMPLE HANDLING

This section discusses proper sample containers, preservatives, and handling and shipping procedures. The UFP-QAPP summarizes the information contained in this section and also includes the sample holding times for each analyte.

3.4.1 Sample Containers

Certified, commercially clean sample containers are obtained from the contract analytical lab. The contract laboratory will label the bottles to indicate the type of sample to be collected. Required preservatives are prepared and placed in the bottles at the laboratory prior to shipment to the site. Appropriate sample containers for the specific analyses required are listed in the UFP-QAPP.

3.4.2 Sample Preservation

Sample preservation efforts will commence at the time of sample collection and will continue until analyses are performed. Samples will be stored on ice at 4°C in coolers immediately following collection. The ice will be double bagged in plastic storage bags. Additional sample preservation requirements are listed in the UFP-QAPP. Chemical preservatives, if necessary, will be added to the sample containers by the laboratory prior to shipment to the field, unless otherwise specified in the UFP-QAPP.

3.4.3 Sample Handling and Shipping

The sample containers are wiped clean of all sample residue and then wrapped in protective packing material (bubble wrap) and taped. Samples will then be placed right side up in a cooler and surrounded with ice (double bagged using plastic bags). Additional protective packing material is used around the upright samples as necessary. A temperature blank provided by the contract laboratory are placed in each sample cooler shipped.

A COC form will accompany each cooler. The COC is put in a plastic bag and attached to the inside lid of the cooler. The cooler lid is taped closed with a custody seal for delivery to the laboratory. Once the cooler has been packed and the COC has been secured inside the cooler, the cooler is sealed on both ends using several wraps of reinforced strapping tape. The tape should be applied from the back of the cooler and over the top of the cooler to pull the front of the cooler lid down. The wraps of strapping tape should cover the hinges of the cooler lid.

Once the strapping tape has been applied, two signed and dated custody seals will be place on two corners of the cooler. One custody seal will be placed on top of the strapping tape on one end of the cooler across the seam of the cooler and the cooler lid, on the front of the cooler. The other custody seal will be placed on top of the strapping tape across the seam between the cooler and cooler lid on the other end of the cooler, on the back of the cooler. The custody seals will be covered with one complete wrap of clear tape.

All water drain valves on the sample coolers will be sealed using duct tape to prevent leakage of any fluids from the cooler during shipment. Samples will be hand delivered or shipped by

overnight express carrier for delivery to the analytical laboratory. All samples must be shipped for laboratory receipt and analyses within specific holding times. This may require daily shipment of samples with short holding times. The temperature of all coolers will be measured upon receipt at the laboratory.

3.4.4 Holding Times and Analyses

The holding time is specified as the maximum allowable time between sample collection and analysis and/or extraction, based on the analyte of interest and stability factors, and preservative (if any) used. Allowable holding times are listed in the UFP-QAPP. Chemical constituents that will be analyzed and other parameters to be measured during field investigations are identified in the UFP-QAPP.

3.5 SAMPLE DOCUMENTATION AND TRACKING

This section describes documentation required in the field notes, on the SCFSs, on the daily quality control reports (DQCRs), and on the sample COC forms.

3.5.1 Field Notes

Documentation of observations and data acquired in the field will provide information on the acquisition of samples and also provide a permanent record of field activities. The observations and data will be recorded using pens with permanent waterproof ink in a permanently bound weatherproof field log book containing consecutively numbered pages.

The information in the field log book will include the following as a minimum:

- Project name
- Location of sample
- Sampler's printed name and signature
- Date and time of sample collection
- Sample identification code
- Description of samples (matrix sampled)
- Sample depth (if applicable)
- Number and volume of samples
- Sampling methods or reference to the appropriate SOP
- Sample handling, including filtration and preservation, as appropriate for separate sample aliquots
- Analytes of interest
- Field observations
- Results of any field measurements, such as depth to water, pH, temperature, and conductivity
- Personnel present
- Level of PPE used during sampling

Changes or deletions in the field book should be lined out with a single strike mark, initialed, and remain legible. Sufficient information should be recorded to allow the sampling event to be reconstructed without relying on the sampler's memory.

Each page in the field books will be signed by the person making the entry at the end of the day, as well as on the bottom of each page. Anyone making entries in another person's field book will sign and date those entries.

3.5.2 Sample Collection Field Sheets (SCFS)

An SCFS for soil will be completed at each sampling location. The data sheet will be completely filled in. If items on the sheet do not apply to a specific location, the item will be labeled as not applicable or not required. The information on the data sheet includes the following:

- Sample location number
- Date and time of sampling
- Person performing sampling
- Type of sample
- Number of samples taken
- Sample identification number
- Preservation of samples
- Record of any QC samples from site
- Any irregularities or problems which may have a bearing on sampling quality

3.5.3 Daily Quality Control Report

Each sampling crew will also maintain DQCRs to supplement the information recorded in the field logbook. DQCRs will be maintained by members of the field sampling team and cross-checked for completeness at the end of each day by the sampling team members and/or Field Manager. They will be signed and dated by individuals making entries and initials by the reviewer upon completion. Copies of the DQCR will be forwarded to the Quality Assurance Officer for review. The DQCR will include the following information:

- Project name
- Project number
- Personnel on site
- Visitor on site
- Subcontractors on site
- Equipment on site
- Weather conditions
- Field work performed
- Quality control and health and safety activities
- Problem, down time, and standby time
- Name and title of person completing the DQCR

3.5.4 Sample Chain of Custody

During field sampling activities, traceability of the sample must be maintained from the time that the samples are collected until laboratory data are issued. Initial information concerning collection of the samples will be recorded in the field log book as described above. Information on the custody, transfer, handling, and shipping of samples will be recorded on a COC form. The COC is a three-part carbonless form.

The sampler will be responsible for initiating and filling out the COC form. The sampler will sign the COC when the sampler relinquishes the samples to anyone else. One COC form will be completed for each cooler of samples collected daily. The COC will contain the following information:

- Sampler's signature and affiliation
- Project number
- Date and time of collection
- Sample identification number
- Sample type
- Analyses requested
- Number of containers
- Signature of persons relinquishing custody, dates, and times
- Signature of persons accepting custody, dates, and times
- Method of shipment
- Shipping air bill number (if appropriate)

The person responsible for delivery of the samples to the laboratory will sign the COC form, retain the last copy of the three-part COC form, document the method of shipment, and send the original and the second copy of the COC form with the samples. Upon receipt at the laboratory, the person receiving the samples will sign the COC form and return the second copy to the Project Manager. Copies of the COC forms documenting custody changes and all custody documentation will be received and kept in the central files. The original COC forms will remain with the samples until final disposition of the samples by the laboratory. The analytical laboratory will dispose of the samples in an appropriate manner 60 to 90 days after data reporting. After sample disposal, a copy of the original COC will be sent to the Project Manager by the analytical laboratory to be incorporated into the central files.

Field Sampling SOP MC-4

Incremental Soil Sampling

For incremental composite sampling, multiple grab samples are collected over an area of interest or a decision unit (DU) and composited into a single large volume sample. Samples are collected randomly over the DU and these sample increments are composited to obtain an approximately 1 kilogram (kg) sample. The benefit of incremental sampling is that it yields a better estimate of an average concentration of analyzed parameters than would mathematical averaging of discrete samples. A limitation is that it does not provide location-specific concentrations that might be used for determining volume of soil in a remedial action such as excavation or treatment.

This SOP provides descriptions of equipment, field procedures, and QA/QC procedures to be implemented for using IS to collect samples. Specific sample locations will be determined in the field and frequency of collection is presented in the UFP-QAPP. The procedures in this SOP are to be used with the UFP-QAPP and other appropriate SOPs. Applicable SOPs referenced by this SOP are listed below:

- SOP MC-3 Sample Handling, Documentation, and Tracking
- SOP MC-6 Surface and Subsurface Soil Sampling
- SOP MC-2 Decontamination

4.1 INCREMENTAL SAMPLING DESCRIPTION

The following sections detail the equipment needed and the procedures to be followed to implement IS.

4.2 EQUIPMENT LIST

The following general list of equipment will be needed to collect IS soil samples:

- Volumetric soil sampler (i.e., soil probe, hand auger, or 5-gram Terra Core®)
- Magnetic locator (if required)
- Surveyor's flags
- Tape rule marked in 0.01-foot increments
- Field books/field log sheets
- Stainless-steel knives and bowls
- 1-gallon zip sealing bags
- Sample bottle labels
- Label tape (clear)
- Paper towels
- Camera
- Waterproof and permanent marking pens
- Grease pencil or paint pen
- Plastic sheeting
- Nitrile gloves (several boxes, appropriate sizes)
- Handheld GPS

- Handheld pushbutton counter
- Location data and/or figure for sample areas
- Plastic trash bags
- Appropriate health and safety equipment, as specified in the SSHP
- Appropriate decontamination supplies, as specified in SOP MC-2
- Cooler with ice

4.3 DECONTAMINATION

Before any sampling begins, the sampling equipment will be decontaminated according to the procedures contained in SOP MC-2. Sampling equipment will be decontaminated between sampling activities for different Decision Units (DU), but decontamination of sampling equipment will not be required between collecting soil increments within one DU or Sampling Unit (SU).

4.4 INCREMENTAL SAMPLING PROCEDURES

IS will be completed using a systematic-random sampling approach. The DU boundary is typically determined by considering the investigative objectives, soil type, and analytes of concern. The illustrations depict the typical DU configuration for a small-arms range (**Figure 4-1**). If more detail is required a DU can be further subdivided into SUs (**Figure 4-2**).

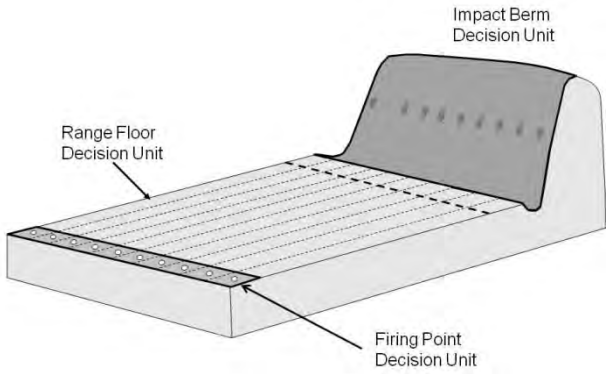

Figure 4-1
Typical DU

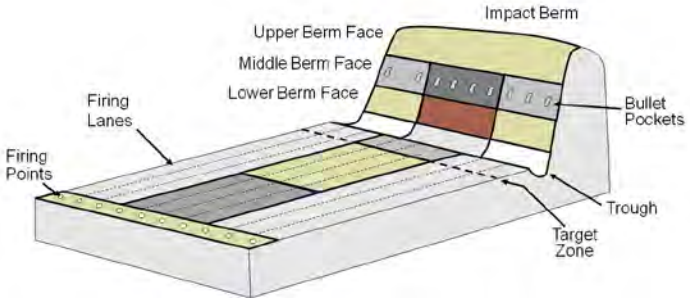

Figure 4-2
DU Subdivided into SUs

The first step will be to mark the boundaries of the DU(s) or SU(s). After the boundaries have been marked, soil samples consistent with systematic-random sampling design IS protocol (**Figure 4-3**) will be collected by a soil sampling person accompanied by a MEC avoidance technician. The MEC avoidance technician will use a magnetic locator to assist with identifying potential MEC at sampling locations. After each sampling location has been cleared, a soil aliquot will be collected. Sampling locations will be adjusted if anomalies are detected. This process will be repeated until all aliquots within a DU/SU have been collected.

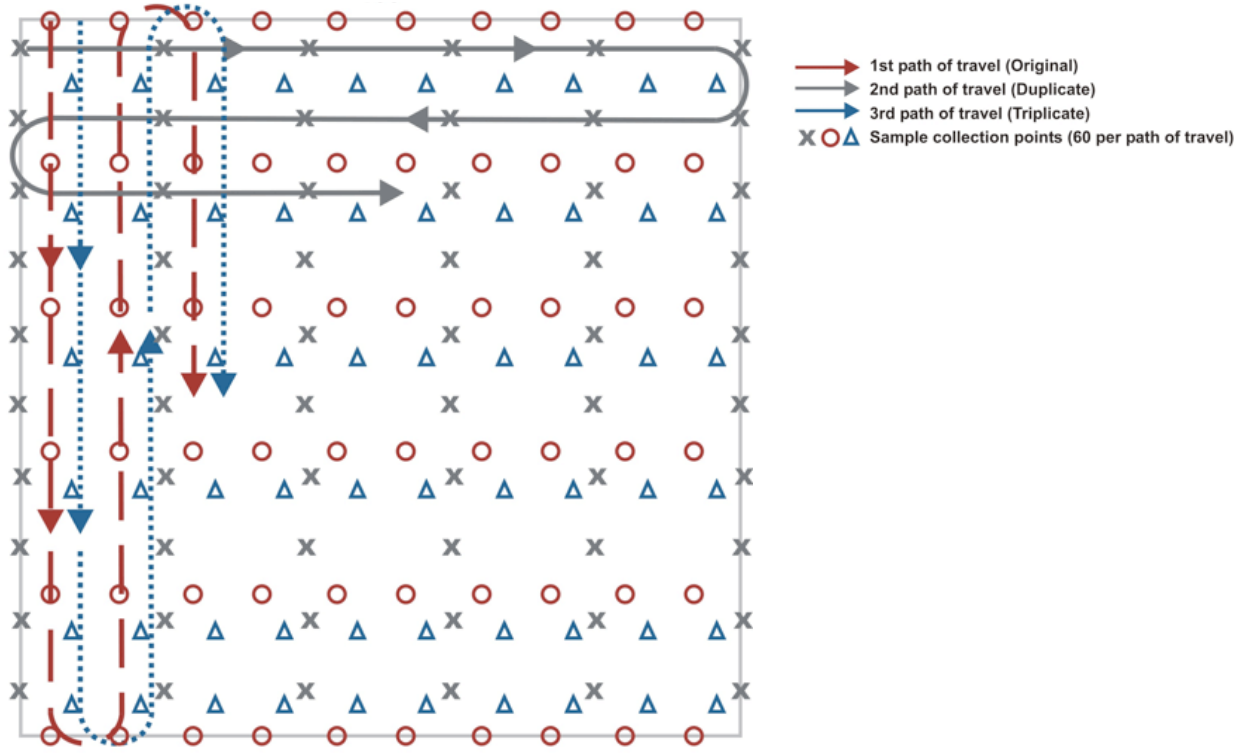

Figure 4-3
Systematic-Random Sampling Design
(ITRC, 2012)

4.4.1 Marking of DUs/SUs and Sampling Locations

The boundaries of each DU/SU will be marked prior to sampling. The boundaries will be marked in such a way that field personnel will not collect any samples outside the DU/SU boundaries. The following procedures will be used by the field crews to locate and mark the DU/SUs in the field:

1. The list of geo-referenced corner coordinates of the DU/SU will be provided to the field crew.
2. The field crew will locate the corners of the DU/SU at a given AOC/site by using a global position system (GPS) with sub-meter accuracy.
3. Once located in the field, the DU/SU corners will be marked by placing a surveyor's flag into the ground. The DU/SU corners will be clearly marked on the flags with a grease pencil or paint pen to denote the site name and DU/SU.
4. Once the DU/SU corners are flagged, colored twine or cord will be stretched between corners to visibly mark DU/SU boundaries. This will ensure the soil aliquots are collected within the boundary.

5. Once the boundaries of a DU/SU have been marked, a soil sampler (accompanied by a MEC avoidance technician) will choose, access, and collect soil samples from the sampling locations.

4.4.2 Sample Collection

For the planned IS as part of this RI, stainless steel hand tools (either an auger or soil probe) will be used. Incremental samples will be collected from the 0 to 0.5-foot interval using the following procedure:

1. The MEC avoidance technician will clear each sampling location immediately prior to sampling and will offset the sample location as necessary to avoid any metallic anomalies Collect the aliquot using a soil probe or hand auger.
2. Using a 5-gram sampler, collect 5 grams of soil from the 0.5 foot interval. Add sample to bag. Increments shall be collected with the same sampling device in order to target a fixed volume per increment and achieve the desired sample mass
3. Label the sample containers and place on ice, complete the COC, and pack the cooler(s) for shipment.

4.4.3 Sample Processing and Analysis

All collected IS soil samples will be processed by the laboratory following similar methods to those described in Appendix A of EPA Method 8330B. A copy of the contract analytical laboratories SOP for IS sample processing under Method 8330B is contained in the UFP-QAPP. Required analyses for each collected IS sample are specified in the UFP-QAPP.

4.4.4 Field QA/QC Procedures and Samples

Duplicate and triplicate samples will be collected as specified in the UFP-QAPP to evaluate IS sampling variability in a similar manner as the primary sample. The duplicate and triplicate samples will require the same number of aliquots as the primary sample. Appropriate sample volumes will be collected for laboratory MS/MSD analysis on identified primary samples (**Section 4.4.4.1** below). Equipment blank samples will also be collected from decontaminated non-disposable sampling equipment. No other IS QA/QC samples are planned for the RI.

4.4.4.1 *Matrix Spike and Matrix Spike Duplicates (MS/MSD)*

MS/MSD are used to assess the potential for matrix effects. Samples will be designated for MS/MSD analysis on the chain of custody form and on the bottles. For IS sampling, the laboratory will use soil from the processed IS samples for the MS/MSD.

4.4.5 Sample Identification, Handling, and Documentation

Samples will be identified, handled, and recorded as described in this SOP and SOP MC-3. The parameters for analysis and preservation are specified in tables contained in the UFP-QAPP.

4.4.6 Documentation

Each field activity must be properly documented to facilitate a timely and accurate reconstruction of events in the field (see SOP MC-3). A SCFS will be completed for each IS soil sample submitted for chemical analysis.

4.4.6.1 *Field Logbook*

The most important aspect of documentation is thorough, organized, and accurate record keeping. All information pertinent to the investigation and not documented on the boring log will be recorded in a bound logbook with consecutively numbered pages. All entries in logbooks will be made in waterproof ink and corrections will consist of line-out deletions that are initialed and dated. Entries in the logbook will include the following, as applicable:

- Project name and number
- Sampler's name
- Date and time of sample collection
- SU grid layout, quadrant sampling locations, and increment collection locations and depths
- Sample number, location, and depth
- Sampling method
- Observations at the sampling site
- Unusual conditions
- Information concerning drilling decisions
- Decontamination observations
- Weather conditions
- Names and addresses of field contacts
- Names and responsibilities of field crew members
- Names and titles of any site visitors
- Location, description, and log of photographs (if taken)
- References for all maps and photographs
- Information concerning sampling changes, scheduling modifications, and change orders
- A detailed description of IS sampling activities including increment and grid information
- Summary of daily tasks and documentation on any scope of work changes required by field conditions
- Signature and date by personnel responsible for observations

Field investigation situations vary widely. No general rules can include each type of information that must be entered in a logbook for a particular site. A site-specific logging procedure will be developed to include sufficient information so that the sampling activity can be reconstructed without relying on the memory of field personnel. The logbooks will be kept in the field team member's possession or in a secure place during the investigation. Following the investigation, the logbooks will become a part of the project file.

4.4.7 Sample Collection Field Sheets (SCFS)

An SCFS will be completed at each SU. The data sheet will be completely filled in. If items on the sheet do not apply to a specific location, the item will be labeled as not applicable or not required. Sheets will not be completed for each aliquot, just for the final composite sample. The information on the data sheet includes the following:

- Sample location number
- Date and time of sampling
- Person(s) completing sampling
- Type of sample
- Number of samples taken
- Sample identification number
- Preservation of samples
- Record of any QC samples from site
- Any irregularities or problems which may have a bearing on sampling quality

4.5 REFERENCES

Interstate Technology Regulatory Council (ITRC). 2012. *Incremental Sampling Methodology.* Technical and Regulatory Guidance. February.

United States Army Corps of Engineers. 2009. Implementation of Incremental Sampling (IS) of Soil for the Military Munitions Response Program. Environmental and Munitions Response Center of Expertise. Interim Guidance 09-02.

United States Army Corps of Engineers. 2013. Incremental Sampling Methodology (ISM) Implementation of Incremental Sampling (IS) for Metallic Residues. Engineer Research Development Center, ERDC TR-13-5. August.

Field Sampling SOP MC-5

Field X-ray Fluorescence Screening

5.1 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to delineate protocols for the operation of a field x-ray fluorescence (XRF) instrument for measuring metals concentrations in soil.

5.2 MATERIAL

a. Work Plan
b. Personal protective equipment (PPE)
c. Field logbook
d. XRF Instrument & Manual
e. Clear plastic bags or clear 8 ounce glass jars
f. Standard reference materials (SRM)

5.3 CALIBRATION

1. Prepare standard samples by filling XRF sample cups with SRMs and covering with Mylar (or similar) plastic sheeting. SRMs should span both below and above the expected range of sample concentration.
2. Check the XRF equipment factory calibration by analyzing each SRM. Each SRM reading should be within 20% of the certified value for the analytes of concern. Retain or copy supplier's calibration document in project file.
3. Calibration checks will occur before and after sampling and at least once every 4 hours of operation. All calibration checks will be documented in the field logbook.
4. SRMs will also be analyzed by reading concentrations through the same plastic bags being used for sampling. Document to show that reading through the plastic bag shows no analytical bias or interference.

5.4 PRECISION MEASUREMENTS

1. A minimum of 1 sample per Decision Unit (DU) should be selected to perform precision measurements/calculations on (EPA Method 6200).
2. It is recommended that samples with concentration(s) near the action level (i.e., +/- 100 ppm of the action level for Pb of 400 ppm) be targeted for selection.
3. Following field operations in Section 5.5 below, each sample should be analyzed 7 times in replicate and the relative standard deviation (RSD) of the sample mean calculated as follows:
4. RSD = (Standard Deviation/Mean Concentration) x 100
5. The target RSD should be $\leq$ 20% with the exception of chromium (RSD $\leq$ 30% for chromium).
6. Document the sample ID, replicate results, and RSD calculation in the field notes.

5.5 FIELD OPERATIONS

1. Fill a 1-gallon plastic bag ½ to ¾ full or an 8 oz. glass jar completely full with the soil sample using hand auger, trowel, or by hand.
2. Thoroughly mix contents of sample bag being sure to break up aggregates of soil and discarding

material >2mm in diameter. If necessary, run sample through 60-mesh sieve to segregate and remove all large grains or use a rubber mallet to disaggregate sample within bag.

3. Per XRF instrument manufacturers specifications, ensure the sample collection time is set between 15 and 30 seconds per reading.
4. During XRF use, when the radiation shutter is open:
   - do not place hands, feet, or other body parts in the radiation field;
   - do not measure samples on a table or raised surface, radiation can travel through non-metal surfaces to objects/body parts below;
   - do not look into the beam path;
   - do not point the XRF at anyone;
   - do not hold the XRF from the front.
5. Collect, at minimum, 4 readings per sample by shooting XRF analyzer through the clear plastic bag. Ensure neither the sample or instrument moves during sample collection duration. The 4 reading locations should be randomly chosen to gather data representative of the entire sample.
6. The sample reading (metal concentration) and internal standard deviation (error) will be recorded for each reading and sample in the field logbook.
7. Co-located duplicate readings will be taken once every 10 samples.
8. After all XRF analyses, the soil samples will be returned to their initial field sampling locations.
9. Plastic sample bags will not be reused for multiple samples and will be disposed of as municipal waste.

5.6 PRECAUTIONS

- If the sample taken has a moisture content >20%, the XRF readings may lose accuracy as the moisture within the sample can interfere with the incoming or outgoing x-rays. It is highly recommended that the sample be dried before collecting readings. Drying can occur in a warm ambient air environment or by heating with a toaster or conventional oven.
- The XRF instrument has a radioactive source and when in operation actively emits high energy x-rays. The instrument should always be used per the manufacturer's recommendations. Never point the instrument at another person or anything other than the sample in question during operation
- Radiation monitoring equipment should be used when handling or operating the XRF instrument. Radiation monitors or badges should be worn by all working with or near the instrument with the understanding that the maximum permissible whole-body dose of occupational exposure is 5 Roentgen Equivalent Man (REMs) per year.

5.7 SAFETY

The U.S. Department of Agriculture's (USDA) Office of Homeland Security & Emergency Coordination Radiation Safety Division has guidelines for the use and possession of portable X-ray fluorescence analyzers (XFAs). In addition to following the all recommendations for use outlined in the manufacturer's user manual, field personnel will conform to the following as specified by the USDA (USDA, 2017):

All servicing or cleaning of an XFA involving exposure of the radioactive sources must be performed by the manufacturer or by an authorized representative of the manufacturer. Before removing the XFA from its place of storage, make sure it is locked in the transport case. When transporting the XFA in a

vehicle, block and brace it to prevent shifting or movement, and lock the XRA in the vehicle when it is unoccupied. When the indicator light is flashing, and the shutter is open, the primary x-ray beam is on and radiation is being emitted from the front of the XFA.

After completing each measurement, immediately close the radiation shutter. Always maintain the XFA under constant view and immediate control when it is not in storage. At job sites, do not walk away from the XFA when it is left on the ground. When the XFA is not in use at a temporary job site, it must be securely locked in the operator's vehicle (or other appropriate locked storage location). Return the XFA to its proper locked storage location at the end of the work shift.

5.8 REFERENCES

EPA Method 6200 – Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment

U.S. Department of Agriculture, Office of Homeland Security & Emergency Coordination Radiation Safety Division. Portable X-Ray Fluorescence Analyzer https://www.dm.usda.gov/ohsec/rsd/xfa.htm. Accessed January 2017.

Olympus Delta™ Family: Handheld XRF Analyzers (model DS2000) User Manual (shipped with equipment from supplier; see attachment for table of contents)

Attachment A

Olympus Delta™ Family: Handheld XRF Analyzers User Manual Table of Contents

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Field Sampling SOP MC-6
Surface and Subsurface Sampling

6.1 PURPOSE AND SCOPE

This document defines the SOP for collecting surface soil samples. This SOP provides descriptions of equipment, field procedures, and QA/QC procedures implemented for the collection of surface soil samples. Specific sample locations and frequency of collection are presented in the UFP-QAPP. This procedure is intended to be used together with the UFP-QAPP and other SOPs. Health and safety procedures and equipment for the investigation are detailed in the SSHP. Applicable SOPs are listed below:

- SOP MC-3 – Sample Handling, Documentation, and Tracking
- SOP MC-2 – Decontamination

6.1.1 Reference Standards

Wherever an ASTM designation is cited in this document, it shall mean the American Society for Testing and Materials Standard Specification of that designation appearing in the "1994 Annual Book of ASTM Standards," published by the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania. "EM 1110-2-1906" refers to United States Department of the Army, "Engineering and Design, Laboratory Soil Testing," 30 December 1970.

6.2 PROCEDURES FOR SOIL SAMPLING

Surface soil samples will be collected using stainless-steel hand utensils or, for drilling rig borings, a stainless-steel split-spoon sampler. Surface soil samples will be collected from 0 to 0.5 feet below ground surface (bgs).

6.2.1 Equipment List

The following list of equipment will be needed to collect surface soil samples:

Equipment for Surface Soil Sampling with Hand Utensils

- Stainless-steel spoon or trowel
- Surveyor's stakes and flags
- Ruler marked in 0.1-foot increments
- Field books/field sheets
- Stainless-steel knife, bowl
- Sample bottles provided by the laboratory
- Sample bottle labels
- Label tape (clear)
- Paper towels
- Camera and film
- Waterproof and permanent marking pens
- Plastic sheeting

- Plastic bags
- Appropriate health and safety equipment, as specified in the SSHP
- Appropriate decontamination supplies, as specified in SOP MC-2
- Ice chest with ice

6.2.2 Decontamination

Before drilling or sampling begins, the drilling and sampling equipment will be decontaminated according to the procedures contained in SOP MC-2. Drilling and sampling equipment will be decontaminated between boring and sampling locations. Sampling equipment will also be decontaminated between collections of samples from different depths at the same location.

6.2.3 Surface Soil Sampling Procedures

This method of soil sample collection is to be used in situations where the bedrock is shallow, or other conditions will not permit the use of auger or drilling methods. The following procedure should be used to collect shallow soil sampling using hand utensils:

- Decontaminate sampling equipment according to SOP MC-2.
- Record the sample location on a site map and in the field logbook.
- Don a clean pair of nitrile gloves.
- Clear and remove vegetation and any surface debris such as rocks, as necessary.
- Using a decontaminated spoon or trowel, remove soil from a 1 square foot area until the specified sampling depth is reached. Removed soil should be placed on plastic sheeting.
- Collect the soil for the analytical parameters from the specified depth using a decontaminated stainless-steel sampling spoon. If more soil is necessary to fill the remaining sample jars, the area is to be expanded without increasing the depth.
- Composite the soil by thoroughly mixing the soil from the sampling point in a decontaminated stainless-steel bowl with the sampling spoon. Fill the jar for the specified analysis. The required analyses and appropriate containers are listed in the UFP-QAPP.
- Label, store and document sample according to SOP MC-3.
- Record applicable information on the Sample Collection Field Sheet.
- Identify the location for future reference using surveying stakes and flags.

6.2.4 Subsurface Soil Sampling Procedures (Direct Push)

Direct push samples will be collected using a dual tube sampling system. The outer rods in this system remain in the ground while the inner rod and sample liner are extracted to retrieve a soil sample from the desired interval. Soil samples may be collected continuously throughout the depth of the direct push boring or from discrete intervals. The direct push rods will be

decontaminated between boring locations, but not between samples at the same boring since a new acetate liner is used for each sample.

At each sampling location, the assembled inner and outer rods will be advanced by a combination of hydraulic down pressure and percussion hammering. After the target depth is reached, the inner rod will be withdrawn and the liner filled with the soil sample will be retrieved.

The following procedures will be followed after the soil sample has been retrieved:

- Don a clean pair of nitrile gloves

- Cut the acetate liner along the length of the sample and measure the recovery. Record the sampling interval and recovery on the drilling log.

- Determine and identify the size of the recovered sample. This will be for soil classification and stratigraphic logging and may be used for chemical analysis.

- Examine the soil sample and record the soil description on the drilling log in accordance with the Unified Soil Classification System (USCS).

- Homogenize an approximate 1-foot interval of the soil sample by thoroughly mixing it in a stainless-steel bowl. Use the homogenized soil to fill the appropriate sample containers. Record the sample interval and analysis requested on the Drilling Log.

- Label, store, transport, and document the samples according SOP MC-3.

- Complete photographic documentation.

- If no other samples will be collected from the boring, abandon the boring by backfilling the hole with hydrated granular bentonite. Pour the granular bentonite down the hole in approximate 1-foot to 2-foot lifts, and then pour approximately ½ gallon of potable water down the hole to hydrate the bentonite. Continue this from the bottom of the hole to the ground surface.

6.2.5 Subsurface Soil Sampling Procedures (Hand Auger)

Soil collected using a hand auger will be collected at 6-inch depth intervals using a stainless-steel hand auger. Procedures are listed below:

- Decontaminate the hand auger and other sampling equipment according to SOP MC-2.

- Don a clean pair of nitrile gloves.

- Using a decontaminated hand auger handle and bucket, advance a borehole to the specified sampling depth. Place the recovered soil on plastic sheeting.

- Record the sample interval, soil description (USCS), and required analysis on the Drilling Log.

- Fill the sample containers with the soil sample from the appropriate depth interval.

- If no other samples will be collected from the boring, abandon the boring by backfilling the hole with hydrated granular bentonite. Pour the granular bentonite down the hole in approximate 1-foot to 2-foot lifts, and then pour approximately ½ gallon of potable water down the hole to hydrate the bentonite. Continue this from the bottom of the hole to the ground surface.

6.2.6 Field Quality Assurance/Quality Control Procedures and Samples

Field Quality Assurance/Quality Control samples are designed to help identify potential sources of external sample contamination and to evaluate potential error introduced by sample collection and handling. All QA/QC samples are labeled with QA/QC identification numbers and sent to the laboratory with the other samples for analyses.

6.2.6.1 *Duplicate Samples*

Duplicate samples are samples collected to assess precision of sampling and analysis. For the soil sampling, a duplicate sample will be collected at the same time as the initial sample. The initial sample containers for a particular parameter or set of parameters will be filled first, then the duplicate sample bottles for the same parameter(s), and so on until all necessary sample bottles for both the initial sample and the duplicate sample have been filled. The duplicate soil sample will be handled in the same manner as the primary sample. The duplicate sample will be assigned a QA/QC identification number, stored in an iced cooler, and shipped to the laboratory on the day it is collected. Duplicate samples will be collected for all parameters. The soil will be divided evenly and then homogenized separately. Duplicate samples will be blind to the laboratory.

6.2.6.2 *Matrix Spikes and Matrix Spike Duplicates*

Matrix spikes (MS) and matrix spike duplicates (MSD) are used to assess the potential for matrix effects. Samples will be designated for MS/MSD analysis on the chain of custody form and on the bottles. It may be necessary to increase the sample volume for samples where this designation is to be made.

6.2.7 Sample Identification, Handling, and Documentation

Samples will be identified, handled and recorded as described in this SOP and SOP MC-3. The parameters for analysis and preservation will be specified in the UFP-QAPP.

6.2.8 Documentation

Each field activity must be properly documented to facilitate a timely and accurate reconstruction of events in the field (see SOP MC-3). Sample Collection Field Sheets will be completed for all soil samples submitted for chemical analysis.

6.2.8.1 *Field Logbook*

The most important aspect of documentation is thorough, organized, and accurate record keeping. All information pertinent to the investigation and not documented on the boring log will be recorded in a bound logbook with consecutively numbered pages. All entries in logbooks will be made in waterproof ink and corrections will consist of line-out deletions that are initialed and dated. Entries in the logbook will include the following, as applicable:

- Project name and number
- Sampler's name
- Date and time of sample collection
- Sample number, location, and depth
- Sampling method
- Observations at the sampling site
- Unusual conditions
- Information concerning drilling decisions
- Decontamination observations
- Weather conditions
- Names and addresses of field contacts
- Names and responsibilities of field crew members
- Names and titles of any site visitors
- Location, description, and log of photographs (if taken)
- References for all maps and photographs
- Information concerning sampling changes, scheduling modifications, and change orders
- Summary of daily tasks (including costs) and documentation on any cost or scope of work changes required by field conditions
- Signature and date by personnel responsible for observations

Field investigation situations vary widely. No general rules can include each type of information that must be entered in a logbook for a particular site. A site-specific logging procedure will be developed to include sufficient information so that the sampling activity can be reconstructed without relying on the memory of field personnel. The logbooks will be kept in the field team

member's possession or in a secure place during the investigation. Following the investigation, the logbooks will become a part of the final project file.

Attachment B

AECOM Field Forms

AECOM

Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics**. This meeting is a daily refresher, not a full orientation**. Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name: **Phone Number:**	
AECOM SH&E Rep. Name: **Phone Number:**	
Meeting Leader:	

Date:	**Project Name/Location:**	**Project Number:**
Today's Scope of Work:		

Muster Point Location:	**First Aid Kit Location:**	**Fire Extinguisher Location:**	**Spill Kit Location:**

1. Required Topics

- ☐ Fitness for Duty requirements, all sign in / sign out
- ☐ Required training (incl. task specific) completed and current
- ☐ SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, hazards, controls, procedures, requirements, etc.)
- ☐ Pre-Job Hazard Assessments (JHA/JSAs) available and understood
- ☐ Task Hazard Assessments (THAs) are to be completed for each task immediately prior to conducting
- ☐ STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA
- ☐ Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition
- ☐ Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- ☐ Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- ☐ Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- ☐ Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- ☐ Required checklists/records available, understood (describe):
- ☐ Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

Check ☑ as reviewed or mark ■ as not applicable

- ☐ ☐ Biological/ Chemical / Electrical Hazards
- ☐ ☐ Ergonomics - Lifting, Body Position
- ☐ ☐ Lock Out/ Tag Out
- ☐ ☐ Short Service Employees - visual identifier and mentor/ oversight assignment
- ☐ ☐ Simultaneous/ Neighbouring Operations
- ☐ ☐ Slip/ Trip/ Fall Hazards
- ☐ ☐ Specialized PPE Needs
- ☐ ☐ Traffic Control
- ☐ ☐ Waste Management/ Decontamination
- ☐ ☐ Weather Hazards / Heat Stress / Cold Stress
- ☐ ☐ Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
- ☐ ☐ Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
- ☐ ☐ Other Topics (describe/attach):
- ☐ ☐ Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	**Signature**	**Date** **Time** (at end of day / shift)

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

* The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
* The hazards & control measures associated with each task you are about to perform.
* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
* That no tasks or work is to be performed without a hazard assessment.
* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

* You are physically and mentally fit for duty.
* You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
* You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

AECOM

Americas

Task Hazard Assessment

S3AM-209-FM6

Customer	**Permit No.**
Location	**Job No.**
Description of Task	**Date**

Basic Task Steps (explain how the task will be carried out)	**Hazards** (identify all hazards and potential hazards)	**Risk** (initial)	**Precautions** (describe how that hazard will be controlled)	**Risk** (final)	**Initials**
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator _____ (Print Name) _____ (Signature)

Supervisor _____ (Print Name) _____ (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

VISITOR SIGN ON

NAME (Please Print) SIGNATURE TIME

Risk Rating Matrix

Probability	Severity				
	5 - Catastrophic	4 – Critical	3 – Major	2 – Moderate	1 - Minor
5 – Frequent	25	20	15	10	5
4 – Probable	20	16	12	8	4
3 – Occasional	15	12	9	6	3
2 – Remote	10	8	6	4	2
1 - Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Task Hazard Assessment Follow-Up/Review.

First Break **Initial**

Lunch Break **Initial**

Second Break **Initial**

Emergency Meeting / Assembly Area

Emergency Contact #

Emergency Radio Channel

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name)

Signature

Date: _____

AECOM Technical Services Inc.

DAILY QUALITY CONTROL REPORT

Report Number: _____
Project Title: _____
Location: _____
Contract/DO Number: _____

WEATHER	BRIGHT SUN	CLEAR	OVERCAST	RAIN	SNOW
TEMPERATURE	< 32	32 - 50	50 - 70	70-85	>85
WIND	STILL	MODERATE	HIGH		
HUMIDITY	DRY	MODERATE	HUMID		

Personnel \ Site Visitors On-Site

No.	Name	Hrs.	Affiliation	Location/Description of Work
a.				
b.				
c.				
d.				
e.				
f.				
g.				

Sampling equipment on site:

Type	Serial Number	Calibration Verification	Time	Parameter	Standard	Reading

Field Changes: YES_____ NO_____

If yes, filed Nonconformance and Corrective Action Report number (NCR No.):_____

Health & Safety (Briefing held, PPE, injuries, near misses, etc.)	
Work Performed (including sampling)	
QA Activities	**Daily Report**_____ **Review of COC**_____ **Track Progress Report against QAPP**_____
QC Activities	**# Duplicates**_____ **Equipment calibrated complete to standards**_____ **# Equipment Blanks**_____ **# MS/MSD**_____ **# Field Blanks**_____
Problems Encountered Resolved	
Additional Information	
Activities Scheduled for the Next Day	

Contractor Verification: On behalf of the contractor, AECOM, I certify this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications, to the best of my knowledge, except as may be noted above.

_____ _____

Signature Date

Date:_____

AECOM Technical Services Inc.

Nonconformance and Corrective Action Report

Report Number:_____ **Location:**_____

Project Title:_____ **Contract Number:**_____

Description of Nonconformance and Cause:	
Proposed Disposition:	

Submitted by: _____ **Date:** _____

Approved by: _____

Actual Disposition approved by Project Manager:	
Implementation of Disposition assigned to:	

Completed by: _____ **Date:** _____

Verified by: _____ **Date:** _____

AECOM

Site ID: _____
Arrival Time: _____
Departure Time:_____

Soil Sample Collection Log

Site Name/Location: _____ Date: _____

On-Site Personnel: _____ Log Preparer: _____

Sample ID: _____

Soil Sample Characterization

Grain Size (%)	
Silt/Clay (<0.06 mm)	
Sand (0.06 – 2 mm)	
Gravel (2.64 mm)	
Cobble (64 – 256 mm)	
Organic Content	LOW / MED / HIGH
Color	
Moisture (%)	
Bullets or Bullet Fragments?	YES / NO

Sample Collection Tools Used: _____

Sample Types

☐ Incremental (always taken Triplicate)– No. of Increments: _____

☐Discrete – Depth interval: _____

XRF Result: _____

XRF Error: _____

Quality Control Samples

☐Duplicate ☐MS/MSDs ☐Field Blank ☐Equipment Blank ☐N/A

Notes:

_____

_____

_____

_____

_____

_____

AECOM

PHOTOGRAPHIC RECORD

Client Name:	**Site Location:**	**Project No.**
Army National Guard	Williston Local Training Area, North Dakota	60520956

Photo No. 1	
Location of Photo:	
Description:	

Photo No. 2	
Location of Photo:	
Description:	

Attachment C

Analytical Laboratory ELAP Certification and Standard Operating Procedures (on CD)

Appendix B

Site Safety and Health Plan

AECOM

Final
Site Safety and Health Plan
Military Munitions Response Program
Williston Local Training Area, North Dakota

Munitions Response Site NDHQ-008-R-01
North Dakota Army National Guard

Army National Guard

Contract No. W9133L-14-D-0001
Delivery Order No. 0008

JUNE 2018

AECOM

Signature Sheet

Site Safety and Health Plan
Remedial Investigation at
Williston Local Training Area
Williston, North Dakota

Plan Preparer:

31 October 2017

Jennifer Li
Deputy Project Manager/Field Task Leader
(301) 820-3476

Date

Plan Concurrence:

3 November 2017

Alberto Munuera
Project & Area Safety, Health and Environment Manager
(540) 431-7908

Date

Plan Approver:

31 May 2018

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Attachments

°F	degrees Fahrenheit
AHA	Activity Hazard Analysis
bpm	beats per minute
CFR	Code of Federal Regulations
CPR	Cardiopulmonary Resuscitation
DEET	diethyl-m-toluamide
DU	Decision Unit
EM	Engineering Manual
EZ	exclusion zone
HAZWOPER	Hazardous Waste Operation and Emergency Response
HSEMS	Health, Safety, and Environment Management System
HSM	Health and Safety Manager
ISM	Incremental sampling methodology
LTA	Local Training Area
MC	munitions constituent
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
MSE	Medical Surveillance Evaluation
OSHA	Occupational Safety and Health Administration
PM	Project Manager
PPE	Personal Protective Equipment
RAC	Risk assessment code
RI	Remedial Investigation
SDS	Safety Data Sheet
SH&E	Safety Health and Environment
SOP	standard operating procedure
SPF	Sun Protection Factor
SSHP	Site Safety and Health Plan
SZ	Support Zone
TLV	Threshold Limit Value
TZ	Transition Zone
USACE	United States Army Corps of Engineers
WBGT	Wet Bulb Globe Thermometer
WP	Work Plan

SECTION ONE: INTRODUCTION

The following Site Safety and Health Plan (SSHP) is intended solely for use during the field activities to be performed as part of the remedial investigation (RI) at Williston Local Training Area (LTA) Munitions Response Site (MRS). The Williston LTA is located in a remote area of Williams County, North Dakota, approximately 21 miles east of the city of Williston. Based on results of Site Inspection (SI), the Army National Guard (ARNG) determined an RI should be conducted under the Military Munitions Response Program (MMRP). The objective of the RI is to determine the nature and extent of munitions constituents (MC) at two range features at the MRS. Soil sampling will be performed to determine if metals associated with small arms training remain in the berm and natural hillside backstop in concentrations that would pose a risk to human health and the environment. Specifications herein are subject to review and revisions based on actual conditions encountered in the field.

This SSHP provides the basis for health and safety requirements, guidelines, and procedures that will be used at Williston LTA during the planned field activities. This SSHP provides a site description, hazard/risk analysis, staff organization, personal protective equipment (PPE) to be used, standard operating procedures, site control measures, decontamination procedures, emergency response plans, and site record keeping requirements. This SSHP will be updated should new tasks be added.

SECTION TWO: PROJECT AND SITE DESCRIPTION

2.1 SITE DESCRIPTION

The Williston LTA MRS is a former small arms range (0.52 acres) located in a remote area of Williams County, North Dakota, approximately 21 miles east of the city of Williston and roughly 630 feet northwest of the northern shore of Lake Sakakawea, a dammed lake along the Missouri River. The MRS is located in the southwest corner of the 344.5-acre former Williston LTA, which contains rugged terrain with mixed grass prairie and woody draws with rolling prairie and badlands topography. Improved entrance roads and interior trails within the LTA are not well maintained. The area outside of the MRS, within the former Williston LTA, was used by NDARNG for both company and squad level training authorized by Camp Grafton, including overnight field training, convoy operations training, land navigation, mobility/counter mobility training, engineer obstacle training, and wheeled vehicle training. Historical use of the site was restricted to small arms firing, the result of which was MC deposition in the target berm and surrounding hillside. There is no historical evidence of munitions and explosives of concern (MEC) being present onsite. Live-fire training no longer occurs. The property is federally owned and administered by U.S. Army Corps of Engineers (USACE)-Omaha District and has been co-leased to NDARNG and a Cattle Grazing Association. The MRS is remotely located with access to the site restricted by a fence and locked gate. Figure 1 of the Work Plan (WP) depicts the location of the site.

The MRS consists of a former 25-meter zero range (approximately 0.52-acres) with an earthen impact berm (Figure 2 of the WP). Soils within the MRS are predominantly loamy and hard packed. The range is located in a coulee, surrounded on three sides by steep, rugged hills; the earthen berm divides the coulee, reaching from the northeastern hill to the southwestern hill slope. In addition to the main berm, a raised side berm was observed during the site visit that extended up-range, towards the firing point, along the southwestern hill slope. During small arms training, the surrounding hills acted as natural backstops. These natural backstop hills are outside of the currently drawn MRS boundary shown in the 2013 Preliminary Assessment (PA; NDARNG, 2013) but will be better delineated during this RI. According to the 2013 PA, a small “duck pond” was constructed behind the 25-meter earthen berm at the request of the USACE (NDARNG, 2013). Since construction, the pond has filled in with cattails, is silted in considerably, and is only wet seasonally.

2.2 PROJECT DESCRIPTION

This purpose of the RI field work is to collect sufficient information to characterize the nature and extent of metals MC (lead, copper, antimony, and zinc) resulting from former military weapons training activities at the MRS. Data collected during field activities will be used to evaluate human health and environmental risks from metals MC. The results of the RI will be used to develop future remedial action alternatives as part of the Feasibility Study and support informed risk management decisions.

In coordination with the ARNG and stakeholders, AECOM will mobilize field teams typically comprising two to four scientists to the MRS. Field teams will have the requisite qualifications, including Hazardous Waste Operations and Emergency Response (HAZWOPER) certification,

first aid/CPR, and ARNG-required security training. Each scientist will understand the WP and SSHP, and have training in sampling techniques and munitions awareness (Recognize, Retreat, Report). The field event will be 1 week or less in duration. At the Williston LTA MRS AECOM will determine the lateral extent of MC and establish decision unit (DU) boundaries based on X-ray fluorescence (XRF) analysis of the surface soil. To determine vertical extent of MC, AECOM will collect subsurface soil samples by hand auger at select locations where XRF readings at the surface exceed screening thresholds. Based on DU boundaries, surface soil samples will be collected with hand tools using incremental sampling methodology (ISM).

2.3 PHASES OF WORK

The phases of work that may be conducted include:

1. Mobilization
2. Estimate lateral extent of MC using XRF
3. Determine vertical extent of MC where XRF readings exceed screening threshold
4. Establish DU boundaries based on XRF data and collect soil samples by ISM
5. Identify background DU and collect soil samples by ISM
6. Site restoration and demobilization

SECTION THREE: HAZARD AND RISK ANALYSIS

3.1 HEALTH HAZARD CONTROL PROGRAM

An objective of this SSHP is to ensure that all operations, materials, and equipment will be evaluated to determine the presence of hazardous environments or if hazardous or toxic agents could be released into the work environment.

The Activity Hazard Analysis (AHA) tables for the project work are presented at the end of this section. The AHAs identify all activities, substances and environments that present a hazard and recommend hazard control measures.

Key elements of the AHAs that are required for a Health Hazard Control Program are:

- The written procedures and AHAs are included in this SSHP as certification of the hazard/risk assessment process
- Each AHA identifies the workplace and activity evaluated
- The AHA identifies the name of the person who prepared the AHA and certifies that the evaluation has been performed
- The analysis identifies the date of the evaluation

AECOM requires hazard identification, risk evaluation, control measures, and written procedures to manage health, safety, and environment risks on the job. Hazard and risk assessments were reviewed by the Project & Area Health and Safety Manager (HSM), Alberto Munuera, to ensure that all operations, materials, and equipment were evaluated and that the hazards and risks associated with the work will be communicated to personnel. The potential hazards associated with work on the site include chemical, physical, and biological hazards.

The Health and Safety Officer, Jennifer Li, will manage the AHAs on site and with the help of the field crew, improve upon or add to existing analyses as new potential hazards are noticed. The AHAs will be reviewed daily to confirm the tasks covered; however, each time a new phase is begun, the corresponding analyses will be read to review the potential safety concerns with each team member prior to each phase of work. The Health and Safety Officer will conduct the required safety and health inspections on a daily basis.

3.2 STATEMENT OF SAFETY AND HEALTH POLICY

The written corporate Safety Health and Environment (SH&E) Policy, signed by the CEO, includes a statement of management commitment to provide a safe and healthful workplace for all employees, and sets forth the goals of the program. The Health, Safety, and Environment Management System (HSEMS) detail the responsibilities of management, employees, and expectations for continued improvement toward a zero incident culture. The SH&E Policy and HSEMS are included in **Attachment A** to this SSHP.

Our key SH&E program expectations for this and every other project include:

- Excellence in safety-related behavior by our employees and our subcontractor personnel;

- Strong support of our safety programs by project management;
- High quality and properly targeted safety training;
- The development of appropriate health and safety programs and AHAs for all field projects;
- Reporting of all identified near misses and safety observations, including timely follow-up and corrective action implementation;
- Meeting or exceeding all client SH&E expectations; and
- Meeting or exceeding all regulatory requirements.

Thus, the AECOM accident experience objective for this project is the same as for any other: ZERO ACCIDENTS. We strive to accomplish this through established programs that require training, pre-job briefings/hazard analyses, periodic site safety inspections, mandatory follow-up of site safety violations, and, if necessary, penalties for employee non-compliance.

AECOM's primary goal is that all employees go home at the end of each workday without having sustained an injury. Additional safety objectives and goals for this task include the following:

- Conduct work in accordance with applicable OSHA, ARNG, and other applicable safety regulations;
- Complete the project with zero injuries and illnesses and no property damage;
- Provide prompt identification and correction of health and safety concerns; and
- Obtain 100 percent participation of employees in the maintenance of a safe work environment.

The AECOM SH&E Program is behavior-based, with the conviction that accidents causing injuries or illness to personnel, or having an impact on the environment, are preventable. The key to prevention is the modification of behaviors at all levels of the organization. AECOM employees have the right and the responsibility to stop work if they observe conditions or actions that are placing themselves or others at risk.

3.3 HAZARD COMMUNICATION PROGRAM

Elements of the AECOM written Hazard Communication Program are presented below and follow the guidance of U.S. Army Corps of Engineers (USACE) Engineer Manual (EM) 385-1-1 06.B.01 (USACE, 2014).

Materials to be brought onsite will have a safety data sheet (SDS) maintained in an accessible location for workers to review.

Materials anticipated to be brought onsite include:

- Liquinox (for decontamination)
- Sample preservative (nitric acid in small volumes)

As part of the Health and Safety Officer daily activities, an inventory of hazardous materials will be prepared with the quantities expected to be on site. The inventory will be updated if any

additional materials are brought on site, and as frequently as necessary to reflect accurate quantities.

Unless each container has appropriate labeling, all chemical containers will be labeled with the following information:

- Product name and identity of the hazardous chemical(s)
- Appropriate hazard warnings
- Name and address of the chemical manufacturer, importer, or other responsible party

Labels on incoming containers of hazardous materials will not be removed or defaced. Labels are also required when a hazardous substance is transferred from a primary container to a secondary container. Labels on secondary containers must indicate the product name or the names of the hazardous substances contained therein, as well as related physical and health hazards and their associated target organs. Labels may incorporate words, pictures, symbols, or combinations thereof to ensure the appropriate information is provided to the end user.

Acceptable labeling systems must include Global Harmonize Standards information including pictograms and other elements. Additional information includes the National Fire Protection Association Diamond, the Hazardous Materials Identification System, the Chemical Hazard Identification and Training system, or similar can also be present.

Employee requirements for reviewing SDS for specific safety and health protection procedures are presented.

AHAs incorporate information contained in the SDSs, which are provided in **Attachment B**.

SDS information will be followed in the use and disposal of material and selection of hazard control and emergency response measures.

The Health and Safety Officer will obtain an SDS for each chemical before it is used. SDSs will generally be received by the person ordering the product. SDSs for products frequently used should be kept on file because additional copies may not be included in repeat shipments.

The Health and Safety Officer will review each SDS when it is received to evaluate whether the information is complete and to determine whether existing protective measures are adequate.

The Health and Safety Officer will maintain a collection of all applicable and relevant material SDSs in an area that is accessible by all employees at all times. An electronic database is an acceptable method of maintaining the SDSs.

The Health and Safety Officer will replace SDSs when updated sheets are received and will communicate any significant changes to those who work with the chemical.

SDSs are required for all hazardous materials brought on site by project personnel.

General household products to be used for their specific purpose, as well as food, drugs, and cosmetics brought into the workplace for employee consumption, are exempt, as are supplies in the first-aid kit, such as isopropyl alcohol and antibacterial wipes.

Employees bringing hazardous materials on to a site or project must submit SDSs to the Health and Safety Officer. The Health and Safety Officer may restrict the use of certain hazardous

materials on a site or project due to occupational health risk, hazardous physical properties of the material, or potential employee sensitivity to odor or irritating properties of the material.

Other personnel working in the same area shall be provided with the following information on chemicals used by or provided to AECOM personnel:

1. Names of hazardous chemicals to which they may be exposed while on the jobsite.
2. Precautions the employees may take to lessen the possibility of exposure by usage of appropriate protective measures, such as ventilation or isolation of the work. In some cases, as an administrative control measure, a task may be delayed to a time when a minimal number of employees are present in the area.
3. Location of SDSs.

Employees will be trained initially and periodically when use of hazardous or toxic agents is altered or modified to accommodate changing on-site work procedures.

Training shall cover the following topics:

4. Requirements and use of the hazard communication program on the project
5. The location of all hazardous or toxic agents at the project site
6. Identification and recognition of hazardous or toxic agents on the project site
7. Physical and health hazards of the hazardous or toxic agents pertinent to project activities
8. Protective measures employees can implement when working with project-specific hazardous or toxic agents

Periodically, employees are required to perform hazardous non-routine tasks. Prior to starting work on such projects, each employee must be provided with information about hazards to which they may be exposed, as follows:

9. Specific chemical hazards associated with munitions (metals MC in soil)
10. Protective/safety measures that must be taken
11. Measures that have been taken to lessen the hazards, including ventilation, respirators, presence of another employee, and emergency procedures as applicable

Provide training to all employees who have the potential to be exposed to hazardous materials: a) at the time of the initial task assignment; b) whenever new chemicals are introduced into the workplace, and c) more frequently where required by site-specific conditions or client-specific requirements.

This training will include the following:

12. Applicable regulatory requirements
13. Location of the program, inventory, and SDS
14. Site-specific chemicals used and their hazards (chemical, physical, and health), including:

a. General characteristics of chemicals

b. Signs and symptoms of exposure

15. How to detect the presence or release of chemicals including the location, types, and usage of any portable and fixed monitoring or detection equipment and their associated alarms, where applicable
16. Safe work practices and methods employees can take to protect themselves from chemical hazards, including the use of respiratory protection
17. How to read a SDS
18. Site- or project-specific information on hazard warnings and labels in use at the location, if applicable
19. Site-specific evacuation and rescue procedures in the event of chemical release, including the location of staging areas and personnel accounting procedures

The following documentation will be maintained in the project file:

20. Chemical Inventory
21. SDSs
22. Training records

3.4 HAZARD ASSESSMENT

The potential hazards associated with work on the site include chemical, physical and biological hazards. AECOM policies require hazard identification, risk evaluation, control measures, and written procedures to manage health, safety, and environment risks on the job. Hazard and risk assessments were conducted by the HSM to ensure that all operations, materials, and equipment were evaluated and that the hazards and risks associated with the work will be communicated to personnel.

Written procedures addressing each identified hazard and AHAs for each critical task were prepared (**Section 3.8**). These procedures and AHAs are included in this section as certification of the hazard/risk assessment process.

Risk Assessment Codes (RACs) were assigned using Department of the Army methods, taking into account the mitigation of risk by instituting the controls and procedures described herein. The Health and Safety Officer will manage the AHAs on site and with the help of field personnel, improve upon or add to existing analyses as new potential hazards are noticed. The AHAs will be reviewed daily to confirm the tasks covered; however, each time a new phase is begun, the corresponding analyses will be read to review the potential safety concerns with each team member prior to each phase of work. The Health and Safety Officer will conduct the required safety and health inspections.

3.5 CHEMICAL HAZARDS

Based on prior studies, contaminants of concern on the site have been determined to include the metals (lead, copper, antimony, and zinc). The main routes of exposure for field personnel

include inhalation, ingestion, skin or eye contact, and dermal absorption of contaminants in soil. In order to protect site personnel from the hazards associated with site contaminants of concern, a personal protection program will be implemented to control potential chemical exposures.

3.6 PHYSICAL HAZARDS

There is a risk of injury from physical hazards at the site. Personnel should be aware of the fact that when protective equipment is worn, visibility, hearing, and manual dexterity are impaired. Slips, trips, and falls are the most common cause of on-site injuries.

3.6.1 Slip/Trip/Fall Hazards

As with any field project, uneven work surfaces and other slipping or tripping hazards may be present. Tripping is the most likely physical hazard that will be encountered. The terrain at the Williston LTA MRS is mostly clear with some tall grasses, shrubs, and small trees. Personnel must use caution when walking on unstable or uneven terrain. Proper site housekeeping, removal of trash, and orderly stacking and removal of materials will reduce slipping and tripping hazards. Proper site housekeeping will be the responsibility of all site personnel. The Health and Safety Officer will conduct regular inspections assessing slip, trip and fall hazards.

3.6.2 Hand Tools and Portable Equipment

Field personnel will use hand tools and portable equipment during field activities. To prevent possible injury to the body, some general guidelines should be applied:

23. Keep tools in good repair and used only for the task for which they were designed.
24. Remove damaged or defective tools from service.
25. Keep surfaces and handles clean and free of excess oil to prevent slipping.
26. Do not carry sharp tools in pockets.
27. Clean tools and return to the toolbox or storage area upon completion of a job.
28. Do not throw tools from place to place, from person to person, or drop from heights.
29. Use non-sparking tools in atmospheres with flammable or explosive characteristics.
30. Inspect all tools prior to start-up or use to identify any defects.

3.6.3 Portable X-ray Fluorescence Analyzer

The U.S. Department of Agriculture's (USDA) Office of Homeland Security & Emergency Coordination Radiation Safety Division has guidelines for the use and possession of portable X-ray fluorescence analyzers. In addition to following the all recommendations for use outlined in the manufacturer's user manual, field personnel will conform to the following as specified by the USDA (USDA, 2017):

- All servicing or cleaning of an XRF analyzer involving exposure of the radioactive sources must be performed by the manufacturer or by an authorized representative of the

manufacturer. Note: XRF analyzer models used during this project will be tube based and not contain a radiation source.

- Before removing the XRF analyzer from its place of storage, make sure it is locked in the transport case.
- When transporting the XRF analyzer in a vehicle, block and brace it to prevent shifting or movement, and lock the XRF in the vehicle when it is unoccupied.
- When the indicator light is flashing, and the shutter is open, the primary x-ray beam is on and radiation is being emitted from the front of the XRF analyzer.
- When the radiation shutter is open:
    - do not place hands, feet, or other body parts in the radiation field;
    - do not look into the beam path;
    - do not point the XRF at anyone;
    - do not hold the XRF from the front.
- After completing each measurement, immediately close the radiation shutter.
- Always maintain the XRF analyzer under constant view and immediate control when it is not in storage. At job sites, do not walk away from the XRF when it is left on the ground.
- When the XRF analyzer is not in use at a temporary job site, it must be securely locked in the operator's vehicle (or other appropriate locked storage location).
- Return the XRF analyzer to its proper locked storage location at the end of the work shift.

The model of XRF used will be tube based and will not contain a radiation source. Field personnel will wear radiation dosimeters during XRF use to monitor exposure. Dosimeter data will be downloaded and reviewed at the end of each field day. Field personnel will review AECOM Radiation safety policy S3AM-120-PR1 (Attachment D) and take the online safety training provided by ThermoScientific on “Radiation Safety for X-ray Tube Based Instruments” prior to working with XRF analyzers.

3.6.4 Hand Safety

Personnel are to perform work that could expose them to hand injury. All personnel are to wear protective gloves specific to their task at hand. If cold conditions exist, glove liners should be worn underneath all protective gloves. Physical protection gloves (i.e., leather) should be worn as necessary. Hands are to be kept clean to prevent slipping and contamination. Hand tools should be kept in good repair and sharp tools should be handled with extra care. All tools should be properly stored. The use of fixed open blades is prohibited.

Nitrile gloves will be worn when contact with contaminated soil or water is anticipated. If both chemical and physical protection are required, nitrile will be worn under the leather or work gloves.

3.6.5 Manual Lifting

Back injuries are among the leading occupational injuries reported by industrial workers. Back injuries such as pulls and disc impairments can be reduced by using proper manual lifting techniques. Leg muscles are stronger than back muscles, so workers should lift with their legs and not with their backs. If the load is too heavy, workers should not attempt to lift it alone. Lifting is always easier when performed with another person, and manual or mechanical assistance should always be used when it is available.

The following guidelines will be followed whenever lifting objects that are of odd size or shape, or that weigh over 50 pounds.

31. Get help when lifting heavy loads. Heavy loads will only be lifted using a two-person lift.
32. When moving heavy objects such as containers, use a dolly or other means of assistance.
33. Plan the lift. If lifting a heavy object, plan the route and where to place the object. In addition, plan communication signals to be used (i.e., "1, 2, 3, lift," etc.).
34. Wear sturdy shoes that are in good condition and supply traction when performing lifts.
35. Keep your back straight and head aligned during the lift and use your legs to lift the load; do not twist or bend from the waist. Keep the load in front of you; do not lift or carry objects from the side. Keeping the heavy part of the load close to your body will help maintain your balance.

3.6.6 Noise

The use of heavy equipment is not anticipated, and no investigation activities are anticipated to produce noise at or above the action level of 85 decibels on the A-weighted scale. However, should conditions warrant, all AECOM personnel within 25 feet of operating equipment, or near an operation that creates noise levels high enough to impair conversation, shall wear hearing protective devices (either muffs or plugs). AECOM personnel who are in the Medical Surveillance program are automatically enrolled in the AECOM Hearing Conservation Program and have had baseline and, where appropriate, annual audiograms. Personnel will wash their hands with soap and water prior to inserting earplugs to avoid initiating ear infections.

3.6.7 Temperature Extremes

Local weather conditions and the required use of PPE may produce an environment that requires restricted work schedules to protect employees from heat or cold stress. The Health and Safety Officer will observe workers for any potential symptoms. Please see **Section 8** for more information on heat and cold stress.

3.6.8 Other Weather-Related Hazards

Other weather-related hazards include heavy rains, damaging winds, thunderstorms, tornados, floods, wildfires, and lightning, etc. These hazards correlate with the season in which site activities occur. Weather forecasts will be checked prior to site work each day on the National

Oceanic and Atmospheric Administration website and will be monitored throughout the day by cell phone or radio. If threatening weather conditions are predicted, the Health and Safety Officer will determine if work can continue without endangering the health and safety of site personnel by using the following guidelines:

36. Potential for lightning strikes
37. Potential for heat or cold stress
38. Limited visibility
39. Inclement weather-related working conditions
40. Roads becoming impassable

Outside work will be suspended during severe weather, including electrical storms. The Health and Safety Officer will monitor storms and activate a lightning safety plan at the count of 30 seconds from the flash to the bang (6 miles away) and activities will not resume for 30 minutes from the last observed strike. This is called the 30:30 Rule. Personnel will seek shelter in the vehicles or a nearby building, as designated during the morning safety briefing.

3.6.9 Flammable and Combustible Materials

All work areas shall be kept free of unnecessary debris. No flammable and combustible liquids will be brought on site. During all on-site activities, the following practices will be used for fire prevention and protection:

41. Smoking on site is prohibited in designated work areas and other areas where smoking may create a fire hazard (e.g., dry vegetation)
42. A designated smoking area will be established when operations on site begin
43. Fire extinguishers will be available at all work and support areas
44. A fire extinguisher will be available in all project vehicles (10-B:C)
45. Fire extinguishers will be inspected monthly
46. Defective firefighting equipment will be replaced immediately
47. Fires or open flame devices are prohibited on site

All employees will be trained in the use of fire extinguishers and the hazards involved in incipient stage firefighting before being allowed to work on the project site as per 29 Code of Federal Regulations (CFR) 1910.157(g)(1)

Only fires in the incipient stage will be addressed using portable fire extinguishers. Regardless of the size and nature of the fire, and the Team's ability to respond, all fires will be reported immediately to the local fire department

For this project, fire extinguishers will be placed in each motor vehicle (10B:C) one ABC rated extinguisher will be available (2A:20B:C). Only UL-listed extinguishers will be used.

The potential for fire will be low; if a fire should occur, it would be expected to fall into Class A, B, or C. These classifications are defined as follows:

- **Class A** – Fires in ordinary combustible materials such as wood, cloth, paper, trash, rubber, and plastic.
- **Class B** – Fires in flammable liquid, oil, grease, tar, oil-based paint, lacquer, and flammable gas.
- **Class C** – Fires involving energized electrical equipment or systems, resulting in the extinguishing media conducting electricity. When electrical equipment or systems are de-energized, extinguishers for Class A or B fires can be used safely.

Extinguishers are rated according to the classification and size of the fires against which they are effective. Extinguisher ratings are found on the extinguisher label. A rating consists of a letter indicating the classification of fire on which the extinguisher is effective and a rating number indicating the relative extinguishing effectiveness. The significance of the rating number varies with the classification of fire for which the extinguisher is rated. The following rating criteria are used:

For extinguishers rated for Class A fires, the rating number indicates relative effectiveness, the higher the number, the more effective the extinguisher. The minimum recommended rating for extinguishers rated for Class A fires is 2A.

For extinguishers rated for Class B fires, the rating number represents the average size (in square feet) of the fire the extinguisher could put out.

No number is used for extinguishers rated for Class C fires, because Class C fires are essentially either Class A or B fires involving energized electrical wiring and equipment.

3.6.10 Illumination

It is expected that site activities will be conducted only during daylight hours.

3.6.11 Vehicle Safety

Personnel must use caution when operating personal or company vehicles. The following field/site vehicle safety items should be followed:

48. All staff members operating a motor vehicle must possess a current, valid driver's license. AECOM authorized drivers have completed the AECOM vehicle safety either online or through one of the approved training resources.
49. All local speed limits and traffic regulations will be followed. Headlights will be used from sunset to sunrise, during fog, or other unfavorable conditions. The driver will exercise extreme caution at uncontrolled intersections.
50. For vehicle operators, cell phone use (even with a hands-free device) is prohibited when driving. The use of any other portable headphones, earphones, or other listening devices is also prohibited. Operators will not eat, drink, or smoke, while the vehicle is in motion. Driving includes the time spent in traffic or while stopped at red lights or stop signs. If a Global Positioning System (GPS) is used, it must be mounted such that it does not interfere with the driver's range of vision. The GPS will not be programmed while driving. GPS units and GPS units on smart phones may only be used if factory installed

or secured to the vehicle with a bracket that allows the driver to view the image without having to take their eyes off the road.

51. Rental vehicles are maintained by the rental company and inspected prior to release. Drivers are responsible for inspecting the vehicle prior to use. Basic safety checks include tire condition/pressure; lights; turn signals; a clean windshield and adequate window washer fluid; gauges/warning lights indicating normal condition; mirrors properly adjusted; and brakes with adequate pedal pressure for proper breaking. Form SAM-005-PR will be used to document the inspection on a weekly basis.
52. Specific vehicle travel routes and parking areas will be identified at field sites. Traffic cones, or other markings, will be used as needed, to define roads and parking. If parking on the shoulder of an active road, employees will park as far off the road as possible. If work is required alongside an active road, park the vehicle behind the area of work to provide a barrier against out of-control vehicles.
53. The operator and all passengers shall use seat belts at all times when a motor vehicle is in motion. No employee may ride in the bed of a pickup truck unless seating and restraints are provided for this specific use. Articles, tools, equipment, etc. placed in vehicles will be stored so as not to interfere with vision or the proper operation of the vehicle in any way. All items in the vehicle must be secured to prevent them from flying about or out of the vehicle during sudden stops, turning, etc.
54. Trucks or vehicles with obstructed rearview mirrors must observe the following procedures when backing up: Position an employee to act as a spotter at the rear of the vehicles, in the driver's line of sight, to ensure that the area behind the truck is clear. If no other employee is present, then the driver must step out of the vehicle and check the area behind the vehicle before backing up. As an added precaution, avoid backing up whenever possible.

3.7 BIOLOGICAL HAZARDS

Potential biological hazards at Williston LTA include bloodborne pathogens, hantavirus, reptiles, invertebrates, mammals, and plants. Employee awareness and knowledge of the potential biological hazards will help reduce the risks associated with these hazards. Biological agents that may cause health hazards are diverse; consequently, their health effects are also diverse.

3.7.1 Bloodborne Pathogens

During site activities, workers can potentially be exposed to bloodborne pathogens when rendering first aid or Cardiopulmonary Resuscitation (CPR). Avoiding contact with biological agents is the best way to prevent adverse health effects caused by them. Recognition of potential hazards is essential. As a general rule, employees will not come into contact with any item that may appear to result from medical waste disposal. When avoidance is impractical or impossible, such as when administering first aid, PPE and personal hygiene will be used to prevent adverse effects. Employees designated to perform tasks involving occupational exposure including designated first-aid providers, shall receive bloodborne pathogens training at the time of initial assignment to the job.

Employees are at risk of contracting infectious diseases each time they are exposed to bloodborne pathogens. Any exposure incident may result in infection and subsequent illness. Since it is possible to become infected from a single exposure incident, it is the practice of AECOM to prevent exposure incidents whenever possible.

To ensure employees are effectively informed concerning potential workplace health hazards, and in accordance with the requirements set forth in 29 CFR 1910.1030 and EM 385-1-1 Section 3, AECOM has established an exposure control plan for bloodborne pathogens. The purpose of this plan is to identify those tasks and procedures for which occupational exposure to bloodborne pathogens may occur, to identify the positions whose duties include those tasks, and to implement controls that will significantly reduce the risk of infection by bloodborne pathogens. The plan also includes provisions for affected employees to receive Hepatitis B vaccinations, training, and, if necessary, confidential medical evaluations and follow up.

The site-specific exposure control plan includes:

- Work practice controls: Provide adequate supplies for providing first aid and CPR, and treat all contact with human blood and bodily fluids as potentially infectious. Hand washing facilities/supplies shall be readily accessible for all employees.
- PPE: Provide PPE at no cost to the employee. Typical equipment includes, but is not limited to, gloves, face masks, eye protection, and CPR shield. PPE will be considered appropriate if it does not permit blood or other potentially infectious materials to reach or pass through clothes, skin, or mucous membranes of the eyes or mouth under normal conditions of use and for the duration of time the equipment will be used. PPE must be readily accessible and will be removed prior to leaving the work area.
- Housekeeping: Use universal precautions when cleaning or decontaminating any surface or equipment that may be contaminated. Appropriate PPE will be used for protection during decontamination.
- Post-Exposure Activities:
    - Report all occupational bloodborne pathogen exposures to the Incident Hotline (800-348-5046) immediately after initial decontamination and first aid is accomplished. Following the report of an exposure incident, a confidential medical evaluation with an occupational physician will be arranged as soon as possible, ideally no later than 1-2 hours after the incident has occurred.
    - Report incident to Health and Safety Officer, Project Manager (PM), and HSM.
    - Make initial notification in IndustrySafe (https://www.industrysafe.com/AECOM/) within 24 hours.
    - AECOM PM will verbally notify the COR of an incident as soon as reasonably possible, but not more than 24 hours after the incident.

The Hepatitis B Vaccination series will be made immediately available to employees who have had an occupational bloodborne exposure incident, whether as a result of their assigned tasks, or occurring as a result of incidental contact. An employee who declines the vaccination must sign a waiver form.

3.7.2 Hantavirus

Wild rodents (rats and mice) can be infected with hantavirus and pass it in their droppings, urine, or saliva. Avoid touching urine and droppings, or places where these animals have nested. Also, avoid disturbing dried droppings or urine, which can be stirred up in dust and inhaled.

Acute illness may be characterized by the abrupt onset of fever, myalgias, headache, and cough, followed by the rapid development of respiratory failure. Anyone with a potential exposure who develops a rapidly progressing, severe viral illness or unexplained adult respiratory distress syndrome should be evaluated for possible hantavirus infection.

3.7.3 Invertebrates

A large variety of invertebrates may be encountered at Williston LTA including ticks, bees, hornets, wasps, mosquitoes, and spiders.

3.7.3.1 Ticks

Ticks typically have a three stage life cycle, larvae, nymphs, and adults. Ticks are most active in spring and early summer and are most common in open forests. At each stage of life the tick climbs to the top of grasses or shrubs (behavior known as questing). The tick extends its front legs, grabs hold of a passing animal and immediately starts looking for a place to attach, usually traveling upward. The ticks then attach with barb-like mouth parts and begin sucking blood. After one to two days of feeding the ticks drop off, molt and move to the next life stage.

The biological hazard associated with a tick bite is the possibility of contracting Lyme disease. Lyme disease is caused by bacteria called *Borrelia burgdorferi*. This bacterium inhabits the digestive tracts of Black-Legged Ticks, commonly known as a "deer tick." When ticks bite humans, the bacteria can be transmitted to the people. It typically takes 24 hours or more before the Lyme disease bacteria will enter the host, therefore prompt tick identification and removal is important to the prevention of contacting Lyme disease from a tick.

Typical short-term symptoms of Lyme disease include headache, fever, fatigue, and muscle pain that can be characteristic of the flu. A key diagnosis point is a distinctive "bulls-eye" rash, where the redness assumes a ring-shaped pattern that appears a day to a month after the tick bite. If personnel observe the rash, the Health and Safety Officer will take the site worker to get medical observation and treatment. At this initial stage Lyme disease is easily treated with a several week regimen of antibiotics. If left untreated, Lyme disease can spread to the heart, nervous system, and joints. Long term Lyme disease sufferers can have a huge list of varied symptoms including meningitis, brain inflammation, muscle twitching, chronic joint pain, arthritis, and even memory loss. Long term Lyme disease can be misdiagnosed as multiple sclerosis or even Type II diabetes.

Personnel should use the following prevention tactics when working outside:

55. Dress in light-colored clothing to make adhering ticks more visible. Wear long-sleeved shirts and tuck pants into or tape around socks.

56. Use a tick repellant containing DEET (diethyl-m-toluamide). Spray repellant containing 100% DEET onto clothing around wrists and ankles and on a head/neck covering; and repellant containing 30% DEET onto exposed skin.
57. Perform self-searches routinely when in the field to check for ticks.
58. Check body areas where ticks are commonly found: behind the knees, between the fingers and toes, under the arms, in and behind the ears, and on the neck, hairline, and top of the head. Check places where clothing presses on skin.
59. After work, place clothing in hot dryer to kill any loose ticks.
60. Shower and perform a careful whole body search for ticks.
61. If any ticks are found attached, remove using fine tweezers or a "tick tool".
62. Report tick bites and attached ticks to the Incident Hotline (800-348-5046).
63. If a tick is observed on the skin with the head burrowed, remove the tick by firmly grasping the tick's mouthparts at the skin with tweezers, and pulling straight out. Try to avoid squishing the body as this forces more digestive juices into the host, increasing the chance of infection. Ticks may be difficult and painful to remove. The Health and Safety Officer or another First Aid trained coworker may need to assist in this removal.
64. Wash the bite site with soap and treat the bite with an antiseptic. If any symptoms of Lyme disease are present, inform the Health and Safety Officer and seek medical care.

3.7.3.2 Bees, Hornets, and Wasps

Stings from bees, hornets, and wasps cause more deaths than bites and stings from all other insects and spiders. Death is usually a result of an allergic reaction. Other stinging insects include mud daubers. Though the sting from these insects can be extremely painful they are rarely serious.

Honeybees are the only stinging insects that leave a stinger in the wound. Other bees can sting repeatedly. If stung by a bee, check the wound to see if the stinger is still there. The stinger will be clearly visible. If the stinger is still there, scrape or flick it out with something stiff like a credit card. Do not try to pull the stinger out as squeezing injects more venom into the wound. Usual symptoms include a burning pain and swelling.

Unusual symptoms can signal the onset of an allergic reaction. There are two types of allergic reactions. In the first type, the bite or sting site becomes excessively swollen and the patient may experience nausea, vomiting, dizziness, and headache.

The second type of allergic reaction can be life-threatening. A severe reaction can cause body-wide skin itching, hives, or puffiness of the eyes, nose, lips, tongue, and throat. Abdominal pain and vomiting may develop. Breathing difficulties are common. The patient may collapse and go into shock. This kind of reaction presents a true medical emergency.

Allergic reactions usually do not develop after the first sting. After a second or third sting, a reaction can develop. It is difficult to predict whether a person will have a life-threatening allergic reaction. If you or family members are very allergic or have asthma, you are more likely to be allergic to stings and should be careful around stinging insects.

If breathing difficulties, difficulty swallowing, and/or body-wide itching develop, the patient is having a severe allergic reaction and should receive medical attention. If the reaction is not severe, wash the bite or sting area well with soap and water to help prevent infection. If stung or bitten on fingers or hand, remove any rings or jewelry in case of swelling. Your local pharmacist can help you select the best over-the-counter medications to help treat insect and spider bites.

To prevent bee and wasp stings, the following precautions will be taken during field activities:

65. Be aware of the presence of bees and wasps while you are working especially in the vicinity of flowers. Bees tend to sting if they feel threatened or are disturbed.
66. Avoid wearing floral patterns or using floral scents, which will attract bees.
67. Do not leave food, drinks, or garbage out and uncovered.
68. Personnel that are sensitive to bees must make the Health and Safety Officer aware of this and should carry a bee sting kit with them. Wear a Medic-Alert bracelet if extremely allergic to bee or wasp stings.
69. If you are allergic, ask your physician about prescribing an emergency epinephrine kit have on hand.
70. If bees or wasps get trapped inside your vehicle while you are driving, pull over to the shoulder and let the creature escape before you continue driving.
71. Only strike a wasp or bee if you are sure to kill it. If you strike or kill a wasp or bee you will set off its defense pheromone, which will bring unhappy relatives calling.
72. In the event of a mass sting attack, try to stay calm, cover your head if possible, and run steadily to safety. Get into anything that is sealed in such a way as not to allow insect entry, such as a vehicle.
73. All bee stings include an alarm pheromone, which incites their mates to attack, so step one is to get away from a nest/hive quickly. Scrape out stingers as soon as possible. A honeybee sting has a pump attached that continues to introduce venom for 1 minute after stinging. A wasp does not leave its stinger.
74. Apply an ice pack to minimize pain and swelling. Lift limb to heart level to reduce swelling. If the victim has been stung multiple times, is young or old, or is one of the 1% that is super sensitive to stings, watch for signs of systemic allergies. These may include:
    - Headaches;
    - Fever;
    - Nausea;
    - Vomiting;
    - Swelling of the tongue or throat;
    - Difficulty in breathing;
    - Cramps;
    - Drowsiness; or,
    - Unconsciousness.

Personnel with known sensitivity to stings should have an epinephrine kit and have it administered, followed by an ice pack and a visit to a hospital. Employees on the site who know they are allergic to bee stings should make the Health and Safety Officer and co-workers aware of that fact, and should have their epinephrine kit with them at all times. Co-workers should know where the kit is located and how to administer it in an emergency. Bee stings can be sensitizers and allergies can develop over time. Because a person has been stung in the past and has had no reaction, does not necessarily mean that the next sting will not bring on an allergic reaction. All employees will be made aware of the symptoms of anaphylactic shock, so that they can recognize it in themselves and co-workers and act accordingly.

3.7.3.3 Mosquitoes

Mosquitoes are responsible for more human deaths than any other living creature. World-wide, nearly four million people die each year from various mosquito-borne diseases.

The mosquito life cycle consists of eggs, larvae or "wrigglers," pupae or "tumblers," and adults. All life stages except adults are aquatic and can occur in a variety of wet or moist places, such as ponds, sloughs, standing pools of water, salt water marshes, artificial containers, hollow trees, low depressions of land, and moist areas of fields, bogs, and forests. Only the female mosquito bites to obtain a blood meal. The male mosquito feeds only on plant juices. The female mosquito may live as long as three weeks during the summer or many months over the winter in order to lay her eggs the following spring.

The majority of mosquitoes spend the winter as eggs within the specific habitat where they will eventually develop into larval, pupal, and adult stages. This means that female adults deposit eggs during late summer in the habitats mentioned above. These eggs then lie dormant throughout the winter until water temperatures are warm enough for hatching to occur the following spring. Mosquito eggs can sometimes lie dormant for several years, particularly when the eggs are deposited in depressions that are not flooded with water each year.

To prevent mosquito bites wear long sleeves, long pants and a hat; go where mosquitoes are not; or use bug dope (or another form of repellant) with 30% DEET. Apply repellent whenever you are outdoors, even for a short period of time. Choose repellents based on how long you plan to be outside and what you will be doing. When you are sweating, physically active, or getting wet, repellents do not last long.

For people sensitive to mosquito bites or are allergic to DEET it is recommended that they wear a head net or special anti-mosquito gear. The Health and Safety Officer should be notified of anyone with a severe allergy to mosquitoes in case of an emergency.

3.7.3.4 Other Invertebrates: Spiders and Scorpions

North Dakota has rare occurrences of two venomous spiders, the black widow and the brown recluse.

The brown recluse is a shy, retiring spider that does not attack people and usually only bites in response to being injured. Most reported bites occur when putting on clothing in which the spider is hiding or rolling on a spider in bed. The brown recluse is a medium-sized spider. The legs span an area roughly the size of a quarter to a half dollar, and most are light to medium brown. The

most distinguishing characteristic is the violin shaped marking on the top of the body directly above the legs and a semicircular arrangement of the three pairs of eyes. Brown recluse spiders prefer sheltered areas with low moisture levels. Since most brown recluse spiders hibernate in the winter (except for those that live indoors), most bites occur between March and October when humans accidentally disturb their habitat: closets, out-buildings or woodpiles.

Brown recluse
Photo credit: Oklahoma Cooperative Extension Service

Black widow
Photo credit: Oklahoma Cooperative Extension Service

Black widow spiders are very numerous in nearly all parts of the U.S., but cases of reported bites are not common. For the most part, black widows live peacefully in close proximity to humans with little contact. The black widow appears shiny and hairless to the naked eye. The body ranges from a deep glossy black to an occasional dark brown to a reddish brown. The underside of the abdomen has a distinct red or orange hourglass shape. In immature spiders, the color can vary and the hourglass may be white or missing. The black widow bite is sharp and painful, and victims should seek immediate medical attention. The first sign of a bite is acute pain at the site of the bite, with more symptoms following 20 minutes to one hour later.

If bitten by a brown recluse or black widow:

75. Use soap and water to clean the wound and skin around the spider bite.
76. Apply a cloth dampened with cold water or filled with ice.
77. Seek immediate medical attention.

3.7.4 Venomous Snakes

According to the North Dakota Department of Game and Fish, North Dakota is home to a single species of venomous snake, the Prairie Rattle Snake (*Crotalus Viridis*)[1]. Generally these snakes are not aggressive unless disturbed.

The Prairie Rattlesnake ranges from 35 to 50 inches in length. Their color varies from greenish-gray, brown or red, to all brown. They have dark, oval blotches surrounded by white markings. It is found inhabiting grasslands and sagebrush areas, as well as high rocky ledges of buttes. It is somewhat mild in disposition and will often rattle and feint before striking. The venom is a powerful protein digesting enzyme, which digests the walls of blood vessels in its victims, causing bleeding into the tissue.

Prairie Rattlesnake
Photo credit: National Park Service

[1]North Dakota Game and Fish Department. https://gf.nd.gov/gnf/conservation/docs/amphibian-reptile-brochure.pdf, accessed October 2017.

The possibility of venomous snakes will be communicated to site personnel during the initial site-specific safety training. Site personnel will be warned to avoid snakes and their preferred habitats, particularly rocks, timber piles, and animal burrows. Site personnel will be required to wear sturdy steel-toed work boots. If there is a snake bite, it is advised that a snake bite victim be immediately transported to the nearest hospital (CHI St. Alexius Hospital, Williston; **Section 10.7**) rather than await transport by ambulance due to the remoteness of the site. First aid will be administered while awaiting transport of the victim to the hospital for emergency treatment.

First aid for snake bites:

78. Immobilize the bitten arm or leg and have the victim stay as quiet as possible to keep the poison from spreading through the body
79. Remove jewelry before swelling starts
80. Position the person so that the bite is at or below the level of the heart
81. Cleanse the wound and cover with a clean, dry dressing
82. Apply a splint to reduce movement of the affected area, but do not restrict blood flow
83. Do not use a tourniquet or apply ice
84. Do not cut the wound or attempt to remove the venom
85. Do not let the victim drink caffeine or alcohol
86. Do not try to capture the snake, but try to remember its color and shape

3.7.5 Mammals

Mammals such as chipmunks, ground squirrels, rats, raccoons and beaver have been known to harbor fleas carrying bubonic plague. Their bites can also transmit rabies and infections. Larger mammals inhabiting the state include the coyotes, gray wolf, and mountain lions. Although highly unlikely, if a mountain lion is encountered, do not run from a lion as this may stimulate the lion's instinct to chase. Instead, stand and face the lion and make eye contact. Do not crouch or bend over, try to make yourself seem as large as possible by raising your arms or opening up your jacket. The idea is to convince the lion that you are not prey and that you are a danger to it. If attacked, fight back. Use rocks, sticks, tools and your bare hands. Seek shelter in a vehicle when possible.

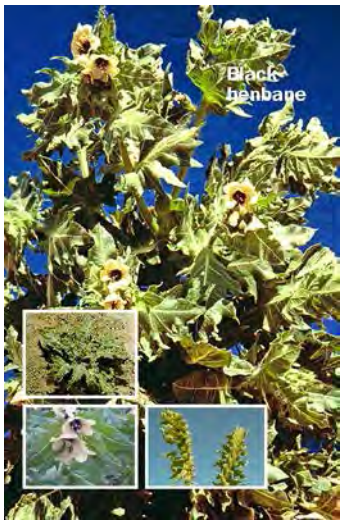
Some animals pose a special problem because people tend to try to feed them or pet them; the increased contact brings a greater possibility of danger. Avoid wildlife when possible. Identify an evacuation route and shelter when working in areas where wildlife may be encountered.

3.7.6 Plants

Hazardous plants at Williston LTA may include black henbane, common tansy, and poison ivy[2]. The oil resin on the leaves and stems of poison ivy contains urushiol, which may cause a serious allergic reaction to the skin if touched. The oil can be transferred from contaminated clothing

[2] U.S. Department of Agriculture Plants Database, http://plants.usda.gov/java/stateSearch, Accessed October 2017.

(typically pant legs and boots) and still cause the allergic reaction. A painful rash is created by the body's immune system. The rash shows up 12 to 48 hours after exposure and will last approximately two weeks.



Black Henbane

Common Tansy

Poison Ivy

Photo credits: U.S. Department of Agriculture

Poison ivy is identifiable by the three 3-inch deep green, ovate, sometimes coarse-toothed, shiny leaflets and has a distinguishing sticky resin on top of the leaves. The leaves are vibrant red in the early spring and late fall. The poison ivy plant grows as a lanky three to five foot high shrub or as a vine and may have tiny yellowish-white flower clusters that bloom from May to June. The plant exudes a resinous, rash-causing sap. It typically grows in rocky or shallow soil areas and often in partial shade low to the ground.

Common Tansy is identified by fern-like leaves, yellow flowers and a bitter odor emitted when the leaves are crushed. It grows anywhere from 1.5 ft. to 6 ft. tall, has purple splotched stems and smooth fern-like leaves. The plant contains alkaloids that can be toxic to humans. Illness in humans usually occurs after hand-pulling.

Black henbane grows up to 5 ft. tall and has coarse sticky leaves and branches. The leaves are large (6 x 8 inches), lobed and grayish green. Flowers are funnel-shaped and brownish yellow with dark purple veins. The plant has an unpleasant odor and contains alkaloids that can poison animals. All parts of the plant are toxic to humans. Simply smelling the flowers can cause headaches and nausea.

Avoid any contact with the plant to prevent exposure. First aid/response to poison plant exposure:

87. Call 911 if the person has trouble swallowing or breathing; or swelling, especially near the eyes or on the face
88. Immediately wash skin thoroughly with soap and water or a product such as Technu, taking care not to touch the face or other parts of the body prior to washing

89. Wash tools and contaminated clothing in strong soap and water because the plant oils can remain active for months
90. Apply cool compresses for 15 to 30 minutes at a time
91. Oatmeal baths or the application of calamine lotion will ease itching discomfort
92. Oral antihistamine may also help, but avoid topical antihistamines, which may make skin more sensitive
93. Seek medical attention for severe cases, if the rash covers a large part of the body, or if the person has blisters or cannot sleep. Steroids may be prescribed by a physician to help stop the spread of the rash in severe cases

3.8 ACTIVITY HAZARD ANALYSES

The Activity Hazard Analyses (AHAs) below list potential hazards associated with each phase of project field work, and associated actions to eliminate or minimize the hazards.

MOBILIZATION/DEMOBILIZATION
ACTIVITY HAZARD ANALYSIS

Date Prepared: 31 October 2017

Project: Williston LTA

Job: Mobilization/Demobilization

Risk Assessment Code (RAC): **M**

Prepared By: Jennifer Li Reviewed By: Alberto Munuera

Minimum Protective Clothing and Equipment:
PPE Level D: General work clothes, reflective vest, safety glasses, steal or composite-toe work boots, work gloves

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

SEVERITY	PROBABILITY				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Mobilization/demobilization of manpower, equipment and establishment of work zones.	Biological Hazards: Stinging and biting insects, spiders, and snakes Wild animals Poisonous plants	• Use repellents and proper clothing for protection against insects including ticks and mosquitoes • Check the area for poisonous plants and use Ivy Block • Wear long-sleeved shirts and gloves • Avoid animals, do not leave food outside • Work in pairs and stay observant of surroundings • Avoid rodent droppings as they may contain the Hantavirus • Avoid holes and rocks that are potential animal habitats • If contact with insects, animal droppings, or poisonous plants then wash area immediately • Wear protective clothing, including long pants and leather chaps as needed in areas/conditions where snakes may be active.	03.A.05 05.A.06 06.E.01 06.E.02 06.E.03

MOBILIZATION/DEMOBILIZATION
ACTIVITY HAZARD ANALYSIS

Date Prepared: 31 October 2017

Project: Williston LTA

Task: Mobilization/Demobilization

Risk Assessment Code (RAC): M

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Mobilization/demobilization of manpower, equipment and establishment of work zones (cont.)	Physical Hazards: Driving/vehicle movement (including trucks) Driving on poorly maintained, unpaved track road within Williston LTA	• Obey traffic rules. • Do not exceed 15 miles per hour in the work area. • Use caution when entering roadways. • Do not operate vehicles in unsafe conditions (e.g, in deep mud). • Do not use cell phones when operating vehicles. • Wear seat belts • Use caution and wear reflective vests if working near active roads or around heavy equipment. • Leave enough time to get to your destination without hurrying. • Verify back-up alarms are functional for pick-ups or SUVs with obstructed rear view; use a back-up alarm or a spotter when backing up. • Exit vehicle and inspect road conditions prior to driving over questionable terrain/roads. • Use a spotter when driving through narrow passageways • Follow advice from NDARNG and USACE points of contact regarding site access and conditions. • Do not drive or park vehicle on unstable roads or terrain • Allow only authorized drivers to operate vehicles.	18.A 18.B 08.B 18.B.03 18.B
	Moving or operation of equipment	• Use trained/experienced operators to run equipment as needed • Inspect equipment prior to use • Back up alarms will be functional • Maintain safe distance from moving mechanical parts; personnel will stay out of swing area of all equipment and from under loads • Maintain eye contact with operator when around moving equipment • No personnel will ride on equipment unless seats are provided • Use caution and wear reflective vests if working near active roads or around heavy equipment • Wear proper PPE (i.e., hard hats, as appropriate)	18.G.02

MOBILIZATION/DEMOBILIZATION
ACTIVITY HAZARD ANALYSIS

Date Prepared: 31 October 2017

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Job: Mobilization/Demobilization

Risk Assessment Code (RAC): **M**

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Mobilization/demobilization of manpower, equipment and establishment of work zones (cont.)	Slips, trips, and falls	• Make sure you have good solid footing and that walking/working surfaces are as clean and dry as possible • Keep work area free of debris • Clear ice, snow and mud from steps to reduce slip hazards • Inspect areas daily and findings are recorded on daily inspection reports. • Personnel will wear sturdy all leather work boot with traction sole and composite safety toe	14.D.01 14.D.04 14.D.06 14.D.07 14.D.08
	Use of hand tools (manual and power)	• Inspect tools prior to use • Use tools for their intended use only • Do not use damaged tools • Push, do not pull wrenches • Use, inspect and maintain power tools according to manufacturer's recommendations • Equip power tools with designed guards • Provide electrical power control on each power tool to make it possible for the operator to cut off the power without leaving the point of operation	13.A.02 13.A.02 13.A.02 13.A.02 13.A.02 13.A.03 13.A.13
	Hands or fingers caught between objects, abrasions and lacerations	• Avoid rough or sharp edges of materials/objects being handled • Avoid placing hands between objects/pinch points • Wear leather work gloves	05.H.
	Lifting and handling of equipment and materials	• Use safe lifting techniques, bending at the knees and lifting with the legs. • Use caution and do not twist the back when carrying a load. • Get assistance or use mechanical devices to move loads; one person will not lift more than 50 pounds. • Wear protective gloves when handling materials.	14.A.01 14.A.01 14.A.03 14.A.04 14.A.05

MOBILIZATION/DEMOBILIZATION
ACTIVITY HAZARD ANALYSIS

Date Prepared: 31 October 2017

Project: Williston LTA

Task: Mobilization/Demobilization

Risk Assessment Code (RAC): M

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Mobilization/demobilization of manpower, equipment and establishment of work zones (cont.)	Inclement weather (cold stress)	• Monitor temperature, precipitation, and wind speed when working outdoors in damp and cool (below 50 degrees Fahrenheit [°F]) conditions or anytime temperatures are below 32°F • Wear cold weather clothing and provide shelter as needed based on site conditions. • Have warm liquids for drinking; avoid caffeine • Have a change of clothing available in case clothes become wet	06.I.04
	Inclement weather (heat stress)	• Make drinking water available to all workers and encourage workers to drink small amounts of water frequently. • Monitor conditions using Wet Bulb Globe Thermometer (WBGT) • Adjust work/rest regimens based on readings • Use sun screen. • Avoid consuming caffeine.	06.I.06 06.J.01 06.J.03
	Extreme weather	• When there are warnings or indications of severe weather, monitor conditions and take precautions to protect personnel. • Identify evacuation routes and places of shelter prior to starting work each day • Health and Safety Officer will monitor conditions and will call a safety stand down in the event of inclement weather.	01.E
	Fire	• Provide portable fire extinguishers in all equipment and vehicles • Inspect fire extinguishers monthly	09.F.01 09.F.02
	Unsanitary conditions	• Toilet and washing facilities will be accessible nearby • Potable water will be provided for drinking • Provide type II 16-unit first aid kits and make these kits accessible at the site.	02.C 02.D 02.E 02.F 03.B

MOBILIZATION/DEMOBILIZATION
ACTIVITY HAZARD ANALYSIS

Date Prepared: 31 October 2017

Project: Williston LTA

Job: Mobilization/Demobilization

Risk Assessment Code (RAC): **M**

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Mobilization/demobilization of manpower, equipment and establishment of work zones (cont.)	Dust inhalation	• Minimize generation of dust during activities • Stay out of visible dust clouds • Use soil wetting techniques to eliminate visible dust	06.A.04
	Noise exposure	• Use hearing protection during operation of heavy equipment, as necessary	05.C.01
Equipment to be Used Hand tools Vehicles	Training Requirements & Competent or Qualified Personnel name(s) Vehicle training	Inspection Requirements All equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to manufacturer's recommendations. Records of inspection will be maintained on site. Fire extinguishers, vehicles, and first-aid kits will be inspected by the Health and Safety Officer.	

SOIL SAMPLING
ACTIVITY HAZARD ANALYSIS

Date Prepared: 31 October 2017

Project: Williston LTA

Job: Soil Sampling

Risk Assessment Code (RAC): **M**

Prepared By: Jennifer Li Reviewed By: Alberto Munuera,

Minimum Protective Clothing and Equipment:
PPE Level D: General work clothes, safety glasses, hard hat, safety-toed boots, leather work gloves, chemical resistant gloves (when handling soil with potential metals constituents).

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

SEVERITY	PROBABILITY				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Sample Collection	Physical Hazards: Slips, trips, and falls Unexploded ordnance (UXO) Avoidance	• Make sure you have good solid footing and that walking/working surfaces are as clean and dry as possible • Keep work area free of debris • Clear ice, snow and mud from steps to reduce slip hazards • Inspect areas daily and findings are recorded on daily inspection reports. • Personnel will wear sturdy all leather work boot with traction sole and composite safety toe • USACE to provide UXO avoidance support; follow UXO personnel guidance, sample only where cleared to sample.	14.D.01 14.D.04 14.D.06 14.D.07 14.D.08
	Hands or fingers caught between objects, abrasions and lacerations	• Avoid rough or sharp edges of materials/objects being handled • Avoid placing hands between objects/pinch points • Wear leather work gloves	05.H
	Lifting and handling of equipment and materials	• Use safe lifting techniques, bending at the knees and lifting with the legs • Use caution and do not twist the back when carrying a load • Wear protective gloves when handling materials	14.A.01 14.A.01 05.A

SOIL SAMPLING
ACTIVITY HAZARD ANALYSIS

Date Prepared: 31 October 2017

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Job: Soil Sampling

Risk Assessment Code (RAC): **M**

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Sample Collection	Biological Hazards: Stinging and biting insects, spiders, and snakes Rabid or defensive animals Poisonous plants	• Use repellents and proper clothing for protection against insects including ticks and mosquitoes • Check the area for poisonous plants and use Ivy Block • Wear protective clothing, including long-sleeved shirts/pants, gloves and leather boots. • Avoid animals, do not leave food outside • Work in pairs and stay observant of surroundings • Avoid rodent droppings as they may contain the Hantavirus • Avoid holes and rocks that are potential animal habitats • If contact with fauna, animal droppings, or poisonous plants then wash area immediately	03.A.05 05.A.06 06.E.01 06.E.02 06.E.03
	Contaminants (metals constituents) in soil	• Properly use specified PPE – safety glasses and nitrile gloves • Practice contamination avoidance • Follow proper decontamination procedures (disposal of gloves, wash glasses as needed) • Observe good personal hygiene practices (wash hands after removing gloves; wash hands and face prior to eating, drinking, or smoking)	
	Inclement weather (cold stress)	• Monitor temperature, precipitation, and wind speed when working outdoors in damp and cool (below 50°F) conditions or anytime temperatures are below 32°F • Wear cold weather clothing and provide shelter as needed based on site conditions. • Have warm liquids for drinking; avoid caffeine • Have a change of clothing available in case clothes become wet	06.I.04

SOIL SAMPLING
ACTIVITY HAZARD ANALYSIS

Date Prepared: 31 October 2017

Project: Williston LTA

Job: Soil Sampling

Risk Assessment Code (RAC): M

JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	EM 385-1-1 (PARA REF)
Sample Collection (cont.)	Inclement weather (heat stress)	• Make drinking water available to all workers and encourage workers to drink small amounts of water frequently. • Monitor conditions using WBGT • Adjust work/rest regimens based on readings • Use sun screen. • Avoid consuming caffeine.	06.I.06 06.J.01 06.J.03
	Extreme weather	• When there are warnings or indications of severe weather, monitor conditions and take precautions to protect personnel. • Health and Safety Officer will monitor conditions and will call a safety stand down in the event of inclement weather.	01.E
	Fire	• Provide portable fire extinguishers in all equipment and vehicles. • Inspect fire extinguishers monthly	09.F.01 09.F.02
Equipment to be Used Hand tools Vehicles XRF Analyzer	Training Requirements & Competent or Qualified Personnel name(s) XRF Training. "3 R's" Training. Vehicle Training.	Inspection Requirements All equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to manufacturer's recommendations. Records of inspection will be maintained on site. Fire extinguishers, first-aid kits, and vehicles will be inspected by the Health and Safety Officer. XRF When the radiation shutter is open: •do not place hands, feet, or other body parts in the radiation field; •do not look into the beam path; •do not point the XRF at anyone; •do not hold the XRF from the front.	

SECTION FOUR: STAFF ORGANIZATION, QUALIFICATIONS AND RESPONSIBILITIES

Roles and responsibilities for key safety personnel are provided in **Table 4-1**. Copies of resumes for safety personnel are presented in **Attachment C**.

Table 4-1: Roles and Responsibilities of Key Safety Personnel

Position	Description of Key Responsibilities
Health and Safety Officer Jennifer Li	• Being present during operations to implement the SSHP • Inspecting site activities to identify safety and occupational health deficiencies and correcting them • Coordinating changes/modifications to the SSHP with the HSM and PM. • Conducting project-specific training • Has stop work responsibility related to safety and health concerns • Implements and enforces the SSHP, along with safety concerns contained in the SOP and reports violations to the PM. • Controls access to established work zones and exclusion zones, if any. • Securing the site until emergency response personnel assume control in the event of an accident or an emergency. • Assisting in the investigation of accidents/incidents and “near misses”. • Notifying and coordinating off-site emergency and medical response agencies. • Enforcing the “buddy system”. • Conducting visitor orientations, on-site safety training, and maintains the visitor log. • Coordinating with health and safety professionals to identify personnel on site for whom special PPE, exposure monitoring, or work restrictions may be required. • Conducting daily field site inspections and safety briefing. • Maintains qualification/certification records for site personnel on electronic and hard copy.
Project Health and Safety Manager Alberto Munuera	• Developing, maintaining, and overseeing implementation of the SSHP • Visiting the project site, as requested, to audit the effectiveness of the SSHP • Remaining available, and responding to, project emergencies • Developing modifications to the SSHP, as needed • Evaluating occupational exposure monitoring data and adjusting SSHP requirements, as necessary • Reviewing and signing the SSHP • Determining the need for periodic audits of the operation to evaluate compliance with this plan • Providing health and safety support as requested by the Health and Safety Officer and PM. • Developing, maintaining, and implementing this SSHP. • Responding, as appropriate, to project emergencies. • Overseeing munitions response health and safety program and personnel, establishing policies and standards, and providing guidance • Review and concur with the SSHP • Verify SSHP implementation and compliance • Verify compliance with MR-related Department of Defense publications, USACE documents, as well as local, state, and federal statutes and codes • Issuing a stop work order for unsafe conditions • Interface with PM in matters of health and safety

4.1 PREVENTION OF ALCOHOL AND DRUG ABUSE

Drug and alcohol abuse pose a serious threat to the health and safety of employees, clients, and the general public as well as the security of our job sites, equipment and facilities. AECOM is committed to the elimination of illegal drug use and alcohol abuse in its workplace and regards any misuse of drugs or alcohol by employees to be unacceptable. The company Substance Abuse

Prevention Procedure (SAM-019-PR1) prohibits the use, possession, presence in the body, manufacture, concealment, transportation, promotion or sale of the following items or substances on company premises. Company premises refer to all property, offices, facilities, land, buildings, structures, fixtures, installations, aircraft, automobiles, vessels, trucks and all other vehicles and equipment - whether owned, leased, or used.

- Illegal drugs (or their metabolites), designer and synthetic drugs, mood or mind altering substances, and drug use related paraphernalia unless authorized for administering currently prescribed medication;
- Controlled substances that are not used in accordance with physician instructions or non-prescribed controlled substances; and
- Alcoholic beverages while at work or while on any customer- or company-controlled property.

This policy does not prohibit lawful use and possession of current medication prescribed in the employees name or over-the-counter medications. Employees must consult with their health care provider about any prescribed medication's effect on their ability to perform work safely and disclose any restrictions to their supervisor.

Although some states may pass laws legalizing medical or recreational marijuana use, the use, sale, distribution and possession of marijuana are violations of federal law and company policy, and will subject an employee to disciplinary action up to and including termination in accordance with controlling law.

4.2 PRE-TASK SAFETY AND HEALTH ANALYSIS

Pre-task safety and health analyses are required and have been conducted by the HSM. AHAs are included in the SSHP**.** The Health and Safety Officer will review project tasks and the AHAs each day prior to and during site activities to ensure that the proper procedures are in place and communicated to the project team. Daily Tailgate Meeting Forms and Task Hazard Assessments will also be completed and reviewed by the Health and Safety Officer with the field team prior to and during site activities (**Attachment D**).

If revisions or additions to tasks or work procedures are needed, these will be identified by the Health and Safety Officer, in conjunction with the HSM, as necessary. If required, an addendum to this SSHP will be prepared and submitted to the ARNG for review and concurrence prior to implementing field changes or additions that are not addressed by this SSHP.

4.3 LINES OF AUTHORITY

The Health and Safety Officer has the authority to enforce safety policies and procedures on the project site, and to stop work if an unsafe condition or act is observed. Any corrective actions instituted will be reported to the HSM, the Area SH&E Manager and the PM. If further action or clarification of policies is required, the situation will be brought to the attention of higher levels of operations and SH&E management.

4.4 NON COMPLIANCE, CORRECTIVE ACTION, AND SAFETY INCENTIVES

In accordance with AECOM policy, each violation of written safety procedures is evaluated on a case-by-case basis, with input from project management, human resources, and the SH&E department. Disciplinary actions may range from verbal reprimands to removal from the project to termination, depending on the severity of the infraction.

AECOM adheres to policies of continuous improvement for the safety program. Every individual receives annual training with instructions on reporting near misses (in addition to accident reporting). The AECOM Germantown Office, which is performing the work described in this SSHP, has an awards program for which individuals are recommended by their peers for contributions to safety procedures and process improvements. The Safety Award is presented annually in this program.

4.4.1 Management Accountability

In accordance with AECOM's HSEMS (**Attachment A**), the ultimate leadership on safety is our CEO. He, in turn, holds accountable the Operations Managers for communicating and implementing the HSEMS. Supervisors implement safety systems on programs that are under their control, and the PM is accountable for ensuring that safe operations will be followed on this project at all times. In accordance with AECOM policy, each violation of written safety procedures is evaluated on a case-by-case basis, with input from project management, human resources, and the SH&E department. Disciplinary actions for all employees, including managers and supervisors, may range from verbal reprimands to removal from the project to termination, depending on the severity of the infraction. Safety performance is evaluated as part of the AECOM annual job performance review.

SECTION FIVE: SAFETY AND HEALTH INSPECTIONS

5.1 SPECIFIC ASSIGNMENTS OF RESPONSIBILITIES

The Health and Safety Officer will conduct safety and health inspections daily. The Health and Safety Officer will document observations in the project logbook and on the Daily Health and Safety Report (DHSR). Forms are contained in **Attachment D**. Other inspections will be conducted by the Health and Safety Officer as required by individual project activities and company-specific safety, health, and environment procedures.

At a minimum, the Health and Safety Officer is responsible to perform the following:

Vehicle inspections prior to driving (SAM-005-PR)

Daily housekeeping inspections (SAM-013-PR)

Check contents of the field first aid kits prior to beginning field work (SAM-012-PR)

Review the AHAs prior to beginning field work, or as needed

Daily PPE inspections (SAM-208-PR)

The HSM or designee will conduct any monthly and/or quarterly inspections as necessary during the duration of the project.

5.2 DEFICIENCY TRACKING SYSTEM AND FOLLOW UP PROCEDURES

The Health and Safety Officer will identify and note deficiencies with an assigned due date for corrective actions. In most cases, discrepancies can be corrected immediately or before the following work day. The Health and Safety Officer will perform a review of corrective actions as part of the daily safety briefing. Follow-up inspections will be conducted to ensure correction of any identified deficiency and will also be documented in inspection reports.

The HSM or the Area SH&E Manager may conduct formal audits documented in accordance with AECOM procedures. The results of these audits will be reported to the PM, the Regional Safety Manager, and the Vice President, SH&E.

5.3 EXTERNAL INSPECTIONS AND CERTIFICATIONS

AECOM does not expect any external inspections/certifications during this project. However, regulatory agencies can conduct inspections periodically. If this is the case, the regulatory agency inspector should introduce himself/herself to the Health and Safety Officer and present credentials to verify that he/she is representing a recognized regulatory agency, such as OSHA or North Dakota Department of Health. Persons who cannot demonstrate their affiliation with a recognized regulatory agency should not be allowed access to the project site or office.

Prior to escorting an inspector on site, the Health and Safety Officer will contact the HSM, and the PM. All site visitors will be required to sign the visitors log and will be given a site safety brief by the Health and Safety Officer. Coordination of any regulatory agency inspection is the responsibility of the Health and Safety Officer who will accompany the inspector during all stages of the inspection.

SECTION SIX: TRAINING

6.1 NEW EMPLOYEE ORIENTATION

AECOM employees complete an initial New Employee Health and Safety Orientation designed to introduce new employees to the AECOM HSEMS at the beginning of their employment and before starting tasks or assignments. In the course of the orientation, the employee's direct supervisor will determine which additional training course the new employee must compete prior to being assigned to specific job tasks. All employees will receive an orientation in the following topics:

The AECOM Corporation HSEMS

- SH&E Policy
- SH&E Philosophy and Employee Responsibilities
- SH&E organization and responsibilities
- SH&E Website
- Incident Reporting Requirements
- Incident Reporting, Notifications and Investigation
- Medical Screening and Surveillance Requirements
- Behavior-Based Safety (BBS) principals
- Vehicle Safety Requirements
- Health and Safety Training Programs
- Obtaining and Reviewing Health and Safety Plans and Safe Work Plans
- Obtaining Personal Protective Clothing and Equipment
- Site Orientation
- Hazards Unique to Project Sites
- Task-Specific Hazards
- Project Specific Requirements

6.2 SITE SPECIFIC TRAINING

Before starting site work, all personnel assigned to the project will attend initial site-specific safety training. This training will cover corporate health and safety policies as well as the activities, procedures, and equipment applicable to the site operation. The Health and Safety Officer will conduct this training, which will specifically include:

- Site layout
- Potential hazards
- Hazard controls

Hazard Communication (HazCom)

- Requirements and use of the project HazCom program
- Location of the hazardous materials on site
- Identification and recognition of hazardous materials on site
- Physical and health hazards of the materials pertinent to project activities
- Protective measures employees can implement when working with hazardous materials on site
- How to detect the presence or release of chemicals used on site
- Monitoring protocols
- PPE
- Safety procedures
- Emergency response services, as outlined in this SSHP

The training session will allow site personnel to clarify any issues they do not understand and will reinforce individual responsibilities regarding health and safety during site work.

Workers will fill out the Safety Compliance Agreement (**Attachment D**) during this training session.

SDSs for materials to be brought on site for each day's use are included in **Attachment B**; the Health and Safety Officer will obtain copies of SDS for any additional chemicals brought on site and maintain these in an accessible location. SDS will be reviewed with employees to identify specific safety and health procedures that should be implemented. SDS will be available for use with AHAs for activities in which hazardous materials will be used. Applicable information will be followed for the proper use and disposal of the materials; and for the selection of hazard control and emergency response measures.

6.3 MANDATORY TRAINING AND CERTIFICATION REQUIREMENTS

This project has training requirements for HAZWOPER training and certification. Employees will be trained in the use of fire extinguishers and the hazards involved in incipient stage firefighting before being allowed to work on the project site.

The 40-hour HAZWOPER training requires an annual refresher course in order to maintain certification. All field personnel will be qualified scientists with at least 24 hours of supervised on the job training. First aid and CPR require retraining and recertification as indicated by that particular training certification. Fire extinguisher training must be provided by AECOM at least once annually.

Certifications for all site personnel will be provided as part of the project personnel package to be submitted to the Contracting Officer's Representative (COR) for approval prior to the commencement of field work. All certifications will be kept on site during field activities.

6.4 REQUIREMENTS FOR EMERGENCY RESPONSE TRAINING

AECOM personnel will provide minimal or first-line response to on-site emergencies. This response will include initial first aid/CPR before arrival of Emergency Medical Services (EMS) personnel and use of fire extinguishers for extinguishing a small or incipient fire. At least two personnel will be trained in first aid/CPR and on-site during work activities. All site personnel will be trained in the use of fire extinguishers to provide emergency response.

6.5 SUPERVISORY AND EMPLOYEE SAFETY TRAINING

Supervisors and employees who are assigned to this project are trained per 29 CFR 1910.120 and receive annual 8-hour refresher training as part of this program. These training classes address topics such as hazard recognition and control, selection and use of PPE, selection and use of monitoring equipment, site control, hazardous materials shipping, and regulatory issues. AECOM employees are required to complete courses in BBS and other selected topics, such as vehicle safety and fitness for duty, on an annual basis. Employees considered “authorized drivers” must complete the defensive driving class, either online or through AECOM approved training providers.

The Health and Safety Officer will conduct daily site safety briefings (i.e., tailgate meetings) to all personnel on site, including supervisors, prior to the start of the work shift. The purpose of the briefings is to assist personnel in safely conducting the scheduled work activities. The briefings will include tasks to be performed and work method, general description of job scope, location of work, equipment to be used, physical hazards, chemical hazards, exposure potential, hazard control, PPE, anticipated weather conditions, and emergency response procedures. The briefings will also provide an opportunity to discuss past accidents and near misses that occurred on similar projects or under similar site conditions and identify safety-related performance deficiencies noted during daily activities or safety audits to increase safety awareness. Attendance and subject matters discussed will be documented on the Tailgate Safety Briefing and Task Hazard Assessment Forms (**Attachment D**).

SECTION SEVEN: PERSONAL PROTECTIVE EQUIPMENT

PPE is considered the last line of defense in hazard control. PPE is meant to protect workers when all other methods (elimination, engineering, and administrative) have been exhausted. All employees must be trained in the proper use and maintenance of PPE. See Procedure SAM-208-PR1, Personal Protective Equipment.

A PPE assessment (see SAM-208-FM1) **Attachment D** was performed to help determine PPE requirements. PPE upgrades for individual tasks or steps of a task are to be identified in Job Safety Analyses or AHAs.

7.1 LEVEL D PROTECTION

Level D PPE provides minimal protection against potential chemical hazards such as metals constituents in soil, and should not be worn in any area with respiratory or skin hazards. Minimum Required PPE:

- Hard hat (when overhead hazards exist)
- Safety glasses w/ side shields (may be clear or shaded)
- Safety-toe work boots
- Long pants and shirts with sleeves (short or long- cover shoulders no tank or muscle shirt styles)
- Leather work gloves for materials handling
- ANSI Class 2 retro-reflective vest (Class 3 during periods of limited visibility), when working near vehicular traffic or heavy equipment
- Leather chaps (when operating chain saws or as required in areas/conditions where snakes may be active)
- Face shields (as required in areas/conditions where debris may be airborne)

Level D PPE will be adequate for the majority of tasks conducted during this project, due to the type of activities planned.

7.2 MODIFIED LEVEL D PROTECTION

Modified Level D PPE includes the items listed in Section 5.2 above, *and one or more* of the following items:

- Regular (white) or poly-coated Tyvek (yellow) or Polyvinyl Chloride rain suit
- Safety goggles/face shield
- Chemical-resistant over-boots or chemical-resistant steel-toe/steel-shank boots
- Inner latex (i.e., surgical) gloves

- Chemical-resistant outer gloves (type: nitrile rubber)
- Tape for sealing arm, leg, and zipper joints

Modified Level D PPE will be donned for tasks whenever skin (other than hands) or clothing contact with potentially contaminated soil is expected.

If the Health and Safety Officer encounters unexpected conditions requiring the use of higher levels of PPE, then work will cease until an AHA is completed, modified PPE requirements are assessed, and the SSHP is amended and reviewed

The tasks scheduled for this project should not require the use of Level A, B, or C PPE, and their use is not covered by this SSHP.

7.3 HAZARD ASSESSMENT AND CONTROL

AECOM has adopted an approach to hazard assessment and control that incorporates both qualitative and quantitative methods to identify hazards and the degree to which they may impact employees and operations. The Risk Assessment and Management procedure (SAM-209-PR1, **Attachment D**) details the process.

7.4 WHEN HAZARD ASSESSMENT WILL BE CONDUCTED

Hazard assessments were conducted as part of the initial SSHP preparation and will be conducted anytime a change in site conditions or operations occurs. Additional hazard assessments will be conducted by the HSM and the Health and Safety Officer if site conditions or operations change. AHAs are provided in Section 3.8 of the SSHP.

7.5 HOW HAZARD ASSESSMENT WILL BE CONDUCTED

Hazard assessments were initially conducted by the HSM, who evaluated the hazards expected to be present on site based on available background information and previous experience with similar projects. AHAs will be reviewed and tasks will be re-evaluated each day prior to and during site activities by the Health and Safety Officer, in conjunction with the HSM, as necessary, to ensure that the proper procedures, as identified in this SSHP, are in place and communicated to the project team. If revisions or additions to tasks or work procedures are needed, these will be identified by the Health and Safety Officer, in conjunction with the HSM. An addendum to this plan will be prepared and submitted to ARNG for review and approval prior to implementing changes or additions that are not covered by this SSHP.

7.6 PERSONAL PROTECTIVE EQUIPMENT TRAINING

Based on the hazard assessment for this site, Level D PPE, as defined in Section 7.1, has been determined as the initial level of protection required. The decision to require the use of optional items (hearing protection, waders, hard hats, and reflective vests) will be made by the Health and Safety Officer, based on the hazard and risk analysis in the field. The Health and Safety Officer may also make the decision to upgrade to Modified Level D, as defined in Section 7.2 of the

SSHP, if site conditions warrant an upgrade. The level of protection worn by site personnel will be enforced by the Health and Safety Officer.

Any recommended changes in the level of protection that involve the use of protective equipment not covered under this SSHP (e.g., respirators) will be documented, and a revised hazard assessment will be prepared by the HSM and submitted to ARNG for review prior to use in the field.

All site workers will have current HAZWOPER training; refresher classes address the use of PPE, including respiratory protection. Training includes:

Identifying when PPE is needed;

Selection of proper PPE;

How to properly don, doff, adjust, and wear PPE;

Limitations of the PPE;

Inspection and testing of PPE;

Care, maintenance, and storage of PPE;

Recognizing when PPE has reached the end of its useful life; and

Proper disposal of used PPE.

PPE will be inspected on a regular basis using SAM-208-FM1 (**Attachment D**).

Levels of PPE to be used for this project are discussed in Section 7.1 and 7.2.

7.7 PERSONAL PROTECTIVE EQUIPMENT RETRAINING

If there is reason to believe that any affected employee who has been trained does not have the understanding and skill required to use the assigned PPE, that employee will be removed from the job site until additional training can be completed. AECOM uses a combination of classroom instruction, on-line modules, and hands-on experience for PPE training.

7.8 IDENTIFYING EMPLOYEE TRAINING

Copies of training certifications (including names and date of training) for on-site personnel will be maintained in project files. The Health and Safety Officer will verify each person's certifications prior to the start of work activities and periodically perform reviews to ensure certifications are update.

SECTION EIGHT: EXPOSURE MONITORING

8.1 TRAINING AND MEDICAL SURVEILLANCE

All personnel must comply with the medical surveillance requirements required by Occupational Safety and Health Administration (OSHA) (29 CFR 1910.120). The AECOM medical surveillance program meets all OSHA criteria for hazardous waste investigations. Personnel must have passed the AECOM medical surveillance examination (or equivalent) within the time frame established (annual or biennial schedule). The PM will verify that all AECOM personnel meet applicable OSHA medical surveillance requirements prior to the start of site work. Documentation regarding medical surveillance clearance will be maintained by the Health and Safety Officer

The requirements of the medical surveillance program include:

- A baseline or pre-assignment baseline exam will be conducted prior to the start of work assignments requiring medical surveillance. All employees whose work assignments involve potential exposure to harmful chemical and/or physical agents should participate in the medical surveillance program. Guidance as to harmful potential exposures is presented in SAM-128-FM1 Medical Surveillance Evaluation (MSE). The form provides the primary guidance for determining whether medical screening is required for an employee and the frequency of periodic exams. The MSE is to be completed by the employee and his/her supervisor at the time of hire for any employee who may work outside an office environment. At each annual performance review, the MSE is to be reviewed for accuracy. Other reviews are required whenever there is a change in job tasks.
- In addition, employees may be requested to participate in the medical surveillance program if they perform a task that requires an assessment for fitness for duty (e.g., lifting, climbing, etc.). The Supervisor, Operations Manager and HSM will identify activities/tasks that will require fit-for-duty assessments.
- Additional site- or project-specific biological monitoring or toxicological screening may be required in addition to this program's scheduled core exams. These medical tests will be specified by the project-specific Health and Safety Officer and will be authorized by the HSM on the exam appointment protocol. No additional medical tests are necessary for work at this project site.
- The exposure-specific examination consists of medical tests to assess the impact of occupational exposures associated with a particular activity or project. The Medical Director or HSM will require an exposure-specific examination when he/she has reason to believe occupational exposures are impacting or may be impacting the health of an employee.

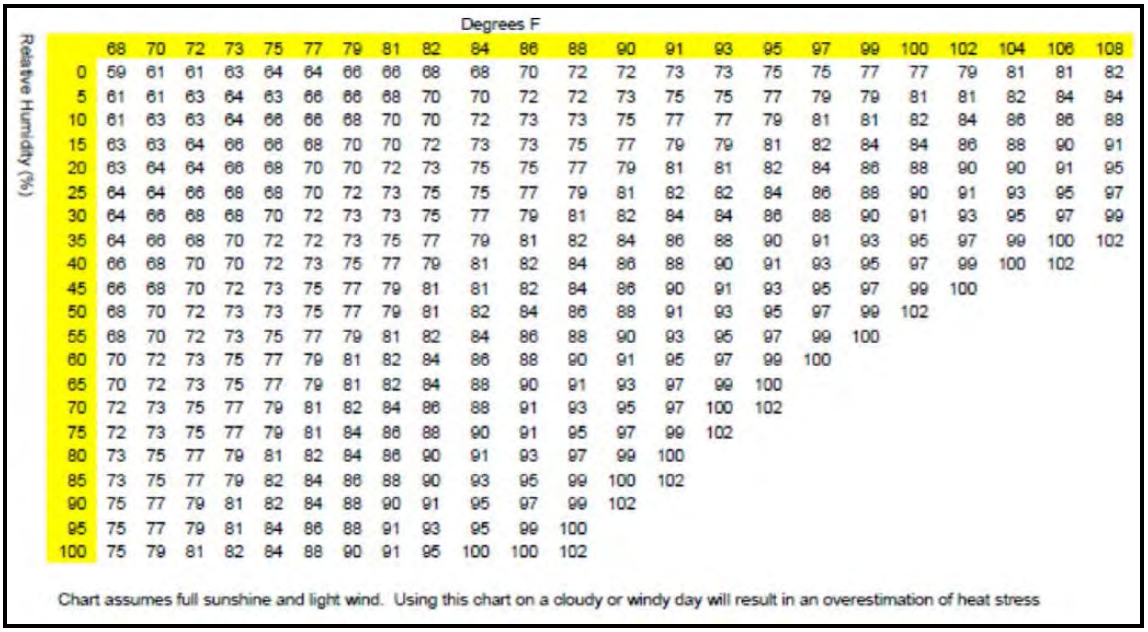
All accidents and potential exposures must be reported immediately to the Health and Safety Officer, who will coordinate with the Area or Region Safety, Health, and Environment Manager to arrange for medical exams or tests that may be indicated as part of the AECOM medical surveillance program. Depending on the type of incident, it may be critical to perform tests within 24 to 48 hours. Failure to report an injury or incident immediately will result in

disciplinary action. Based on the nature of the field activities and the hazard assessment results, it is not expected that any airborne contaminants or nuisance dust level exposure limits will be exceeded; therefore, no air monitoring will be performed. Upon changes in site conditions or operations, AHAs may be amended based on an evaluation of potential work exposure. Any amendment to this SSHP will be reviewed and approved by AECOM HSM and accepted by ARNG prior to implementation.

Due to the climate at the Williston LTA and the duration of project, both heat and cold stress are hazards that may be encountered. Therefore, the following control measures shall be followed, as appropriate.

8.2 HEAT STRESS

1. Workers are encouraged to wear lightweight, breathable clothing during times of high heat and humidity.
2. Environmental monitoring or physiological monitoring shall be conducted and work/rest regimens established.
3. Monitoring shall be conducted when temperature exceeds 75°F and 55% humidity.
4. Use of a WBGT instrument is preferred, however, if a WBGT instrument is not available, and the WBGT cannot be obtained from local weather stations, then **Figure 8-1** will be used to estimate the Heat Index.



	68	70	72	73	75	77	79	81	82	84	86	88	90	91	93	95	97	99	100	102	104	106	108
0	59	61	61	63	64	64	66	66	68	68	70	72	72	73	73	75	75	77	77	79	81	81	82
5	61	61	63	64	63	66	66	68	70	70	72	72	73	75	75	77	79	79	81	81	82	84	84
10	61	63	63	64	66	66	68	70	70	72	73	73	75	77	77	79	81	81	82	84	86	86	88
15	63	63	64	66	66	68	70	70	72	73	73	75	77	79	79	81	82	84	84	86	88	90	91
20	63	64	64	66	68	70	70	72	73	75	75	77	79	81	81	82	84	86	88	90	90	91	95
25	64	64	66	68	68	70	72	73	75	75	77	79	81	82	82	84	86	88	90	91	93	95	97
30	64	66	68	68	70	72	73	73	75	77	79	81	82	84	84	86	88	90	91	93	95	97	99
35	64	66	68	70	72	72	73	75	77	79	81	82	84	86	88	90	91	93	95	97	99	100	102
40	66	68	70	70	72	73	75	77	79	81	82	84	86	88	90	91	93	95	97	99	100	102	
45	66	68	70	72	73	75	77	79	81	81	82	84	86	90	91	93	95	97	99	100			
50	68	70	72	73	73	75	77	79	81	82	84	86	88	91	93	95	97	99	102				
55	68	70	72	73	75	77	79	81	82	84	86	88	90	93	95	97	99	100					
60	70	72	73	75	77	79	81	82	84	86	88	90	91	95	97	99	100						
65	70	72	73	75	77	79	81	82	84	88	90	91	93	97	99	100							
70	72	73	75	77	79	81	82	84	86	88	91	93	95	97	100	102							
75	72	73	75	77	79	81	84	86	88	90	91	95	97	99	102								
80	73	75	77	79	81	82	84	86	90	91	93	97	99	100									
85	73	75	77	79	82	84	86	88	90	93	95	99	100	102									
90	75	77	79	81	82	84	88	90	91	95	97	99	102										
95	75	77	79	81	84	86	88	91	93	95	99	100											
100	75	79	81	82	84	88	90	91	95	100	100	102											

F=Fahrenheit

Figure 8-1: Approximate Wet-Bulb Globe Temperature Chart

5. If **Figure 8-1** is used, direct radiant sun exposure, air velocity, temperature, and humidity and adjustment factors for various work clothing should be taken into consideration.

6. Employees exposed to solar radiation with the potential for sunburn, should be encouraged to use sun screen with a sun protection factor (SPF) of 30 or greater, and should wear hats, long sleeve shirts, sunglasses, and other protective attire.

Work-rest schedules and water intake will be established by the Health and Safety Officer based on the following criteria.

Table 8-1: Heat Stress Exposure Threshold Limit Value (TLV) and Action Limits

Work Cycle (per hour)	TLV (^{o}F)			Action Limit (^{o}F)		
	Light	Moderate	Heavy	Light	Moderate	Heavy
75 to 100% Work	87.8	82.4	NR	82.4	77.0	NR
50 to 75% Work	87.8	84.2	81.5	83.3	78.8	75.2
25 to 50% Work	89.6	86.0	84.2	85.1	80.6	77.9
0 to 25% Work	90.5	88.7	86.9	86.0	84.2	82.4

NR = Not recommended
^{o}F= Fahrenheit

It is expected that workloads will fall into the moderate category (walking about with moderate lifting or pushing, or carrying 10 pounds or less). If the Heat index exceeds 77.0 ^{o}F (for personnel wearing standard work clothing) a work-rest cycle will be established and physiological monitoring will be conducted to assess the effectiveness of the heat stress controls.

Heat Stress Controls

The best approach to avoiding heat-related illness is through preventive heat stress management. Measures to be implemented for this project will include:

Rest Areas – A relatively cool, shaded area will be provided for breaks when ambient temperatures exceed 80^{o}F and workers are wearing regular work clothes. If shade is not available, a canopy will be constructed, or workers will have access to air-conditioned buildings or vehicles. Employees will have access to these rest areas at break times and at any other time a recovery period is needed.

Liquids – Water and electrolyte replacement drinks will be made available. Employees will have access to potable drinking water equivalent to one quart of water per employee per hour during the work shift. Workers should drink 16 ounces before starting work in the morning and after lunch, and 8 to 16 ounces at each break. The water shall be kept reasonably cool (50-60^{o} F) to encourage consumption. Employees will be encouraged to avoid alcohol during non-work hours and caffeine during work hours when heat stress conditions are anticipated.

Acclimatization – When working in a heat stress environment, employees will need to adapt to the hot conditions. Workloads should start at 50% capacity and increase 10 % each day to

achieve 100% capacity. Acclimatization will start to decrease after 3-4 days, and will be gone after one week of not working in a hot environment.

Heat stress controls to be implemented include:

- Allow workers to become acclimatized to the heat (3 to 6 days);
- Provide shaded or air-conditioned break areas;
- Provide sun screen to prevent sun burn; and
- Provide drinking water and electrolyte-replenishing fluids.

Whenever the WBGT reading exceeds the values on the table above for the identified work-rest regime, the Health and Safety Officer will monitor workers for heat stress by measuring temperature and pulse. The Health and Safety Officer will further adjust individual work/rest schedules based on results of physiological monitoring.

- Heart Rate – Heart rate should be measured by the radial pulse as early as possible in the initial rest period (P1) and after two minutes (P2). If P1 is greater than or equal to 110 beats per minute (bpm) and P1-P2 is less than or equal to 10 bpm, shorten the next work cycle by 1/3 without changing the rest period. If the same condition exists at the end of the next work period, that individual should not return to work until repeated measurements are in the acceptable range and they are fully recovered.
- Body Temperature – The body temperature may be measured using a clinical oral thermometer or a clinical ear thermometer. If the body temperature exceeds 99.6°F, shorten the following work period by 1/3 without changing the rest period. If at the next rest period, the temperature still exceeds 99.6°F, that individual should not return to work until their body temperature drops below 99.6°F and they are fully recovered.

The Health and Safety Officer will assess conditions that may cause heat stress in site workers. All site workers will be familiar with the symptoms of heat stress illness described below and will report any symptoms to the Health and Safety Officer immediately. Personnel should monitor themselves and each other for the development of symptoms such as sudden fatigue, nausea, dizziness, irritability, malaise, flu-like symptoms, and lightheadedness.

Conditions related to heat stress:

Heat Rash may result from continuous exposure to heat or humid air. It appears as red papules, usually in areas where the clothing is restrictive, and gives rise to a prickly sensation, particularly as sweating increases.

To prevent heat rash, shower after work, dry off thoroughly, and put on clean, dry clothes. Try to stay in a cool place after work. See a physician if the rash continues to develop.

Heat Cramps are caused by heavy sweating with inadequate electrolyte replacement. Symptoms include muscle spasms and pain in the hands, feet and abdomen.

First Aid for Heat Cramps: Leave the work area, and rest in a cool, shaded place. Drink beverages that contain salt or eat salty food. Taking adequate breaks and drinking electrolyte replacement drinks should prevent cramps from returning.

Heat Exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool, moist skin
- Heavy sweating
- Dizziness
- Nausea
- Fainting
- Headache
- Blurred vision
- Vomiting

The key here is that the victim is still sweating, so the cooling system is still working; it's just under severe stress. The body core temperature may be elevated, but not higher than 104ºF. It is important to recognize and treat these symptoms as soon as possible, as the transition from heat exhaustion to the very hazardous heat stroke can be quite rapid.

First Aid for Heat Exhaustion: Treatment involves replacing fluids (rehydration) and salts and removing the person from the hot environment. If symptoms are mild, sipping cool, slightly salty beverages every few minutes may be all that is needed. Removing or loosening clothing and applying a wet cloth or ice packs to the skin also aid cooling.

Heat Stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels, typically at or above 104ºF. Immediate action must be taken to cool the body before serious injury and death occurs. Competent medical help must be obtained. Signs and symptoms are:

- Red, hot, usually dry skin
- Lack of or reduced perspiration (lack of perspiration may be masked for those wearing chemical protective clothing since perspiration from earlier in the day will be present)
- Nausea
- Vomiting
- Dizziness and confusion
- Strong, rapid pulse
- Coma

First Aid for Heat Stroke - THIS IS A MEDICAL EMERGENCY! SUMMON MEDICAL ASSISTANCE IMMEDIATELY! Due to the remoteness of the site, it is suggested that persons with life threatening injuries be transported immediately to the hospital. If unable to move an injured person to vehicles for transport, Emergency Life Flight is available. Coordinates for the WTA landing area are: 48.14961, -103.16645.

While awaiting transportation to the hospital, a person should be wrapped in cold, wet bedding or clothing; immersed in a lake, stream, or cool bathtub; or cooled with ice. At the hospital, body cooling is usually accomplished by removing the clothes and covering the exposed skin with water or ice. To speed evaporation and body cooling, a fan may be used to blow air on the body. Body temperature is measured frequently, often constantly. To avoid overcooling, cooling is stopped when the body temperature is reduced to about 102°F.

8.3 COLD STRESS

Cold stress is a concern when field crews are working outdoors in damp and cool (below 50°F) conditions or anytime temperatures are below 32°F. Personnel should monitor weather forecasts each day and schedule work for the warmer part of the day. While working, ambient temperature, wind speed, and precipitation should be monitored, and a warming regimen should be implemented to allow workers breaks from the cold. Shelter to escape cold, wind, and precipitation, and a source of heat (such as warm packs or portable heaters) should be provided at the worksite. Other cold stress prevention controls include:

94. Changing clothes when work clothes become wet with sweat
95. Avoiding caffeine (which has diuretic and circulatory effects)
96. Ensuring workers drink plenty of warm liquids. It is easy to become dehydrated in cold weather.

When site conditions are as described above, workers should wear at least three layers of clothing, with an inner layer of cotton or synthetic material, a middle layer of down, wool, or similar material to provide insulation, and an outer layer to break the wind and allow some ventilation (e.g., Gortex® or nylon). A hat or hardhat liner will help maintain body heat, and insulated boots and gloves will reduce the chance of frostbite. Workers should keep a change of dry clothing available in case work clothes become wet; drink plenty of warm liquids, avoiding caffeine and alcohol; eat high-calorie snacks to help maintain body metabolism; and work in pairs and watch for signs of cold stress.

Signs of and treatment for cold stress-related illness is presented below in **Table 8-2**.

Hypothermia: Hypothermia results when the body loses heat faster than it can be produced. When this situation first occurs, blood vessels in the skin constrict in an attempt to conserve vital internal heat. Hands and feet are first affected. If the body continues to lose heat, involuntary shivers begin. This is the body's way of attempting to produce more heat, and it is usually the first real warning sign of hypothermia. Further heat loss produces speech difficulty, confusion, loss of manual dexterity, collapse, and finally death. Wet clothes or immersion in cold water greatly increases the hypothermia risk. The progressive clinical presentation of hypothermia is described in the table below.

Frostbite: Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite can be categorized into:

Frost Nip or Initial Frostbite: (1st degree frostbite) Characterized by blanching or whitening of skin.

Superficial Frostbite: (2nd degree frostbite) Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient. Blistering and peeling of the frozen skin will follow exposure.

Deep Frostbite: (3rd degree frostbite) Tissues are cold, pale, and solid; extremely serious injury with possible amputation of affected area.

Frostbite can occur without hypothermia when the extremities do not receive sufficient heat. The toes, fingers, cheeks, and ears are the most commonly affected. Frostbite occurs when there is freezing of the fluids around the cells of the affected tissues. The first symptom of frostbite is an uncomfortable sensation of coldness, followed by numbness. There may be tingling, stinging, or cramping. Contact by the skin with tools or other metal objects below 20°F (-7°C) may result in contact frostbite.

Table 8-2: Signs of Cold Stress-Related Illness and Treatment

Condition	Signs/Symptoms	Treatment
Hypothermia **Mild** Body temperature (98° - 90° F)	• Shivering • Lack of coordination • Stumbling, fumbling hands • Slurred speech • Memory loss • Pale, cold skin	• Move to warm area • Stay active • Remove wet clothes and replace with dry clothes or blankets • Cover the head • Drink warm (not hot) sugary drink for hydration
Hypothermia **Moderate** Body temperature (90° - 86° F)	• Shivering stops • Unable to walk or stand • Confused and irrational	• Move to warm area • Stay active • Remove wet clothes and replace with dry clothes or blankets • Cover the head • Drink warm (not hot) sugary drink for hydration • Call for an ambulance • Cover all extremities completely • Place very warm objects, such as hot packs or water bottles on the victim's head, neck, chest and groin
Hypothermia **Severe** Body temperature (86° - 78° F)	• Severe muscle stiffness • Very sleepy or unconscious • Ice cold skin death	• Call for an ambulance • Treat the victim very gently • Do not attempt to re-warm -- the victim should receive treatment in a hospital
Frostbite	• Cold, tingling, stinging or aching feeling in frostbitten area • Numbness • Skin color turns red, then purple, then white or very pale skin, cold to the touch • Blisters in severe cases	• Seek medical attention • Do not rub the area • Wrap in soft cloth • If help is delayed, immerse in warm, not hot, water
Trench Foot	• Tingling, itching or burning sensation • Blisters	• Soak feet in warm water, then wrap with dry cloth bandages • Drink a warm, sugary drink for hydration

SECTION NINE: SITE CONTROL

AECOM personnel will keep the NDARNG informed of RI activities as well as report any suspicious activities noticed during field operations.

9.1 EXCLUSION ZONES

Although not anticipated in the scope of this project, if site conditions require the establishment of site zones (Section 11.4) the Health and Safety Officer will coordinate the control of on-site access. Only essential personnel will be allowed in the exclusion zone during sampling. Site control will be maintained by communication and the following:

- Sampling will cease if nonessential personnel are present within the exclusion zone.
- A Site Control Log will be maintained to ensure accountability of all personnel on-site.
- Authorized visitors will sign a Site Visitors Log and wear proper PPE.
- Authorized visitors will be escorted at all times by the Health and Safety Officer, or their designee.
- A safety briefing will be provided by the Health and Safety Officer to all personnel or visitors to inform them on the potential hazards. All personnel and visitors must acknowledge this briefing via signature.
- Designated safety areas will be established in case of an emergency. The Health and Safety Office will notify the onsite HSM and PM if an emergency warrants site evacuation.

9.2 SITE COMMUNICATION, HAND SIGNALS AND EMERGENCY COMMUNICATIONS

A cellular phone will be available on site for emergency use. Emergency numbers will be provided to project personnel and will be available at all times workers are on site. Work will not be conducted on site if there is not access to a telephone, and site personnel will be informed of the nearest available telephone.

Cellular service can be problematic in remote areas. The nearest land line telephone is located at Lund's Landing at 11350 ND-1804, Ray, ND 58849, approximately 4.1 miles driving distance from the work site.

9.2.1 Emergency Signals

Emergency signals are critical for alerting workers of danger and to maintain site control during an emergency. All field personnel will be trained to recognize the emergency communications and signals described in **Table 9-1**.

Table 9-1: Emergency Communication Signals

Signal	Meaning
One long sound/blast of the emergency alarm signal, air horn, siren, whistle	Emergency situation, face safety watch and watch or listen for directions
Pause; followed by a number of short sounds, 1, 2, 3, or 4	Evacuate to the predestinated emergency meeting place indicated by the number of sounds
Two long blasts of the emergency alarm signal, air horn, siren, whistle	All clear
Point one arm in direction of evacuation, make a large circling motion with the other arm in direction of evacuation	Evacuate the area
Point index finger toward self	I; me
Point index finger toward object	It; them
Point index finger toward person	You; them
Circle index finger at group	We; us; all of us
Pointed finger on extended arm	Look in that direction
Beckon with index finger	Come here
Point with thumb in a particular direction	Move this way; go this way
Hold index finger up near head	Wait
Slowly ease palm face down	Relax; slow down
Put palm over brow	Scout it out; check it out
Move hand far away from body	Stay away
Hands on top of head	Need assistance
Grip partner's wrist or place both hands around partner's arm	Leave area immediately
Thumbs up	OK; I'm all right
Thumbs down	No; negative; bad; not OK
Hand gripping throat	Cannot breathe; out of air
Wave hands over head from side-to-side	Attention; stand-by for the next signal
Swing hand from direction of person receiving signal to directly overhead and through in circle	Come here
Clenched fist of extended arm	Stop motion/hold position
Draw index finger across front of throat	Shut off engine; cut off power; quit
Place palm face down and rotate from side to side	Unsure; cannot decide
Form a circle with thumb and index finer	OK; I understand; agree
Military salute	I understand and will comply

SECTION TEN: EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

When an emergency occurs, decisive action is required. Decisions must often be made immediately and personnel must be ready to respond immediately to an emergency. For this purpose, pre-emergency planning is an essential part of each project's Emergency Response Plan. Pre-emergency planning tasks will be developed and established prior to the start of site work. Pre-emergency planning for the site includes the following tasks:

- Development and approval of this Emergency Response Plan in accordance with SAM-010-PR1), Emergency Response Planning Procedures.
- Review of this Emergency Response Plan with AECOM and AECOM subcontractor personnel prior to starting work.
- Coordination of the Emergency Response Plan with local health and emergency response agencies.
- Training of site personnel in appropriate emergency procedures.
- Maintaining emergency response equipment on site, such as fire extinguishers, first aid supplies, and spill response equipment.
- Performance of an emergency response practice drill during site mobilization and before site activities begin.
- Modification of the Emergency Response Plan, if necessary, as work progresses.

Expected site conditions and operations have been evaluated by the HSM during the preparation of the Emergency Response Plan to formulate a hazard control program for the types of emergencies that may occur. For other events not anticipated, personnel will stop work, secure the site, and follow procedures as directed

If needed, client requirements will be incorporated into this Emergency Response Plan and communicated to all personnel onsite.

10.1 RESPONSE PRIORITIES

Only if it is safe to do so, AECOM personnel may choose to provide only minimal or first line response to all emergencies.

First Priority: Prevent further injury or illness by:

- Protecting response personnel;
- Isolating the scene to authorized personnel only;
- Notifying emergency response personnel; and
- If possible, rescuing any injured parties.

Second Priority: Provide first aid to persons with life-threatening injuries or illnesses.

Third Priority: Alleviate the immediate hazards by:

- Extinguishing incipient-stage fire;
- Reducing chemical releases; and/or
- Containing any spill.

10.2 EVACUATION ROUTES AND PROCEDURES

In a severe emergency such as a large fire, site evacuation may become necessary. **Table 10-1** provides the procedures for site evacuation. The Health and Safety Officer will be responsible for informing site personnel of the anticipated routes of evacuation during the morning safety briefings. The evacuation route and assembly area will correlate to the wind direction, topography, and the nature of the incident. Personnel will be advised to move to an upwind location at least 100 yards from any fires and/or releases, and will be advised to continually monitor wind direction for changes.

If moving upwind is not possible without encountering the incident, personnel will be advised to move crosswind or downwind to a distance out of the path of vapor releases, smoke, odors, or spills. In the event that a site evacuation becomes necessary, the procedures listed in the table below will be used.

Table 10-1: Site Evacuation Procedures

Step	Procedures
1	Site personnel will be notified of an emergency evacuation via horn signal or verbal command. All site personnel will immediately stop work.
2	All site personnel will evacuate the work area as quickly as possible and assemble at a location at least 100 yards upwind of the incident, or as instructed during the morning safety briefing.
3	The Health and Safety Officer will be responsible for roll call.
4	The Health and Safety Officer will contact emergency response personnel as all site personnel are being accounted for during roll call.
5	The Health and Safety Officer will ensure that emergency apparatus have adequate site access.
6	The Health and Safety Officer will ensure that all combustion equipment has been shut down.
7	All site personnel assembled at the designated safe evacuation area will wait for further instructions from emergency response personnel.

10.3 INJURY/ILLNESS TREATMENT

Site personnel will maintain current First Aid/CPR certifications. In the event of any illness or injury, the following steps will be taken:

- Evaluate the extent of injuries or seriousness of illness.
- When employees require urgent medical attention, transport to the hospital or call for emergency assistance. First aid should be administered while awaiting an ambulance or paramedics. All emergency medical treatment, other than first aid, will be administered by the local paramedics. In all cases, critical injuries must be immediately referred for professional medical attention.
- Due to the remoteness of the site, it is suggested that persons with life threatening injuries be transported immediately to the hospital. If unable to move an injured person to vehicles for transport, Emergency Life Flight is available. Coordinates for the WTA landing area are: 48.14961, -103.16645.

- All first aid will be administered by on-site personnel trained and certified in CPR and first aid.
- All vehicles used to transport injured persons to the off-site medical facility will be provided with directions and a map to the medical facility. The Health and Safety Officer or designee will accompany the victim to the hospital.
- For a non-critical injury/illness, provide first-aid treatment and evaluate the need for further treatment.
  - AECOM personnel will utilize the services of AECOM safety staff or the Incident Hotline (1-800-348-5046) to make this evaluation and approve treatment.
  - If further treatment is approved, the HSM will provide the appropriate forms to the occupational medicine clinic. AECOM personnel should seek treatment from an occupational medicine clinic approved by the workers' compensation insurance carrier.
  - Subcontractor personnel will follow their company procedures for medical treatment and case management.

10.4 CHEMICAL EXPOSURE

In the event of a chemical exposure, the guidelines presented in **Table 10-2** will be followed.

Table 10-2: First Aid for Chemical Exposure

Type of Over Exposure	First-Aid Guidelines
Skin Contact	Skin: Wash/rinse the affected area thoroughly with copious amounts of soap and water.
	Eyes: Eyes should be rinsed for at least 15 minutes following chemical contamination.
	Contact emergency response personnel if required, or transport victim to the hospital.
Ingestion	Contact Poison Control Center.
	Contact emergency response personnel, or transport victim to the hospital.

10.5 DECONTAMINATION DURING A MEDICAL EMERGENCY

As previously indicated, few site operations will trigger contamination of any type. For minor medical problems or injuries, regular decontamination procedures will be followed. If emergency, life-saving first aid and/or medical treatment are required, regular decontamination procedures may need to be abbreviated or omitted:

- If the victim has been contaminated with acid, other chemicals, or contaminated soil: immediately wash or rinse the victim with water to rinse off the material.
- Outer garments can be removed if it does not cause a delay, interfere with treatment, or aggravate the problem.
- PPE can be cut away, and respiratory protective equipment must always be removed.

- If contaminated clothing cannot be safely removed, then the victim should be wrapped in a blanket or plastic sheeting to prevent the contamination of the inside of the ambulance and/or emergency response personnel.

The Health and Safety Officer will advise the medical staff of the type of contamination.

10.6 ON-SITE MEDICAL SUPPORT

AECOM field personnel will have current first aid/CPR certification. These personnel will provide initial treatment, while waiting for the local paramedics to arrive. Emergency medical assistance will be coordinated through the appropriate public emergency response resources. Local fire and police departments will respond to 911 calls and provide emergency response to incidents involving AECOM personnel. As appropriate, emergency responders will administer on-site medical treatment beyond initial first aid and will transport AECOM employees to the hospital, as required. See **Section 10.7** regarding emergency response to remote areas.

10.7 OFF-SITE MEDICAL SUPPORT

In all cases, critical injuries must be immediately referred for professional medical attention.

When employees require urgent medical attention, transport them to the hospital or call for emergency assistance. First aid should be administered while awaiting an ambulance or paramedics. All emergency medical treatment, other than first aid, will be administered by the local paramedics.

Due to the remoteness of the site, it is suggested that persons with life threatening injuries be transported immediately to the hospital. If unable to move an injured person to vehicles for transport, Emergency Life Flight is available. Coordinates for the Williston LTA landing area are: 48.14961, -103.16645.

Figure 10-1 and Figure 10-2 provide maps and directions to the nearest hospital and occupational health clinic, respectively. **Table 10-3** lists the emergency telephone numbers for the site. In the event that 911 service is not available at the work site, NDARNG PM Stephen Herda (701-527-1065) should be contacted to direct emergency personnel to the work site.

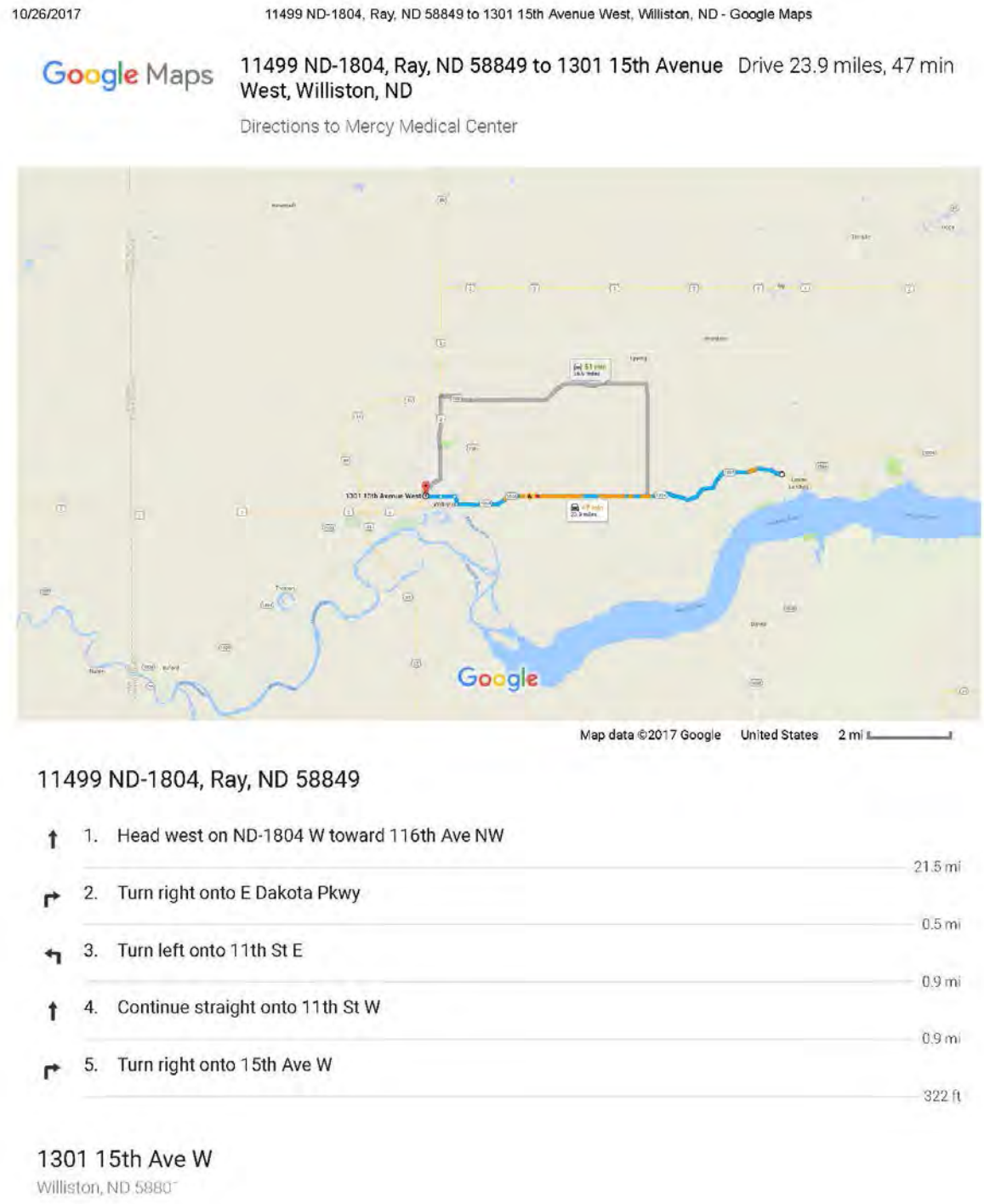
Table 10-3: Williston LTA Emergency Telephone Numbers

EMERGENCY TELEPHONE NUMBERS	
Ambulance Service:	911*
Fire:	911*
Police:	911*
Hospital: CHI St. Alexius Health – Williston Medical Center 1301 15th Ave W, Williston, ND 58801	(701) 774-7400
National Spill Response Center	(800) 424-8802
Poison Control Center	(800) 222-1222
Federal OSHA Hot Line	(800) 321-6742
THE FOLLOWING AECOM PEOPLE WILL BE NOTIFIED IF AN INCIDENT HAS OCCURRED:	
AECOM Region SH&E Manager:	Work: (813) 645-2804

EMERGENCY TELEPHONE NUMBERS	
Tony Indorato	Cell: (757) 298-1563
AECOM HSM & Area SH&E Manager: Alberto Munuera	Cell: (757) 408-4276
Incident Hotline	(800) 348-5046
AECOM Health & Safety Officer: Jennifer Li	Work: (301) 820-3476 Cell: (301) 272-4948
AECOM PM: Laurie Stenberg	Work: (301) 820-3123 Cell: (301) 580-6067
ARNG	
ARNG PM/COR: MAJ Julie Hatcher	Work: (703) 601-7608
ARNG ND PM: Stephen Herda	Work: (701) 333-2070 Cell: (701) 527-1065

* = if 911 service is not available at the work site, call Stephen Herda (NDARNG) at (701) 527-1065 (cell) to direct emergency personnel to the work site.

Figure 10-1: Hospital Directions



10/26/2017 11499 ND-1804, Ray, ND 58849 to 1301 15th Avenue West, Williston, ND - Google Maps

Google Maps

11499 ND-1804, Ray, ND 58849 to 1301 15th Avenue West, Williston, ND

Drive 23.9 miles, 47 min

Directions to Mercy Medical Center

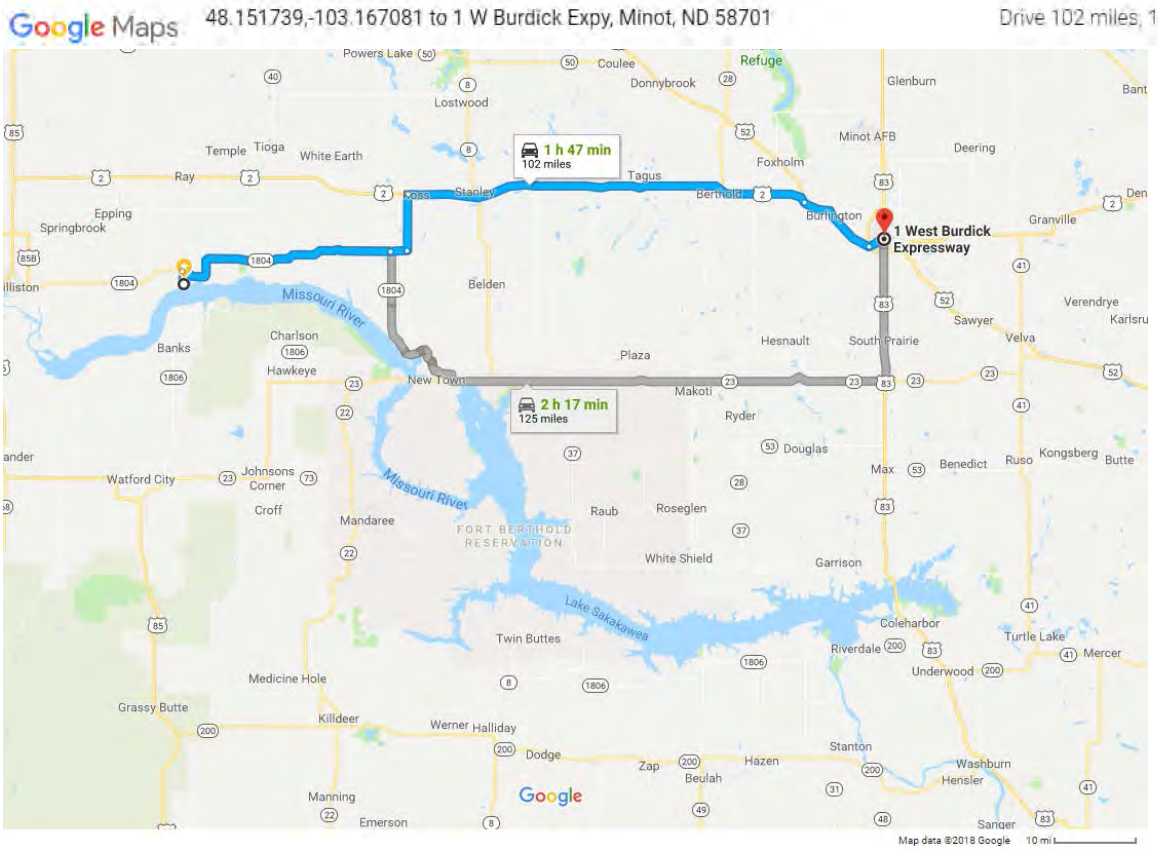
11499 ND-1804, Ray, ND 58849

1. Head west on ND-1804 W toward 116th Ave NW — 21.5 mi
2. Turn right onto E Dakota Pkwy — 0.5 mi
3. Turn left onto 11th St E — 0.9 mi
4. Continue straight onto 11th St W — 0.9 mi
5. Turn right onto 15th Ave W — 322 ft

1301 15th Ave W

Williston, ND 5880

Figure 10-2: Clinic Directions



48.151739,-103.167081

Take ND-1804 E to US-2 E in Manitou

46 min (40.0 mi)

1. Head east toward ND-1804 E

2.4 mi

2. Turn right onto ND-1804 E

28.5 mi

3. Turn left onto 55th St NW

2.2 mi

4. Continue onto 90th Ave NW

6.9 mi

5. Continue onto 90th Ave NW

171 ft

Follow US-2 E to US-2 BUS E/US-52 BUS in Harrison

55 min (60.2 mi)

6. Turn right onto US-2 E

50.0 mi

7. Continue straight onto US-2 E/US-52 E

10.2 mi

8. Turn left onto US-2 BUS E/US-52 BUS

Destination will be on the right

5 min (2.2 mi)

10.8 MEDICAL SURVEILLANCE

AECOM's SAM-128-PR1, Medical Screening and Surveillance, details the requirements to participate in a medical monitoring program. Medical Surveillance provides a streamlined process to determine if employees meet the physical requirements to perform assigned duties as defined by applicable regulations. It is also designed to provide a means to collect data relevant to exposure to chemical and physical agents for the protection of the workers and to confirm the effectiveness of health and safety programs

All accidents and potential exposures must be reported immediately to the Health and Safety Officer, HSM, or Area or Region SH&E Manager to arrange for medical exams or tests that may be indicated as part of the medical surveillance program. Depending on the type of incident, it may be critical to perform tests within 24 to 48 hours. Failure to report an injury or incident immediately will result in disciplinary action.

10.9 EMERGENCY RESPONSE PLANS (FIRES)

10.9.1 Small Incident/Fire

A small fire is defined as a fire that can be extinguished with an available 20-pound ABC fire extinguisher. An incipient fire is a fire that is small because it has just started. In the event of a small or incipient fire, the following minimum actions will be taken:

- Evacuate nearby personnel from the area, if possible, to an upwind location, or to an area not affected by smoke or hazardous decomposition products if an upwind location is not feasible.
- Attempt to extinguish fire using portable fire extinguisher or by smothering.
- Contact emergency response personnel, as needed, for any injuries or exposures to hazardous decomposition products.
- After the fire has been extinguished, or emergency response personnel have been contacted, notify the AECOM PM and HSM.

10.9.2 Large Fire/Explosion

An explosion, large fire, or a small fire that cannot be extinguished is beyond the first line response capabilities of AECOM personnel. Professional emergency response personnel would be needed to provide emergency assistance for these types of incidents. In the event of a large fire, explosion, or a small fire that cannot be extinguished, the following minimum actions will be taken:

- Evacuate all personnel from the site, if possible, to an upwind location, or to an area not affected by smoke or hazardous decomposition products if an upwind location is not feasible.
- Perform a quick roll call to account for all site personnel.
- Contact the fire department.

- Contact emergency response personnel, as needed, for any injuries or exposures to hazardous decomposition products.
- After emergency response personnel have been contacted, notify the PM and HSM

10.9.3 Fires Involving Explosives

If a fire occurs in an area containing explosive materials, the Health and Safety Officer will immediately direct site personnel to an upwind location. The Health and Safety Officer will make notifications to the appropriate agencies. At no time will AECOM personnel fight a fire where explosive material is present.

10.9.4 Hazardous Substance Spill or Release

It is not expected that any spills of hazardous materials will occur from AECOM activities on site. In the event that a hazardous substance spill or release occurs, the following steps will be taken:

- Evacuate site personnel, if necessary. Follow the evacuation sequence outlined in Section 10.2.
- Attempt to determine the source of leak or release, the contaminants involved, and the approximate volume of the leaked or released substance.
- After the spill/release has been contained, or emergency response personnel have been contacted, notify the PM.
- A spill or release of a hazardous substance at or above its reportable quantity will require reporting to the National Spill Response Center at (800) 424-8802.

10.9.5 Emergency Equipment and First Aid Requirements

First aid/CPR support will be provided by trained AECOM personnel. In the event that specialized or elevated care is necessary, the AECOM Incident Hotline (800-348-5046) or 911ambulance service will advise or transport the injured person to the appropriate medical facility.

A supply of emergency and first aid PPE and equipment will be maintained in sufficient quantities to ensure an adequate supply for response. All emergency equipment will be fully stocked and readily accessible. American Red Cross First Aid and CPR Instruction Manuals will readily accessible. The following supplies will be available:

- Bloodborne pathogens personal protective equipment kit (minimum requirements are nitrile gloves [2 pairs] and CPR shield)
- Allergy response kit
- Portable, plastic or metal, water-resistant first-aid kit, with handle and manual
- Industrial first-aid kit (one 16-unit kit that complies with American National Standards Institute [ANSI] Z308A for every 25 persons or fewer) with the following supplies:

  - Flashlight/batteries
  - Bandage scissors
  - Gloves, latex free: 2 pair
  - Red bag for biohazard waste disposal
  - CPR breathing barrier
  - Individually wrapped items:
    - Compress bandages - minimum of six in sizes ranging from 2" to 4"
    - Assorted adhesive bandages (at least 16)
    - Sterile gauze compress pads: 4" x 4"
    - Sterile nonstick gauze pads 3" x 3", minimum of 4 packages
    - Water-soluble burn dressing with gel pad (for minor burns, use after cold water soak), at least 6
    - Occlusive dressings: 4”x4”
    - Butterfly strips (wound closure)
  - Tape (hypoallergenic), at least 5 yards of 3/8" wide
  - Antiseptic (alcohol prep pads, towelette, or swab), at least 10 individual-use packages (must meet Food and Drug Administration CFR 333 requirements)
  - Iodine prep pads (if not allergic to iodine, use after soap and water wash for bloodborne exposure)
  - Ice pack or cold pack
  - Gauze roller bandages: two 2" x 6 yards and one 4" x 6 yards
  - Tweezers (one use, disposable)
  - Temperature strips
  - Triangular bandage: 40" x 40" x 56"
  - Sterile normal saline eye wash, 4-ounce bottle
  - Eye covering, at least 2
  - Antibiotic - individual use packages only, at least 6
  - Insect sting relief wipes or spray
  - Aspirin, individually wrapped: at least 2 doses
  - Tourniquet with windlass, combat-style: (when power tools in use)
- Spill control/absorption supplies
- Soap or waterless hand cleaner and towels
- Technu or alternative poison ivy wash or wipes
- Fire extinguishers placed in the following locations:
  - In each motor vehicle (10B:C)
  - On site (2A:20B:C)

SECTION ELEVEN: GENERAL PLAN

11.1 GENERAL SITE RULES

- All site personnel will wear PPE as required by the task.
- The buddy system will be observed at all times.
- Entry into exclusion zones not permitted without Health and Safety Officer approval and sign-in.
- All site personnel who wear corrective lenses will provide their own prescription safety glasses.
- Horseplay will not be tolerated.
- Smoking is allowed only in area designated by the Health and Safety Officer.
- Proper site housekeeping (including removal of trash and orderly stacking and removal of materials to reduce slipping, tripping, and fire hazards) will be the responsibility of all site personnel on a daily basis.
- If any unusual site conditions are noted (odors, presence of unknown liquids, suspect biohazards) or any symptoms are experienced, work will be stopped until site hazards can be evaluated.

11.2 SANITATION

Sanitation issues for this site will include the following:

- Drinking/potable water
- Toilets

Employees will not be required to perform work under unsanitary conditions. AECOM will establish and maintain hygienic sanitation provisions at Williston LTA including the following:

- Drinking/potable water (bottled water) will be kept onsite during field activities. This will be replenished, as necessary, to provide adequate supplies of potable water. Soap and water will also be available at the jobsite for washing body parts.
- Containers used for drinking water will be clearly marked and not used for any other purpose.
- Cups must not be shared by employees.
- Non-potable water (i.e., lake/river water) will not to be used by employees for drinking, washing, or cooking purposes.
- Toilet facilities will be available at Lund's Landing, approximately 4 miles from the MRS. Permission will be requested from Lund's Landing prior to start of work. If not granted, a portable toilet will be brought to a reasonably accessible portion of the site.

- Disposable PPE will eliminate the need for a Personnel Decontamination Station. Used PPE and refuse generated during field activities will be collected in trash bags and disposed of at an approved location.

11.3 CONTAMINATION PREVENTION

One of the most important aspects of decontamination is the prevention of contamination. Good contamination prevention should minimize worker exposure. During the use of hazardous chemicals or when potentially contaminated materials (e.g., soil) are encountered, contamination prevention protocols will be implemented. Procedures for contamination prevention for personnel include:

- Do not handle or touch contaminated materials directly.
- Make sure all PPE is free of cuts or tears prior to donning.
- Fasten all closures on suits, covering with tape if necessary.
- Particular care should be taken to protect any skin injuries. If open wounds exist on hands or forearms, handling contaminated materials or samples should be restricted or eliminated.
- Stay upwind of airborne contaminants.
- Do not carry cigarettes, gum, chewing tobacco, cosmetics, etc. into potentially contaminated areas.

Procedures for contamination prevention for equipment include:

- Take care to limit the amount of contamination that comes in contact with heavy equipment.
- If contaminated tools are to be placed on non-contaminated equipment for transport, use plastic to keep non-contaminated surfaces clean.

11.4 SITE ZONES

Although not anticipated in the scope of this project, should site conditions require the establishment of site zones to control the potential spread of contamination, a three-zone system will be implemented. Prior to the start of any activities involving the contaminants of concern, a Support Zone (SZ), a Transition Zone (TZ), and an EZ will be identified.

- *Support Zone* - A non-contaminated area that will be separated from the EZ by the TZ. It contains a center for team communications and emergency response. Appropriate sanitary, safety, and support equipment are also located in this zone. Site operations will be controlled from this location. A log will be kept in the SZ of all personnel entering and exiting the site.
- *Transition Zone* - Established between the EZ and the SZ, the TZ provides for personnel and equipment decontamination. The TZ will be used for EZ entry and exit and for donning and removing PPE.

- *Exclusion Zone* - The areas that contain, or are suspected to contain physical hazards or contaminants of concern are the EZs. Prior to the start of each task, the EZ "hot line," or boundary, will be clearly identified using physical marking systems, which may include stanchions, warning tape, jersey barriers, fencing, or other methods. The Health and Safety Officer will determine the appropriate type of physical marking system at the time of zone establishment. Selection will depend on the activity being conducted within the EZ, as well as the potential for the presence of visitors in the area. All areas that contain, or are suspected to contain, contaminants of concern will be marked as an EZ. Personnel are not allowed in the EZ without:
    - A "buddy"
    - Appropriate PPE
    - Current OSHA medical authorization
    - Current OSHA training certification

Work areas will be clearly marked to alert visitors to the hazards associated with the area. This shall include the placement of appropriate signage and, where necessary, the erection of physical barriers (e.g., barricades). At a minimum, caution tape will be used to mark EZs.

11.5 PERSONNEL DECONTAMINATION

All personnel handling hazardous chemicals will pass through a decontamination station, where conditions necessitate. To reduce the volume of water generated through decontamination, protective clothing will be discarded instead of cleaned and reused. The generation of decontamination water should be minimized whenever possible. The steps outlined in **Table 11-1** will be taken for personnel decontamination when exiting the chemical handling area. The decontamination setup is subject to modification by the Health and Safety Officer.

Equipment and supplies needed for the personnel decontamination station include:

- Plastic buckets and scrub brushes for glove wash and rinse
- Plastic sheeting
- Wash tubs for boot wash and rinse
- Detergent/water solution (non-phosphate detergent)
- Long-handled soft bristle scrub brushes for boot wash

Table 11-1: Personnel Decontamination Procedure

Step	Description
1	Deposit all equipment and tools used in the EZ onto plastic sheeting or into plastic-lined containers.
2	Scrub boots and any soiled PPE thoroughly with a soapy wash solution and a scrub brush. Rinse off boots and PPE.
3	Remove tape from around boots and sleeves and dispose of into a plastic-lined drum.
4	Remove gloves (inside out) and dispose of into a plastic-lined drum.
5	Thoroughly wash prior to eating, drinking, smoking, or using the rest room.

11.6 EQUIPMENT DECONTAMINATION

Hand tools will be decontaminated using phosphate free detergent and distilled water. Wash water is anticipated to be minor in volume and discharged directly at the site of generation. All tools will be cleaned prior to site entry to remove grease, oil, dirt, or any other off-site materials. The Health and Safety Officer will inspect the equipment prior to approving the items for use on site. The Health and Safety Officer will also be responsible for inspecting all items for adequacy of decontamination prior to removal off site. The inspection will be noted in the Health and Safety Officer's logbook. Other site materials will be disposed of as normal trash.

The steps in **Table 11-2** will be taken when decontaminating small equipment:

Table 11-2: Small Equipment Decontamination Procedure

Step	Description
1	Wrap small equipment such as soil probe and hand auger in plastic sheeting.
2	Transport the small equipment from the EZ to the decontamination location.
3	Rinse small equipment with a spray bottle filled with distilled water.
4	Scrub small equipment with soapy water using brushes and a phosphate-free soap.
5	Rinse small equipment with distilled water until free from suds.
6	Place small equipment on clean plastic sheeting and allow it to dry.

11.7 DISPOSAL OF DECONTAMINATION WASTE

PPE that may have come in contact with contaminated media will be decontaminated with phosphate free detergent and rinsed with potable water. The used and decontaminated PPE will be collected in plastic trash bags and disposed of as regular trash. The small volumes of decontamination water will be allowed to infiltrate into the soil.

11.8 WORK / REST SCHEDULE AND PROCEDURES

As discussed in **Section 8.2**, a work/rest cycle will be established if the heat index exceeds 77.0 ^{o}F (for personnel wearing standard work clothing). Rest periods will be increased in frequency and duration based on the heat index (**Figure 8-1**). Breaks will be taken as needed by field staff to use the wash room and toilet facilities located at Lund's Landing or nearest portable toilet.

A designated eating and drinking location will be established by the health and safety officer when operations on site begin. The applicable procedures of **Section 11.5** will be followed prior to entering or exiting the site. Site workers will be provided with pre-moistened hand wipes for use in the field prior to eating or drinking. Wipes will be disposed of as general trash.

Smoking on site and within vehicles is prohibited. Smoking is permitted during breaks to Lund's Landing in their established smoking area. Cigarette butts shall only be disposed of in receptacles provided by the establishment.

11.9 DISCOVERY OF MUNITIONS AND EXPLOSIVES OF CONCERN (MEC)

There is no historical evidence of that MEC may be present within the MRS. Although the MRS is a former small arms range, UXO support will be provided by USACE during field work. In addition, AECOM field personnel will be experienced in military munitions work and know the "3Rs" for MEC safety: Recognize, Retreat, and Report.

Field staff will follow the guidance of USACE UXO personnel during sampling. Intrusive activities will only be conducted in areas where UXO personnel have cleared and deemed safe to sample. Although unlikely, should any material be discovered that may pose an explosive hazard during field work, field staff will:

1. Immediately STOP WORK and evacuate the immediate area
2. Call to notify AECOM PM – Laurie Stenberg (301-580-6067)
    a. AECOM PM will notify the ARNG Contracting Officer's Representative and the property owner
3. Call to notify NDARNG contact – Stephen Herda (701-527-1065)
    a. NDARNG contact will notify Air National Guard Explosives Ordnance Disposal Team to immediately respond (701-451-2889)
4. Stay on-site until Explosives Ordnance Disposal personnel have arrived.
5. Safety protocols for continuation of work will be re-evaluated, for instance, MEC avoidance protocols may need to be initiated to complete the RI field work.

SECTION TWELVE: REQUIRED DOCUMENTATION AND REPORTING

The following documentation must be kept on site or readily accessible:

- Current Hazardous Waste Operation and Emergency Response (HAZWOPER) training certificates (including 8-hour refresher and site supervisor training);
- Current First Aid/CPR certification;
- SDSs for all hazardous chemicals brought on site by AECOM and its subcontractors;
- OSHA-required medical surveillance examination clearance records;
- Field logbook;
- Copies of any Incident Reports such as:
  - AECOM Incident Report; and
- Signed copies of the SSHP Compliance Agreement;
- Site Safety Briefing Form;
- Deficiency Tracking Log
- Completed AHA forms
- Medical Data Sheets for all site personnel;
- Any other permits, training records, or documentation.

12.1 TRAINING LOGS

Training logs will include initial site-specific safety training, daily safety briefings, weekly "toolbox" topic training, and visitor training. A record of the training will be documented on a training log, which will include the following information:

- The date;
- Employee's name;
- Time allocation in training session;
- Training topic(s); and
- Trainer(s) signature.

12.2 FIELD LOG BOOKS

The Health and Safety Officer will maintain a logbook on site in accordance with standard AECOM procedures. Complete and detailed documentation of site activities will be very important. The following information will be recorded on a daily basis:

- Site conditions (e.g., weather);
- Activities being performed;
- Log of photographs taken;
- Personnel on site;
- Site visitors;
- Incidents, accident, and near misses;
- Violations of health and safety procedures; and
- Other significant events.

12.3 INCIDENT REPORTING

Any incident for which assistance by SH&E is required, including any injury – even if no first aid is required – must be reported. Incident reporting procedures are described below. Incidents include any injury, fires, environmental releases, vehicle incidents, incidents where the public is involved, and security-related incidents. See **Table 10-3** for Emergency Telephone Numbers.

1. If the incident is a significant or life-threatening emergency, the employee or supervisor shall immediately dial 911 or the appropriate emergency contact phone number for the site.
2. The employee or supervisor shall contact the AECOM Incident Hotline (800-348-5046) for assistance with all non-life-threatening injuries or illnesses.
3. Within 1 hour, the employee or supervisor must verbally notify their operational leader or Area SH&E Manager.
4. The supervisor, or delegate, must make initial notification in AECOM's incident reporting system "IndustrySafe" (https://www.industrysafe.com/AECOM/) within 4 hours for significant incidents, or 24 hours for less significant events event.
5. AECOM PM will verbally notify the Contracting Officer's Representative of an incident as soon as reasonably possible, but not more than 24 hours after the incident.

SECTION THIRTEEN: REFERENCES

North Dakota Game and Fish Department, https://gf.nd.gov/gnf/conservation/docs/amphibian-reptile-brochure, Accessed October 2017

U.S. Department of Agriculture Plants Database, http://plants.usda.gov/java/stateSearch, Accessed October 2017.

U.S. Department of Agriculture, Office of Homeland Security & Emergency Coordination Radiation Safety Division. Portable X-Ray Fluorescence Analyzer https://www.dm.usda.gov/ohsec/rsd/xfa.htm. Accessed January 2017.

USACE, 2014. Safety and Health Requirements Manual, EM 385-1-1. 30 November.

Attachment A

AECOM Safety, Health and Environment Policy and Management System

AECOM Imagine it. Delivered.

Safety, Health & Environment Policy

Purpose

This policy establishes the framework to attain best-in-class Safety, Health and Environmental (SH&E) performance in the interest of benefitting AECOM's employees and stakeholders in the global marketplace.

Policy

AECOM is committed to exceptional levels of performance in safeguarding our people and the environment as one of our Core Values. Keeping our people safe is our most important measure of success. We strive to be the beacon of safety excellence in the industries and global communities in which we work.

To advance our SH&E program, we are committed to:

- Zero work-related injuries to AECOM employees and protection of the environment as a result of our activities.
- Providing a highly effective SH&E management system that drives continual review and improvement.
- Meeting client requirements and properly incorporating all safety, health and environmental rules and regulations at the local, state, provincial and national levels.
- Developing an exceptional safety culture where our people embrace ownership for the safety of themselves and others.
- Advancing our goals of pollution prevention, resource conservation and environmental sustainability.
- Setting and meeting aggressive SH&E performance goals and Core Value Metrics to promote continuous improvement.
- Working with employees and business partners to continuously improve SH&E performance.
- Recognizing and celebrating those who contribute to excellent SH&E performance.
- Striving to make AECOM the provider of choice for the safe execution of design, build, finance, operate and maintenance work globally.

The commitment to this policy by the leadership, management and employees of AECOM provides the foundation for a safe workplace, operational excellence and long-term business success.

Expectations

Safety is a core value and a key to our success. We demand continuous improvement in our journey toward a "zero" incident culture, where everyone is committed to safety, health and environmental excellence.

To that end, we demand:

- Our leaders, managers, supervisors and employees demonstrate their commitment in their actions and decisions to assure that every person goes home safe every day.
- Our employees embrace safety as a core value both on and off the job.
- Each employee is committed to his/her own safety and that of his/her fellow employees.
- We will incorporate AECOM's Life-Preserving Principles into our work planning and execution.
- We proactively and aggressively identify, manage and eliminate hazards in the workplace.
- We train and prepare our people to have the knowledge, skills, competency and equipment required to work safely.
- We stop our employees from working if the work cannot be executed safely or if conditions or behaviors on the work activity are unsafe.
- All employees immediately report safety, health and/or environmental incidents, near-misses, unsafe conditions, and at-risk behaviors to their supervisor; and that we diligently work to correct the problem.

Our SH&E expectations will be accomplished by the demonstrated leadership of management, compliance with regulatory requirements and participation of AECOM personnel.

Review and Communication

This Policy will be reviewed annually to ensure it meets the needs of the company, and will be made available to all persons under the control of the company.

March 4, 2018

Michael S. Burke — Date

Chairman and Chief Executive Officer

Attachment B

Safety Data Sheets

SAFETY DATA SHEET

Creation Date 12-Mar-2009 **Revision Date** 18-Jan-2018 **Revision Number** 7

1. Identification

Product Name **Nitric acid (65 - 70%)**

Cat No. : **A198C-212, A200-212, A200-212LC, A200-500, A200-500LC, A200-612GAL, A200C-212, A200S-212, A200S-212LC, A200S-500, A200SI-212, A467-1, A467-2, A467-250, A467-500, A483-212; S719721**

CAS-No 7697-37-2
Synonyms Azotic acid; Engraver's acid; Aqua fortis

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Oxidizing liquids	Category 3
Corrosive to metals	Category 1
Skin Corrosion/irritation	Category 1 A
Serious Eye Damage/Eye Irritation	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
May intensify fire; oxidizer
May be corrosive to metals
Causes severe skin burns and eye damage

Precautionary Statements
Prevention
Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep/Store away from clothing/ other combustible materials
Take any precaution to avoid mixing with combustibles
Keep only in original container
Wear respiratory protection
Response
Immediately call a POISON CENTER or doctor/physician
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER or doctor/physician
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
IF SWALLOWED: Rinse mouth. DO NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Spills
Absorb spillage to prevent material damage
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Store in corrosive resistant polypropylene container with a resistant inliner
Store in a dry place
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Corrosive to the respiratory tract

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Nitric acid	7697-37-2	65 - 70
Water	7732-18-5	30 - 35

4. First-aid measures

General Advice Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

	Immediate medical attention is required.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Remove and wash contaminated clothing before re-use. Call a physician immediately.
Inhalation	If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Remove from exposure, lie down. Call a physician immediately.
Ingestion	Do not induce vomiting. Never give anything by mouth to an unconscious person. Clean mouth with water. Call a physician immediately.
Most important symptoms and effects	Causes burns by all exposure routes. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	CO_2, dry chemical, dry sand, alcohol-resistant foam.
Unsuitable Extinguishing Media	No information available
Flash Point	Not applicable
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Oxidizing Properties	Oxidizer
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. The product causes burns of eyes, skin and mucous membranes. Oxidizer: Contact with combustible/organic material may cause fire. May ignite combustibles (wood paper, oil, clothing, etc.).

Hazardous Combustion Products
Nitrogen oxides (NOx) Thermal decomposition can lead to release of irritating gases and vapors
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
4	0	0	OX

6. Accidental release measures

Personal Precautions	Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Sweep up and shovel into suitable containers for disposal.

7. Handling and storage

Handling

Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not ingest. Do not breathe vapors or spray mist. Keep away from clothing and other combustible materials.

Storage

Keep containers tightly closed in a cool, well-ventilated place. Do not store near combustible materials.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Nitric acid	TWA: 2 ppm STEL: 4 ppm	(Vacated) TWA: 2 ppm (Vacated) TWA: 5 mg/m^3 (Vacated) STEL: 4 ppm (Vacated) STEL: 10 mg/m^3 TWA: 2 ppm TWA: 5 mg/m^3	IDLH: 25 ppm TWA: 2 ppm TWA: 5 mg/m^3 STEL: 4 ppm STEL: 10 mg/m^3	TWA: 2 ppm TWA: 5 mg/m^3 STEL: 4 ppm STEL: 10 mg/m^3

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures

Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection

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

Skin and body protection

Long sleeved clothing.

Respiratory Protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures

Keep away from food, drink and animal feeding stuffs. When using, do not eat, drink or smoke. Contaminated work clothing should not be allowed out of the workplace. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes and clothing. For environmental protection remove and wash all contaminated protective equipment before re-use. Wear suitable gloves and eye/face protection.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Clear Colorless, Light yellow
Odor	Strong Acrid
Odor Threshold	No information available
pH	< 1.0 (0.1M)
Melting Point/Range	-41 °C / -41.8 °F
Boiling Point/Range	Not applicable
Flash Point	Not applicable
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable

Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	0.94 kPa (20°C)
Vapor Density	No information available
Specific Gravity	1.40
Solubility	miscible
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	HNO3
Molecular Weight	63.01

10. Stability and reactivity

Reactive Hazard Yes

Stability Oxidizer: Contact with combustible/organic material may cause fire.

Conditions to Avoid Incompatible products. Combustible material. Excess heat. Exposure to air or moisture over prolonged periods.

Incompatible Materials Combustible material, Strong bases, Reducing agents, Metals, Powdered metals, Organic materials, Aldehydes, Alcohols, Cyanides, Ammonia, Strong reducing agents

Hazardous Decomposition Products Nitrogen oxides (NOx), Thermal decomposition can lead to release of irritating gases and vapors

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.

Dermal LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.

Vapor LC50 Based on ATE data, the classification criteria are not met. ATE > 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Nitric acid	Not listed	Not listed	LC50 = 2500 ppm. (Rat) 1h
Water	-	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Causes severe burns by all exposure routes

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Nitric acid	7697-37-2	Not listed	Not listed	Not listed	Not listed	Not listed
Water	7732-18-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. Large amounts will affect pH and harm aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Nitric acid	Not listed	LC50: = 72 mg/L, 96h (Gambusia affinis)	Not listed	Not listed

Persistence and Degradability Miscible with water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Nitric acid	-2.3

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN2031
Proper Shipping Name NITRIC ACID
Hazard Class 8
Subsidiary Hazard Class 5.1
Packing Group II

TDG

UN-No UN2031
Proper Shipping Name NITRIC ACID
Hazard Class 8
Subsidiary Hazard Class 5.1
Packing Group II

IATA

UN-No UN2031
Proper Shipping Name NITRIC ACID
Hazard Class 8
Subsidiary Hazard Class 5.1
Packing Group II

IMDG/IMO

UN-No	UN2031
Proper Shipping Name	NITRIC ACID
Hazard Class	8
Subsidiary Hazard Class	5.1
Packing Group	II

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Nitric acid	X	X	-	231-714-2	-		X	X	X	X	X
Water	X	X	-	231-791-2	-		X	-	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Nitric acid	7697-37-2	65 - 70	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Nitric acid	X	1000 lb	-	-

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Nitric acid	-	TQ: 500 lb

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Nitric acid	1000 lb	1000 lb

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Nitric acid	X	X	X	X	X
Water	-	-	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product contains the following DHS chemicals:

Component	DHS Chemical Facility Anti-Terrorism Standard
Nitric acid	2000 lb STQ

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 12-Mar-2009
Revision Date 18-Jan-2018
Print Date 18-Jan-2018
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017 **Revision** : 05/17/2017

Trade Name: Liquinox

1 Identification of the substance/mixture and of the supplier

1.1 Product identifier

Trade Name: Liquinox
Synonyms:
Product number: Liquinox

1.2 Application of the substance / the mixture : Cleaning material/Detergent

1.3 Details of the supplier of the Safety Data Sheet

Manufacturer	Supplier
Alconox, Inc. 30 Glenn Street White Plains, NY 10603 1-914-948-4040	Not Applicable

Emergency telephone number:
ChemTel Inc
North America: 1-800-255-3924
International: 01-813-248-0585

2 Hazards identification

2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments.

Hazard-determining components of labeling:
Alcohol ethoxylate
Sodium alkylbenzene sulfonate
Sodium xylenesulphonate
Lauramine oxide

2.2 Label elements:

Eye irritation, category 2A.
Skin irritation, category 2.

Hazard pictograms:

Signal word: Warning

Hazard statements:
H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P501 Dispose of contents and container as instructed in Section 13.

Additional information: None.

Hazard description

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Hazards Not Otherwise Classified (HNOC): None

Information concerning particular hazards for humans and environment:

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:

The classification is according to EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

3 Composition/information on ingredients

3.1 Chemical characterization : None

3.2 Description : None

3.3 Hazardous components (percentages by weight)

Identification	Chemical Name	Classification	Wt. %
CAS number: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	10-25
CAS number: 1300-72-7	Sodium Xylenesulphonate	Eye Irrit. 2; H319	2.5-10
CAS number: 84133-50-6	Alcohol Ethoxylate	Skin Irrit. 2 ; H315 Eye Dam. 1; H318	2.5-10
CAS number: 1643-20-5	Lauramine oxide	Skin Irrit. 2 ; H315 Eye Dam. 1; H318	1-2

3.4 Additional Information: None.

4 First aid measures

4.1 Description of first aid measures

General information: None.

After inhalation:

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

After swallowing:

Rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

4.2 Most important symptoms and effects, both acute and delayed

None

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Trade Name: Liquinox

4.3 Indication of any immediate medical attention and special treatment needed:

No additional information.

5 Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For safety reasons unsuitable extinguishing agents : None

5.2 Special hazards arising from the substance or mixture :

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Protective equipment:

Wear protective eye wear, gloves and clothing.
Refer to Section 8.

5.4 Additional information :

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.
Avoid contact with skin, eyes and clothing.

6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures :

Ensure adequate ventilation.
Ensure air handling systems are operational.

6.2 Environmental precautions :

Should not be released into the environment.
Prevent from reaching drains, sewer or waterway.

6.3 Methods and material for containment and cleaning up :

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections : None

7 Handling and storage

7.1 Precautions for safe handling :

Avoid breathing mist or vapor.
Do not eat, drink, smoke or use personal products when handling chemical substances.
Conditions for safe storage, including any incompatibilities:
Store closed upright and in a cool dry place, should be 15 - 30 deg C or 60 - 90 deg F.

7.2 Specific end use(s):

No additional information.

Safety Data Sheet

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Trade Name: Liquinox

8 Exposure controls/personal protection

8.1 Control parameters :

No applicable occupational exposure limits

8.2 Exposure controls

Appropriate engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

General hygienic measures:

Wash hands before breaks and at the end of work.
Avoid contact with skin, eyes and clothing.

9 Physical and chemical properties

Appearance (physical state, color):	Pale yellow liquid	**Explosion limit lower**: **Explosion limit upper**:	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	**Vapor pressure at 20°C**:	Not determined or not available.
Odor threshold:	Not determined or not available.	**Vapor density**:	Not determined or not available.
pH-value:	8.5 as is	**Relative density**:	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	**Solubilities**:	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	**Partition coefficient (n-octanol/water)**:	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	**Auto/Self-ignition temperature**:	Not determined or not available.

Evaporation rate:	Not determined or not available.	**Decomposition temperature**:	Not determined or not available.
Flammability (solid, gaseous):	Not determined or not available.	**Viscosity**:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.

Safety Data Sheet

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Effective date: 05/17/2017 **Revision** : 05/17/2017

Trade Name: Liquinox	
Density at 20°C:	Not determined or not available.

10 Stability and reactivity

10.1 Reactivity : None

10.2 Chemical stability : None

10.3 Possibility hazardous reactions : None

10.4 Conditions to avoid : None

10.5 Incompatible materials : None

10.6 Hazardous decomposition products : None

11 Toxicological information

11.1 Information on toxicological effects :

Acute Toxicity:

Oral:

: LD50 >5000 mg per kg Rat, Oral) - product .

Chronic Toxicity: No additional information.

Skin corrosion/irritation:

Alcohol Ethoxylate: May cause mild to moderate skin irritation.

Sodium Alkylbenzene Sulfonate: Causes skin irritation.

Lauramine oxide: Causes skin irritation.

Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye irritation.

Alcohol Ethoxylate: Causes moderate to severe eye irritation and conjunctivitis.

Sodium xylenesulphonate: Rabbit: irritating to eyes.

Lauramine oxide: Causes serious eye damage.

Respiratory or skin sensitization: No additional information.

Carcinogenicity: No additional information.

IARC (International Agency for Research on Cancer): None of the ingredients are listed.

NTP (National Toxicology Program): None of the ingredients are listed.

Germ cell mutagenicity: No additional information.

Reproductive toxicity: No additional information.

STOT-single and repeated exposure: No additional information.

Additional toxicological information: No additional information.

12 Ecological information

12.1 Toxicity:

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.

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Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 mg/l, 48 hours.
Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.
Lauramine oxide: Fish, LC0 24.3 mg/l, 96h [Killifish (Cyprinodontidae)]
Lauramine oxide: Aquatic invertebrates, (LC50): 3.6 mg/l 96 hours [Daphnia (Daphnia)].
Lauramine oxide: Aquatic plants, EC50 Algae 0.31 mg/l 72 hours [Algae]
Alcohol Ethoxylate: Aquatic invertebrates, (LC50): 4.01 mg/l 48 hours [Daphnia (daphnia)].

12.2 Persistence and degradability: No additional information.

12.3 Bioaccumulative potential: No additional information.

12.4 Mobility in soil: No additional information.

General notes: No additional information.

12.5 Results of PBT and vPvB assessment:

PBT: No additional information.

vPvB: No additional information.

12.6 Other adverse effects: No additional information.

13 Disposal considerations

13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)

Relevant Information:

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

14 Transport information

14.1 UN Number: None
ADR, ADN, DOT, IMDG, IATA

14.2 UN Proper shipping name: None
ADR, ADN, DOT, IMDG, IATA

14.3 Transport hazard classes:
ADR, ADN, DOT, IMDG, IATA

Class: None
Label: None
LTD. QTY: None

US DOT
Limited Quantity Exception: None

Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.
Comments: None

Non Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.
Comments: None

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14.4 Packing group: ADR, ADN, DOT, IMDG, IATA	None
14.5 Environmental hazards :	None
14.6 Special precautions for user:	None
Danger code (Kemler):	None
EMS number:	None
Segregation groups:	None

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.

14.8 Transport/Additional information:

Transport category:	None
Tunnel restriction code:	None
UN "Model Regulation":	None

15 Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture.

North American

SARA

Section 313 (specific toxic chemical listings): None of the ingredients are listed.
Section 302 (extremely hazardous substances): None of the ingredients are listed.

CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable

Spill Quantity: None of the ingredients are listed.

TSCA (Toxic Substances Control Act):

Inventory: All ingredients are listed.
Rules and Orders: Not applicable.

Proposition 65 (California):

Chemicals known to cause cancer: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed.

Chemicals known to cause developmental toxicity: None of the ingredients are listed.

Canadian

Canadian Domestic Substances List (DSL):
All ingredients are listed.

EU

REACH Article 57 (SVHC): None of the ingredients are listed.

Germany MAK: Not classified.

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Trade Name: Liquinox

Asia Pacific

Australia

Australian Inventory of Chemical Substances (AICS): All ingredients are listed.

China

Inventory of Existing Chemical Substances in China (IECSC): All ingredients are listed.

Japan

Inventory of Existing and New Chemical Substances (ENCS): All ingredients are listed.

Korea

Existing Chemicals List (ECL): All ingredients are listed.

New Zealand

New Zealand Inventory of Chemicals (NZOIC): All ingredients are listed.

Philippines

Philippine Inventory of Chemicals and Chemical Substances (PICCS): All ingredients are listed.

Taiwan

Taiwan Chemical Substance Inventory (TSCI): All ingredients are listed.

16 Other information

Abbreviations and Acronyms: None

Summary of Phrases

Hazard statements:

H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P501 Dispose of contents and container as instructed in Section 13.

Manufacturer Statement:

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use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

NFPA: 1-0-0

HMIS: 1-0-0

Attachment C

Resumes

Curriculum Vitae
Alberto Munuera
alberto.munuera@aecom.com

Alberto Munuera

DC Metro+ Area SH&E Manager

I am specialized in Occupational Safety and Health, currently responsible for managing DC Metro+ Area at AECOM.

From 2012 I also managed SH&E management systems for international clients at an International Level, developing, implementing, monitoring and improving the systems.

I worked in the soil and groundwater department as hydrogeologist for over 8 years (2003-2012), where I was involved in many environmental projects and civil works, including investigation and remediation of contaminated sites and decommissioning and demolition of old industrial plants.

From 2006 I worked as SH&E manager in AECOM Spain, OHSAS 18001 certified.

Proffessional history

DC Metro+ Area SH&E Manager
AECOM (June 2016 to present)

Spain SH&E Manager
AECOM (2006 to June 2016)

Int. Client EMAAP SH&E Manager
AECOM-URS (2009 to present)

Hydrogeologist - Environmental Consultant
Legacy URS (2003 to 2012)

Education and Training

Master's Degree in Occupational Health and Safety. 2015 (Universidad San Pablo CEU, Madrid, Spain). Project (Hons): Development and implementation of SH&E Management system according to OHSAS 18001

Graduated in Geological Sciences. 1998-2004 (Universidad Complutense de Madrid, Spain)

Nebosh International General Certificate in Occupational Health and Safety (Workplacelaw, 2013)

OHSAS 18001 Auditor and OHS Systems Auditor (2015)

OSHA Outreach Training for General Industry and Construction Works. 30h+30h courses (University of South Florida – OTIEC, 2014-15)

High Technician Certificate in Occupational Health and safety – Specialities of Ergonomy and applied psicosociology, Safety in the workplace and industrial hygiene 2007 (IMF) – 1200h

Certified Health & Safety trainer for HAZWOPER training, OSHA 29 CFR 1910.120 (URS, 2009)

Essential Navigation & Seamanship Training (Avante, 2014) – Including Safety and Emergency Response on powerboats

Emergency and fire extinguishing and first Aids training (Fremap, 2013).

Hazardous Waste Materials Management Expert (Ambientum, 2010)

Preventive driving training. (Prevensis, 2006 and refreshers up to date)

Management of SH&E System

I manage the implementation of the AECOM SH&E management system both in the office and field with the objective of reducing accidents, illnesses and property damage rate by having a safe environment and promoting safety culture and healthy habits within employees. This includes worksites risk assessments and implementation of control measures, ergonomics, industrial hygiene, social psychology and environment protection.

As part of my daily work I manage, among others, the following elements:

- SH&E annual action plan development, management, follow up and continuous improvement
- Training plan development, management and follow up (>2000 employees)
- Trainer in OSHA Hazardous waste operations and emergency response (Hazwoper 24h) and Limnology courses.
- Management of internal (Management and all other employees) and external communications (subcontractors, clients and third parties) on SH&E matters
- Key Performance Indicators definition and control (leading and lagging indicators)
- Safe Work and Emegercy Plans preparation and review
- Office and Field audits and follow up of non conformities (all types of industrial sites, demolition works, landfills, work over water, airport activities, etc)
- Accidents and Incidents investigation and implementation of appropriate control measures. Sharing Lessos Learned.
- Providing support in the development, coordination and implementation of industrial hygiene programs
- OHSAS 18001 implementation and continuous safety improvement
- Encouraging leaders to commit to safety and employees to participate in SH&E and to include safety in their daily activity, projects design, work and life.
- SH&E advising for national and international projects
- Business impact evaluation of SH&E events and measures
- Maintaining adequate records of pertinent data

Affiliations and proffessional associations

International Ambassador in IOSH Education Committee

Graduate IOSH (International Occupational Safety and Health)

ASSE (American Society of Safety Engineers)
Young Professionals Group in ASSE

BCSP (Board of Certified Safety Professionals)

Awards

2016 CE Excellenece Awards: Safety for Life Winner

2016 AECOM Coins Awards: implementation of Wellness Program in Spain

2014 Finalist in the AECOM-URS EMI Safety For Life Annual Awards

OHSAS 18001 certification implementation in URS Spain. April 2014.

2012 through 2015: URS Spain #1 Ranked in unified H&S system of top 6 Oil and Gas companies (Retail) in Spain

2011 BP HSSE Award in recognition of 5 consecutive years of incident-free work in Europe (URS-BP Iberia SH&E Manager)

URS quarterly award 1stQ 2010 (Work over water Training development)

BP Excellence award 2006

Languages

English and Spanish (spoken and written):
Bilingual – Spanish native

Portuguese (spoken and written): medium-high.

French (spoken and written): medium

Other Information

Member of the Innovation and Collaboration Excellence Committee in Safety, Health and Environment within AECOM (2015-2016)

Management of SH&E for International Clients

I have been involved in the development and follow up of several SH&E management systems within AECOM for International Clients with strong safety culture.

Especially I have developed and implemented a client specific SH&E Management system at an EMAAP Region level. This system focuses, among others, on the following elements:

- Having a consistent culture evolution work plan (Key Performance Indicators to follow up)
- Internal and external communication plan development and implementation, especially client fluid communication plan.
- Leadership commitment, including site audits and visits plan
- Training sessions and specific training requirements set up
- Incidents management and investigation
- Establishing joined safety expectations
- Recognition program
- Ensure sites Safe Work Plans consistency across the region
- Subcontractors management
- Site specific safety management programs development and implementation.

Management of SH&E in Field Operations

I have managed SH&E in field projects from 2003, developing worksites risk assessments, implementing preventive and control measures and supervising the compliance of legislation and client and AECOM specific procedures. Some of the field projects I have worked on are:

- SH&E management and environmental investigation of the subsoil in several petrol stations and industrial plants.
- SH&E management during installation and monitoring of several remediation systems at sites contaminated with many different chemical compounds.
- Monitoring, control and management of SH&E in large excavations and refineries.
- Developing, implementing and management of SH&E program in an old lindane landfill
- SH&E audits in several industrial plants and petrol stations.
- Supervisor and SH&E manager of dismantling and demolition works of an oil and gas storage terminal.
- Environmental audit, SH&E management and site assessment during works in a cruise motors factory.
- Management of health and safety, decommissioning, demolition and soil remediation of an industrial complex to be developed as a residential area
- Several derelict industrial buildings SH&E studies
- Environmental audit and risks assessment of a demotlition project of a fertilizers distributor industrial site.
- Development of a detailed Dam Emergency Plan.
- SH&E Management of construction works in airports.

Jennifer J. Li

Environmental Scientist

Areas of Expertise

Environmental Science

Aquatic Ecology

Stream Monitoring

Groundwater and Surface Water Sampling

Freshwater Benthic Macroinvertebrate Sampling and Identification

Field Manager

QA/QC

Health and Safety

Education

MS, Geography and Environmental Systems, University of Maryland Baltimore County, 2011

BS, Biology-Organismal Biology and Ecology, Towson State University, 2007

Licenses/Registrations

2013, 40-Hour Hazardous Waste Operations and Emergency Response Site Worker and Refreshers

2015, American Heart Association – First Aid, CPR, and AED Certified

Years of Experience

With AECOM	2
With Other Firms	2
With URS	<1.5

Training and Certifications

Freshwater Benthic Macroinvertebrate Identification (MBSS Trained)

Summary

Ms. Li is an environmental scientist with 5+ years of direct project experience across multiple disciplines as the project Health and Safety Officer, field coordinator, field technician, laboratory manager and analyst, data manager and analyst, and office task leader. Her area of expertise includes aquatic ecosystem management and monitoring and has recently expanded her interests to include hazardous waste site investigations and remediation projects. She has lead and participated in numerous projects with both state and federal government agencies as well as private clients such as the South River Federation, Severn River Keepers, Motiva, Shell Oil, Dover AFB, the Army National Guard, and the US Army Corps of Engineers (USACE).

Experience

Army National Guard (ARNG), Remedial Investigation through Decision Document for Five and Six Army National Guard Munitions Response Sites, Multiple U.S. Locations, Deputy Project Manager/Field Task Leader, September 2016 – Ongoing. Manage project activities related to conducting Remedial Investigation of multiple former small arms ranges at Non-Department of Defense, Non-Operational Defense Sites (NDNODS) located with CONUS. Technical lead on implementation of incremental sampling methodology (ISM) technologies to assess the risks of metals contamination in target berm soils. Act as team lead and health and safety officer for field operations. Author RI Work Plans and UFP-QAPPs and assess the fate and transport of site related contaminants.

US Army Corps of Engineers (USACE), Military Munitions Response Program (MMRP), Crow's Nest Impact Area and Training Areas G1, G2, and J1 Remedial Investigation, West Point, Environmental Scientist/Field Team Leader February 2015 – Ongoing. Worked closely with project manager to develop the conceptual site model for the Crow's Nest munitions response site (MRS) for the Site Inspection Report and Remedial Investigation (RI) Work Plan for the characterization and removal of munitions and explosives of concern (MEC). Played a significant role in authoring the RI Work Plan and UFP-QAPP with particular respect to developing the munitions constituent (MC; metals and explosives) sampling program for both soils and wetland sediments using discrete and incremental sampling methodologies. Acted as the Field Team Leader for the collection of soil and sediment samples for MC analysis. Primary author of the Remedial Investigation report and Screening Level Ecological Risk Assessment.

USACE, Tobyhanna Artillery Range Formerly Used Defense Site Remedial Action, Deputy Project Manager, May 2015 – Ongoing. Manage daily MEC clearance data and QC/QA activities for five munitions response sites. Responsible for data entry for all MRS' including the

locations of discovered UXO items into MS Access database, preforming quality control assessments on the data, and generating weekly update reports for the client and stakeholders. Coordinate with GIS specialists to update detailed site maps depicting the progress of field teams and the locations of UXO items.

USACE, Spring Valley Formerly Used Defense Site Remedial Investigation, Human Health Risk Assessment, Environmental Scientist, March 2015. Preformed the Human Health Risk Assessment for Spring Valley Formerly Used Defense Site under EPA RAGS Part D. Calculated the human health risks of several metals for both surface water and groundwater media under various current and future exposure scenarios for residential, industrial, and student receptors.

Army National Guard, Ravenna Army Ammunition Plant - Request for Proposal, Groundwater and Environmental Investigation Services, Environmental Scientist February 2015). Provided support in obtaining costing back up from multiple vendor sources. Compiled and formatted complex costing workbook containing multiple task orders and subtasks through MS Excel for the remedial investigation of contaminated groundwater on the installation.

Shell Gas, Former South Penn Services Facility, Former Pennzoil Products Company Facility, Revised Human Health Risk Assessment, Environmental Scientist, February 2015. Reviewed calculations in the development of a human health risk assessment utilizing EPAs RAGS Part D for multiple petroleum contaminant chemicals of concern via various exposure pathways for both soil and surface water media.

Delaware Department of Natural Resources and Control, Car City Hydrologic Investigation Report Addendum, Environmental Scientist, January 2015. Assessed groundwater data for petroleum contaminants. Contoured groundwater and contaminant plumes. Acted as the primary author to the Hydrologic Investigation Report Addendum which conveyed the most recent data and findings.

Delaware Department of Natural Resources and Control, Request for Proposal, Harrington Delaware Citgo, Environmental Scientist January 2015. Conducted site characterization based on historic groundwater and soil boring data to develop and propose a sampling and analysis program for the remediation of a fuel release from former underground storage tanks at a former petroleum retail station.

Shell Petroleum Remediation, Administrative Work - Massachusetts Underground Storage Tank Petroleum Product Cleanup Fund, Chapter 21J, Administrative, January 2015 – Ongoing. Performed Revenue in Excess of Contract exercises based on the Massachusetts 21J cleanup fund to estimate expected revenue from conducting petroleum contamination remediation and monitoring field work in Massachusetts. Prepared claims with backup for submittal to the Massachusetts 21J board. Coordinate with administrative and field staff across multiple URS offices to obtain all required documents.

Howard County Bureau of Environmental Services, Environmental Investigation and Compliance Task No. 1: Visual Stormwater Monitoring, Environmental Scientist, December 2014 – Ongoing. Conduct visual monitoring of stormwater discharges from outfalls located at seven Howard County MD facilities. Qualitatively assess water quality of samples through visual assessment methods to determine clarity,

suspended solids, odor, and presence/absence of petroleum sheen.

Dover Air Force Base (DAFB) Fuel Sites – C5 Crash Site, SS27, ST05, & ST37, Environmental Scientist, December 2014. Preformed laboratory data analysis and annual report preparation. Tracked the evolution of fuel plumes and using trend charts, concentration and groundwater contour maps, and comparison of data to remedial action objectives.

DAFB Sites WP14/LF15 Proposed Plan and Record of Decision (ROD) Amendment, Environmental Scientist, July 2014 – Ongoing. Ms. Li is currently serving as lead author in the preparation of documents recording the change in remedy selection at the former liquid waste disposal area and former land fill sites WP14/LF15 at DAFB. Following United States (US) Environmental Protection Agency (EPA) guidelines, she has prepared the Amended Proposed Plan and is currently in preparation of the ROD Amendment.

DAFB East Management Unit Natural Attenuation Monitoring Environmental Scientist, July 2014. Preformed laboratory data analysis and annual report preparation. Tracked the evolution of chlorinated solvent plumes and monitored anaerobic subsurface conditions using trend charts, concentration and groundwater contour maps, and comparison of data to remedial action objectives.

DAFB Basewide Water Level Measurement Field Task Personnel, June 2014 – Ongoing. Participated in field efforts to measure groundwater levels across all sites at DAFB. Additionally, maintained field records utilizing the ArcGIS Collector application and assisted in organizing field tasks and health and safety program amongst the team while onsite.

USACE, Military Munitions Response Program (MMRP) – Remedial Investigation (RI) for River Road Training Site (RRTS), Delaware ARNG, Environmental Scientist/ Health and Safety Officer, March 2014 – September 2014. Ms. Li assisted in the compilation of the of the Work Plan (WP)/ Uniform Federal Policy-QAPP (UFP-QAPP) for the RI field activities for munitions constituent (MC) sampling at the Former Small Arms Range Water Area Munitions Response Site at RRTS in New Castle, Delaware. She also filled in for the project Task Manager and Health and Safety Officer for several field sampling deployments to collect sediment from the Delaware river for MC analysis (lead). Field activities included measuring water quality using a Horiba multiparameter probe and collecting sediment samples using a Ponar grab sampler deployed from a shallow draft vessel. She has additionally assisted in sample collection tracking and has played a significant role in authoring and producing the RI report.

Dover Air Force Base (AFB) Proposal Preparation – FT03 Dioxin Delineation, Environmental Scientist, December 2013. Ms. Li prepared the Scope of Work and solicited bids for subcontractor work including laboratory analysis of soil, groundwater, and surface water, and the installation of temporary groundwater monitoring wells using direct-push technology.

USACE – Operational Range Phase II Assessments for the Army National Guard (ARNG), Environmental Scientist, November 2013 – Ongoing. Assisted in the development of Range Best Management Practice (BMP) Implementation Plans for multiple ARNG installations. Has played a significant role in authoring and developing tools and

educational materials for installations to use in the selection and documentation of Range BMPs. In particular, she has researched and developed installation specific methods and resources to select and manage range vegetation and metals recycling BMPs. She has also retained and managed the workflow and deliverables of a subcontractor tasked with researching additional resources.

She has assisted in developing the Quality Assurance Protection Plan (QAPP) and conducted field tasks for the Phase II Assessment for evaluating munitions constituents (including lead and explosives) in streams at Camp Shelby (MS) and Camp Blanding (FL). Field tasks include deploying automated composite sampling devices for surface water sampling and sediment sampling using an incremental sampling methodology. Additionally, she has played a significant role in authoring the Phase II report for Keahukaha Military Reservation (HI) and has assisted in the incorporation of client comments into both Phase II reports as well as BMPs Letter Reports.

Ms. Li has managed project file organization and archival across multiple contract years for numerous installations located nationwide.

Shell Gas Station Remediation Work and Report Preparation, Environmental Scientist and Field Task Personnel, November 2013 – Ongoing. Ms. Li has assisted in multiple ongoing monitoring and remediation projects at sites across the States of Maryland, Massachusetts, and New Jersey. Her responsibilities have included collecting groundwater samples from permanent groundwater monitoring and remediation wells using hand bailers, peristaltic pumps, inertial pumps, and submersible pumps; coordinate with homeowners to collect potable water samples; use handheld YSI multi parameter probes to monitor groundwater parameters; record PID measurements; collect soil samples; and oversee subcontractors including surveyors and drilling crews. She has maintained daily field log books and established and maintained traffic control while on site.

Additionally, she has assisted in the preparation of quarterly sampling reports and client presentations; compiled detailed Work Plans (WPs); and updated Health and Safety Plans (HASPs) for work at numerous sites across Maryland and the New England area.

Former PQS Refinery Remediation Work, Oil City, PA, Shell Oil, Environmental Scientist, November 2013. Ms. Li has prepared detailed WPs for site walks to investigate and record observations of orphaned production wells and evaluate potential sources of contamination at parcels Plant 1 and Holiday Run for future closure and remediation.

Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science, Stream Restoration Monitoring, Advanced Faculty Research Assistant, September 2011 – October 2013. Monitored the effects of stream restoration on water quality across multiple coastal plain streams during base and stormflow conditions. Coordinated synoptic sampling across multiple laboratories and institutions. Developed strategic sampling regimes to meet project needs and goals in at timely manner. Collected stormwater samples using Teledyne ISCO automated samplers.

Analyzed water and sediment samples using Shimadzu TOC-V Total Organic Carbon Analyzer, Lachat Quick Chem, Dionex ICS-1000 Ion Chromatography System, Costech ECS-4010 Elemental Combustion

System CHNS-O. Maintained and serviced aforementioned analyzers.

Created and managed databases in MS Excel and Access. Analyzed water quality data using MS Excel. Wrote and assisted in the development of update, summary, and annual reports to county and private clients. Supervised multiple junior scientists during field activities, laboratory analysis, and data entry.

University of Maryland Baltimore County, Urban Storm Water Pond Monitoring, Research Aide, May – August 2011. Assisted in research studying invertebrate community composition of urban storm water ponds. Collected and processed samples for phytoplankton for Chl-a analysis. Collected, enumerated, and identified freshwater zooplankton species in both field and macrocosm environments. Conducted stream surveys (delineation, water chemistry, macroinvertebrate collection).

University of Maryland Baltimore County, Masters of Science Student, September 2008 – May 2011. Experimentally enriched foliar nitrogen content for use in decomposition studies. Developed experimental methods to conduct field studies across multiple streams and complementary laboratory microcosm studies. Measured and analyzed stream dissolved oxygen, temperature, conductivity, and NO3 concentrations. Collected and identified benthic macroinvertebrates. Mentored several undergraduate research assistants.

University of Maryland Baltimore County, Research Aide, June – August 2008. Aided in research on the effect of road salt deicers on amphibian communities and the food web interactions at work in their freshwater habitats. Maintained experimental conditions of aquatic macrocosm experiments. Used handheld YSI multiparameter probes. Collected and processed samples of periphyton and phytoplankton for Chl-a analysis. Monitored macrocosms for metamorphosing grey tree frogs (development stage, weight, and characteristics).

Towson University, Research Experience for Undergraduates (REU)Program, REU Student, Summer 2007. Conducted and aided in research regarding potential ecosystem services of White lipped Peccaries in Peru's Amazon Basin. Wrote proposal for project titled "Do Peccary Wallows Structure the Genetic Diversity of Anurans." Wrote successful grant proposal to the Towson U. Undergraduate Research Committee ($500). Lived two months on site in the Peruvian Amazon Basin collecting tissue samples of anurans, measuring physical characteristics of wallows, obtaining locations using handheld GPS units, identifying plant species, and measuring height and DBH of saplings. Independently responsible for project data collection and management.

Anne Arundel Community College, Environmental Center, Grant Technician, 2004 – 2005. Wrote internal publication titled "The Propagation of Growth Media For The Propagation and Growth Of Underwater Grasses in Axenic and Autotrophic Systems." Hand collected fruiting sub-aquatic vegetation (SAV) from tributaries off of the Chesapeake Bay. Processed SAV seeds and maintained their experimental storage conditions (varying salinity concentrations and aeration). Propagated SAV axenically and prepared growth media. Performed routine laboratory maintenance (sterilizing work areas, autoclaving, organizing supplies). Co-presented scientific poster at Chesapeake Bay Foundation fundraiser.

Chronology

09/2011 – 10/2013: Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science, Solomons, MD

2008 – 2011: University of Maryland Baltimore County, Baltimore, MD (various positions)

2004 – 2005: Environmental Center, Anne Arundel Community College, Arnold, MD.

Contact Information

Company: AECOM Technical Services
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Germantown, MD 20876
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Direct: 301.820.3476
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Email address: jennifer.j.li@aecom.com

Certificate of Completion

This is to certify that

Jennifer Li

Has completed the

Radiation Safety for X-ray Tube Based Instruments

Online training course

On

1/30/2017

Supervisor signature

Erin Poitras, RSO Thermo Fisher Scientific
Portable Analytical Instruments

Attachment D

AECOM Safety Forms

SAFETY COMPLIANCE AGREEMENT AND
DOCUMENTATION OF SITE SAFETY BRIEFING
Williston LTA, ND
Contract/Delivery Order: W9133L-14-D-0001/ 0008

DATE AND TIME: _____ PROJECT NAME AND NUMBER: _____

SITE LOCATION: _____ SITE SAFETY OFFICER: _____

NAME AND EFFECTIVE DATE OF SITE HEALTH AND SAFETY PLAN: _____

TOPICS COVERED DURING BRIEFING:

___ Extent and Concentration of Chemical Hazards on Site
___ Monitoring Procedures
___ Health Effects of Chemical Hazards
___ Action Levels
___ Physical Hazards on Site
___ Decontamination Procedures
___ Levels of Protection Required
___ Location of Emergency Numbers
___ Route to the Hospital
___ Location of Emergency Equipment (e.g., first-aid kit, fire extinguishers)
___ Verification That Health and Safety Plan Has Been Received and Read
___ Other:_____

I, the undersigned, have received a copy of the safety plan for the referenced project. I have read the plan, understand it, and agree to comply with all of the health and safety requirements. I understand that I may be prohibited from working on the project for violating any of the requirements. In addition, I have been verbally briefed on the topics noted above.

Name (print): _____

(Signature):_____

Company:_____

AECOM

Americas

Daily Tailgate Meeting

S3AM-209-FM5

Instructions: Conduct meeting prior to sending crews to individual tasks. Require attendance of all AECOM employees and subcontractors. Invite personnel from simultaneous operations for coordination purposes. Review scope of work and briefly discuss required and applicable topics**. This meeting is a daily refresher, not a full orientation**. Task-specific discussions associated with Task Hazard Assessment (THA) follow this meeting at the task location immediately before individual task is started.

AECOM Supervisor Name: **Phone Number:**	
AECOM SH&E Rep. Name: **Phone Number:**	
Meeting Leader:	

Date:	**Project Name/Location:**	**Project Number:**
Today's Scope of Work:		

Muster Point Location:	**First Aid Kit Location:**	**Fire Extinguisher Location:**	**Spill Kit Location:**

1. Required Topics

- ☐ Fitness for Duty requirements, all sign in / sign out
- ☐ Required training (incl. task specific) completed and current
- ☐ SH&E Plan onsite - understood, reviewed, signed by all (incl. scope, hazards, controls, procedures, requirements, etc.)
- ☐ Pre-Job Hazard Assessments (JHA/JSAs) available and understood
- ☐ Task Hazard Assessments (THAs) are to be completed for each task immediately prior to conducting
- ☐ STOP WORK Right & Responsibility- all task changes/changed conditions re-assess with THA
- ☐ Requirement to report to supervisor any injury, illness, damage, near miss, unsafe act / condition
- ☐ Emergency Response Plan – including muster point, first aid kit, fire extinguisher, clinic/hospital location
- ☐ Personal Protective Equipment (PPE) - Required items per hazard assessments in good condition / in use by all
- ☐ Equipment/machinery inspected (documented as required) and in good condition - operators properly trained/certified
- ☐ Work area set up and demarcation/ barricades in place to protect workers, site staff, and the public
- ☐ Required checklists/records available, understood (describe):
- ☐ Lessons Learned / SH&E improvements (describe):

2. Discuss if Applicable to Today's Work

☑ ■ **Check ☑ as reviewed or mark ■ as not applicable**

- ☐ ☐ Biological/ Chemical / Electrical Hazards
- ☐ ☐ Ergonomics - Lifting, Body Position
- ☐ ☐ Lock Out/ Tag Out
- ☐ ☐ Short Service Employees - visual identifier and mentor/ oversight assignment
- ☐ ☐ Simultaneous/ Neighbouring Operations
- ☐ ☐ Slip/ Trip/ Fall Hazards
- ☐ ☐ Specialized PPE Needs
- ☐ ☐ Traffic Control
- ☐ ☐ Waste Management/ Decontamination
- ☐ ☐ Weather Hazards / Heat Stress / Cold Stress
- ☐ ☐ Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
- ☐ ☐ Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
- ☐ ☐ Other Topics (describe/attach):
- ☐ ☐ Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

Describe incidents, near misses, observations or Stop Work interventions from today:	Describe Lessons Learned/ Improvement Areas from today:

The site is being left in a safe condition and work crew checked out as fit unless otherwise specified as above.

Site Supervisor Name	**Signature**	**Date** **Time** (at end of day / shift)

Worker Acknowledgement / Sign In Sign Out sheets applicable to this meeting are on reverse and, if applicable, attached.

All employees:

- **STOP WORK if concerned / uncertain about safety / hazard or additional precaution is not recorded on the THA.**
- **Be alert and communicate any changes in personnel or conditions at the worksite to the supervisor.**
- **Reassess task, hazards, & mitigations on an ongoing basis; amend the THA if needed.**

SITE WORKERS (including AECOM Contractors and Subcontractors): Your signature below means that you understand:

* The requirement to participate in creating, reviewing, & updating hazard assessments (THA) applicable to your task(s).
* The hazards & control measures associated with each task you are about to perform.
* The permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
* That no tasks or work is to be performed without a hazard assessment.
* Your authority & obligation to "Stop Work" intervene, speak up/ listen up.

Your initials (right columns) certify that you arrived & departed fit for duty, & have reported all incidents/near misses; meaning:

* You are physically and mentally fit for duty.
* You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
* You are aware of your responsibility to immediately report any illness, injury (regardless of where or when it occurred), or impairment/fatigue issue to the AECOM Supervisor.
* You signed out as fit / uninjured unless you have otherwise informed the AECOM Supervisor.

Print Name & Company	Signature	Initials & Sign In Time	Initials & Sign Out Time
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit
		In & Fit	Out & Fit

(Attach additional Site Worker sign-in/out sheets if needed) Identify number of attached sheets: _____

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

AECOM

Americas

Task Hazard Assessment

S3AM-209-FM6

Customer	**Permit No.**
Location	**Job No.**
Description of Task	**Date**

Basic Task Steps (explain how the task will be carried out)	**Hazards** (identify all hazards and potential hazards)	**Risk** (initial)	**Precautions** (describe how that hazard will be controlled)	**Risk** (final)	**Initials**
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator _____ (Print Name) _____ (Signature)

Supervisor _____ (Print Name) _____ (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

VISITOR SIGN ON

NAME (Please Print) SIGNATURE TIME

Risk Rating Matrix

Probability	Severity				
	5 - Catastrophic	4 – Critical	3 – Major	2 – Moderate	1 - Minor
5 – Frequent	25	20	15	10	5
4 – Probable	20	16	12	8	4
3 – Occasional	15	12	9	6	3
2 – Remote	10	8	6	4	2
1 - Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Task Hazard Assessment Follow-Up/Review.

First Break **Initial**

Lunch Break **Initial**

Second Break **Initial**

Emergency Meeting / Assembly Area

Emergency Contact #

Emergency Radio Channel

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name)

Signature

Americas

Driving

S3NA-005-PR1

1.0 Purpose and Scope

1.1 The purpose of this document is to establish policies and procedures for operation of AECOM-owned, rented, or leased vehicles, client or customer-owned vehicles, and personal vehicles used by AECOM employees.

1.2 This procedure applies to all AECOM Americas-based employees and operations. Policies and procedures related to the operation of commercial motor vehicles are in addition to this procedure; refer to *S3NA-320-PR1 Commercial Motor Vehicles.*

2.0 Terms and Definitions

2.1 **AECOM Business** – Any activity that is performed in the name of AECOM. This includes, but is not limited to, vehicle travel between work locations, client sites, meeting locations as well as driving performed as a part of work-related travel (e.g., driving to and from airports, hotels, train stations). AECOM business does not include driving that is a part of a daily routine commute from home to an AECOM location.

2.2 **Authorized Driver** – AECOM employees who receive manager approval following evaluation of driver criteria to drive and maintain an AECOM-owned, leased or rented vehicle, a client or customer-owned vehicle, or a personal vehicle operated in the course of conducing AECOM business. Authorized Drivers shall maintain a current driver's license with full privileges applicable to the vehicle to be operated. There are three categories of Authorized Drivers;

- Professional (AECOM employee who operates a commercial motor vehicle. Please refer to *S3NA-320-PR1 Commercial Motor Vehicles*).
- Hired (Employee's specific AECOM role is to drive employees in a normal street vehicle, which may or may not require commercial licensing by the applicable authorities. This category does not include busses or vans with a capacity of more than 12 people.).
- General (Driving is required as a part of the employee's job duties. This includes driving AECOM-owned, leased, or rented vehicles, client or customer-owned vehicles, or personal vehicles on AECOM business).

2.3 **Collision** – Any incident in which a motor vehicle that (whether in motion, temporarily stopped, or parked) makes contact with another vehicle or pedestrian, or results in property damage and/or bodily injury, regardless of who was injured, what property was damaged, or who was responsible.

2.4 **Commercial Motor Vehicle (CMV)** – Any self-propelled or towed motor vehicle used for AECOM business (e.g., to transport passengers or property) when the vehicle is one of the following:

- Has a gross vehicle weight rating (GVWR) or gross combination weight rating, of ≥ 10,001 pounds (4,536 kilograms); or
- Is designed or used to transport more than eight passengers, including the driver, for compensation; or
- Is designed or used to transport more than 15 passengers, including the driver, and is not used to transport passengers for compensation; or
- Is used in transporting hazardous material in quantities ≥ 1,001 pounds (454 kilograms) combined total weight at any time.
- Refer to *S3NA-320-PR1 Commercial Motor Vehicles* for additional information.

2.5 **Distracted Driving** – An activity that takes the driver's attention away from the primary task of driving.

2.6 **Driving Under the Influence (DUI)/Driving While Intoxicated (DWI)** – The operation of a vehicle while under the influence of alcohol, drugs, medications, or other substances capable of inducing an altered mental state and/or impairing physical and mental judgments, such that the influence of the substances produces impairment in violation of the applicable governmental laws.

2.7 **Fatigue** – A general term used to describe the experience of being "sleepy", "tired" or "exhausted". The effect of fatigue is both physiological and psychological and can severely impair a driver's judgement. Fatigue can cause lapses in concentration which could prove fatal. Fatigue is not just a problem for drivers on long trips, as drivers can also suffer from fatigue on short trips.

2.8 **Incident** – For the purposes of this procedure, a vehicle collision or other event where personal injury or property damage occurs, or where a citation is issued while the employee is on AECOM business. This may also include acts of theft, vandalism, and criminal mischief.

2.9 **Journey Management** – A process for planning and executing necessary journeys safely.

2.10 **Local Laws** – Signs, postings, laws, regulations, ordinances and codes applicable for the jurisdiction in which the motor vehicle is being operated.

2.11 **Motor Vehicle Report (MVR) / Driver's Abstract** – A listing of the tickets (violations), incidents collision for an individual driver over a period of time (e.g., 3 years, 5 years) provided by a state or provincial authority such as the Department of Motor Vehicles.

2.12 **Personal Vehicle** – A motorized vehicle owned or leased by an employee.

2.13 **Portable Electronic Device** – A mobile electronic device that is used to receive or communicate voice, email, internet, and/or public media. The device requires user interaction (typing, dialing, reading, keying, etc.) that distracts the motor vehicle operator. Example devices include, but are not limited to:

- Mobile Communication Devices (MCD)
  - Mobile/Cellular phones
  - Two-way Radios
- Personal Data Assistant (PDA)
- iPads, iPods, or other tablet models
- Computers
- Global Positioning System (GPS) receivers

2.14 **Spotters –** Extra personnel that may provide guidance when maneuvering in close and/or complex situations in order to avoid the occurrence of an incident.

2.15 **Task Hazard Analysis (THA)** – A tool for evaluating work activities for the purpose of:

- Identifying the SH&E hazards and risks associated with the activity being performed;
- Identifying and implementing control measures to eliminate or reduce hazards and risks; and,
- Evaluating the effectiveness of control measures and making modifications as needed.

3.0 References

3.1 AECOM Global Travel Policy

3.2 RS2-001-PR Firearms Standard

3.3 S3NA-003-PR1 SH&E Training

3.4 S3NA-004-PR1 Incident Reporting, Notifications & Investigation

3.5 S3NA-009-PR1 Fatigue Management

3.6 S3NA-010-PR1 Emergency Response Planning

3.7 S3NA-209-PR1 Risk Assessment & Management

3.8 S3NA-314-PR1 Working Alone

3.9 S3NA-319-PR1 All-Terrain Vehicles

3.10 S3NA-320-PR1 Commercial Motor Vehicles

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager / Supervisor**

- Confirming employees are informed of the provisions of this procedure and related vehicle procedures.
- Providing a copy of this procedure to an employee who will be driving an AECOM-owned, leased or personal vehicle for AECOM business.
- Allowing employees to designate time to complete required driving safety training, vehicle inspections and related activities.
- Assigning driving tasks to authorized employees only.
- Selecting and providing vehicles for use by authorized employees that are appropriate for the planned working conditions and environment.
- Supporting employees in the reporting of vehicle incidents per *S3NA-004-PR1 Incident Reporting, Notifications & Investigations,* including the entry of the incident into the on-line incident management system (e.g., IndustrySafe).
- Confirm notification of AECOM Human Resources and Counsel upon receipt by an employee of a legal summons associated with a moving violation related to the use of a company vehicle.

4.1.2 **Employee**

- Follow this procedure and applicable laws while operating a vehicle.
- Complete assigned driver safety training based on the training matrix and any additional training assessments developed at the business group. Refer to *S3NA-003-PR1 SH&E Training, including S3NA-003-FM1 SH&E Training Matrix.*
- Report to the Manager / Supervisor if the vehicle selected is not appropriate for the working conditions and environment.
- Report to the Manager / Supervisor if the employee is inexperienced in operating the type of vehicle assigned.
- Report to the Manager / Supervisor if the employee is inexperienced in driving in the type of working conditions and environment assigned.
- Review the completed Task Hazard Assessment and complete journey management. If required, document the Journey Management Plan using *S3NA-005-FM1 Journey Management Plan* or equivalent.
- Immediately report vehicle incidents per *S3NA-004-PR1 Incident Reporting, Notifications & Investigations*, including the entry of the incident into the on-line incident management system (e.g., IndustrySafe).
- Notify the appropriate Manager / Supervisor and SH&E Manager upon receipt of a legal summons associated with a moving violation related to the use of a company vehicle.
- Immediately report a change or limitation(s) to his/her Driver's License to the appropriate AECOM Human Resources representative or his/her Manager / Supervisor.

- Conducting a pre-operational inspection of the vehicle for damage or deficiencies and reporting discovered deficiencies affecting the safe operation of the motor vehicle to the appropriate authority (e.g., supervisor, rental car agency, etc.).

4.1.3 **SH&E Manager**

- Maintaining and updating training resources for vehicle and driver safety.
- Providing guidance.
- Assisting operational leaders with determining the risk incurred by the use of motor vehicles.
- Assist in the incident investigation and review process.

4.2 General Procedures and Practices

4.2.1 Only Authorized Drivers are to operate a motor vehicle (rental, personal, client or customer-owned, or AECOM-owned/leased) while on AECOM business.

4.2.2 Drivers must comply with *AECOM's Global Travel Policy* and applicable laws, and employ safe driving practices. (NOTE: *Individual state, provincial, and local laws vary*.) Refer to *S3NA-005-ATT1 Authorized Driver Safety Practices*.

4.2.3 Authorized Drivers shall confirm their operating license is on their person, and valid registration and insurance is maintained with the respective vehicle prior to operation.

4.2.4 All local laws including, signs, postings, regulations, ordinances, and codes applicable for the jurisdiction in which the motor vehicle is being operated shall be adhered to.

4.2.5 At-risk driving behavior by AECOM employees shall be identified and managed accordingly.

4.2.6 Authorized Drivers must be at least 18 years of age (noncommercial license) or 21 years of age (commercial license) and have a current driver's license for the appropriate class of vehicle (unless more stringent requirements are established by the leasing/renting agency). Employees with conditional licenses are prohibited from operating vehicles on AECOM business.

4.2.7 If an Authorized Driver receives a citation resulting in their license being suspended, has his/her driver's license revoked, or is otherwise unauthorized to drive, he/she shall notify the appropriate AECOM Human Resources representative or his/her Manager prior to start of the following work day. Failure to do this may result in disciplinary action up to and including termination.

4.2.8 The office to which the vehicles are registered is liable for any damages to the vehicle being operated by an Authorized Driver.

4.2.9 Seat belts are to be worn by the occupants. The number of passengers shall not exceed the manufacturer's specifications for the vehicle.

4.2.10 The vehicle may not move until all passengers have fastened their restraints in the proper manner (e.g., lap belt secured and shoulder harness placed over the shoulder). Vehicles are not to be operated or used by AECOM employees if seatbelts are not included as part of the vehicle's safety equipment.

4.2.11 The vehicle's engine is to be turned off during refueling. Smoking or cellular phone use is not allowed while refueling.

4.2.12 Motorcycles may not be operated on AECOM business unless:

- Specific approval is provided by the Supervisor with concurrence from the SH&E Manager.
- A hazard analysis is completed.
- Required training and license is in place.
- Headlights or daytime running lights will be used when the vehicle is in operation.
- A Class 2 or 3 safety vest and appropriate helmet shall be worn while operating a motorcycle.

4.2.13 When practical, drivers should travel during daylight hours and avoid driving during adverse weather conditions. Drivers should also inform colleagues of their travel itinerary including destination and anticipated departure and arrival times.

4.2.14 Fire arms and weapons are not permitted in AECOM-owned, leased or rented vehicles insured by AECOM. Firearms and weapons in personal vehicles are subject to the laws and regulations of the respective local, provincial, state, territory, federal and region and/or country. Refer to the *RS2-001-PR1 Firearms Standard*.

- Exceptions to this standard may exist where there is a credible and demonstrated risk to AECOM employees or assets, or when knives or weapons are required as part of the work activity. Under such circumstances, the exception must be approved by the Chief Resilience Officer, and must strictly adhere to the procedures set forth by the Global Resilience Group.

4.2.15 Vehicles are to be selected based on the nature of planned use. In some working conditions, specialized vehicles, such as four-wheel drive and higher clearance vehicle, may be required to confirm safe travel. These specialized vehicle requirements/specifications shall be identified in the project specific SH&E Plan and/or THA.

4.2.16 Vehicles are to be maintained according to manufacturer's specifications and the applicable environmental and operating factors (e.g. winterized with appropriate fluids, winter tires installed, appropriate coolant for hot climates, etc.).

4.2.17 Vehicles are to be outfitted with the appropriate support equipment based on the THA or client vehicle specifications. Support equipment may include, but is not limited to, cones, rotating warning lights, warning flags, vehicle identification (magnetic door signs or similar), wheel chocks, cargo nets, and rollover protection.

4.2.18 Drivers are to operate vehicles in a manner that avoids situations where backing is necessary. Whenever possible and as permitted, reverse parking of all vehicles while on business is required. A spotter shall be used when backing of trucks and heavy equipment presents a risk of collision.

4.2.19 Non-AECOM drivers (subcontractors, joint venture partners, clients) are prohibited from operating an AECOM company owned, leased or rented vehicle unless the activity is specifically agreed to in the applicable contract and only if the use of the vehicle is consistent with the terms of the contract.

4.2.20 Authorized drivers required to operate vehicles with special hazards (e.g., trucks carrying fuel cells, vehicles used to tow trailers, vehicles with limited visibility, etc.) will be thoroughly briefed on the hazards and control measures necessary for safe operation of the vehicle. The local AECOM operation will maintain documentation of the briefing.

4.2.21 Define specific vehicle travel routes and parking areas at field sites through the use of fencing, cones, or other markings.

4.3 Distracted Driving

4.3.1 Distractions while driving are a major cause of incidents. Distractions include the use of cellular phones (including texting), eating, drinking, smoking, and engaging in intense conversations. AECOM Authorized Drivers must exercise proper control of the vehicle at all times, including the management of possibly distracting actions and behaviors.

4.3.2 The use of portable electronic devices that may distract the driver while driving is prohibited. This includes cell phones, two-way radios and other items whether hand-held or hands-free. Electronic devices include, but are not limited to, all mobile phones pagers, iPods, MP3s, GPS DVD players, tablets laptops and other portable electronic devices that can cause driver distraction.

- Employees shall not use a personal or company mobile communication devices (MCD) while driving any vehicle on AECOM business.
- Employees shall not use a company MCD while driving a personal vehicle.
- Driving includes the time spent in traffic or while stopped at red lights or stop signs.

4.3.3 GPS units and devices (e.g., smart phones, tablets) used for navigation may only be used if factory installed or secured to the vehicle with a bracket that allows the driver to view the image without having to take their eyes off the road.

4.3.4 Electronic devices shall be setup for operation prior to commencing driving activities and shall not be changed by the driver while driving.

4.4 Impairment

4.4.1 Impairment can take many forms ranging from fatigue, to the use of prescription medication or alcohol (even small amounts), to the abuse use of illegal and legal drugs and alcohol. AECOM employees shall not drive in an impaired condition.

4.4.2 AECOM employees are prohibited from being under the influence of alcohol or drugs or improperly using medication in a way that could diminish, or raise questions concerning, an employee's ability to perform at his or her best while performing services for or on behalf of AECOM. Operation of vehicles while under the influence may void insurance coverage.

4.4.3 Drivers/operators will not drive or operate vehicles while under the influence of medications when told by a physician, another healthcare provider, or the manufacturer (e.g., instructions on the label) the medication could render the activity unsafe.

4.4.4 AECOM employees are prohibited from operating a vehicle if they are experiencing signs and symptoms of fatigue. Employees should stop work and rest before driving. No employee should operate a vehicle if they have worked 14 consecutive hours within a 24 hour period. Refer to *S3NA-009-PR1 Fatigue Management*.

4.5 Journey Management

4.5.1 When practical, alternatives to road travel should be evaluated including teleconferencing/video conferencing, the use of public transportation or carpooling.

4.5.2 Journey management is a process for planning and executing necessary journeys safely and may or may not be documented. Review the completed THA and complete the journey management process. If required, document a Journey Management Plan (JMP) using *S3NA-005-FM1 Journey Management Plan* or equivalent. The journey management process includes the following steps:

- Determining if the trip is necessary.
- Evaluating alternative safer modes of transport.
- Evaluating the potential to combine journeys with others.
- Planning the trip.
- Select the safest and most efficient route. Confirm compliance with any site specific specified routes, route rules, or restrictions.
- Confirm route planning factors in fatigue management. Refer to *S3NA-009-PR1 Fatigue Management*.
- Review road conditions and potential hazards associated with the route.
- Review weather conditions and forecast.
- If applicable, review *S3NA-314-PR1 Working Alone*.
- Confirm Emergency Response Plan includes procedures to be taken in the event of a collision or vehicle incident.
- Allow for adequate travel time.
- Inform others of destination, estimated time of arrival and routing.

4.5.3 Drivers who are to undertake trips in excess of 250 miles (400 km) each way, drive in remote or hazardous areas, or when otherwise deemed necessary, shall develop and document a JMP. This plan typically includes the route, location of route hazards, timing, rest periods and locations, communications, emergency response and security arrangements.

4.5.4 Drivers are responsible for developing the JMP and coordinating with the applicable parties identified in the plan.

4.6 Driver Safety Training

Authorized drivers shall have a current driver's license for the appropriate class of vehicle (unless more stringent requirements are established by the leasing/renting agency).

Driver safety training is to be assigned based on the risks posed with the work environment, driver type and vehicle type, using the training matrix and any additional training assessments developed at the business group level. Refer to *S3NA-003-PR1 SH&E Training, including S3NA-003-FM1 SH&E Training Matrix*. A determination of training type is at the discretion of the Manager / Supervisor, with the following guidance applied.

4.6.1 All Authorized Drivers (Professional, Hired, and General Drivers) shall be trained in this procedure; *S3NA-005-PR1 Driving*.

4.6.2 All Authorized Professional Drivers shall be trained in *S3NA-320-PR1 Commercial Motor Vehicles.*

4.6.3 Vehicle Safety (online) Training

- Recommended for all employees who drive on behalf of AECOM (Professional, Hired and General Drivers).
- Shall be completed within 1 month of the Authorized Driver’s hire date.

4.6.4 Defensive Driver (online) Training

- Recommended for all Authorized Drivers (Professional, Hired, and General Drivers) who are assigned an AECOM company owned, leased or rented vehicle for a significant period of time with the expectation that the employee utilizes the vehicle on a regular basis for AECOM business.
- It is recommended that authorized drivers who have completed web-based defensive driver training or equivalent also complete a refresher every three years.
- Defensive Driver training is provided online through AECOM University or one of the following AECOM-approved training resources:
  - The National Safety Council
  - Alert Driving

4.6.5 Defensive Driver (hands-on) Training

- Recommended for all Authorized Professional Drivers and Authorized Hired Drivers.
- Recommended for Authorized General Drivers who drive in remote locations, hazardous environments (such as refineries, ports, terminals etc.), at-risk drivers, and when required by clients.
- Defensive Driver hands-on training is provided through an AECOM-approved training resource, such as Smith Systems.
- Hands on defensive driver training may be required as a result of an incident or negative Motor Vehicle Report.

4.6.6 Driver Retraining

- Drivers involved in repeated motor vehicle incidents, incidents of sufficient severity or concern, or drivers identified as at-risk through review of their Motor Vehicle Report/Driver Abstract may be retrained or, as applicable, subject to disciplinary action and refused the right to drive on behalf of AECOM.
- Retraining programs will be implemented at the discretion of the Supervisor and SH&E Manager.

- Employees eligible to continue driving shall be subject to a driver retraining program that may include any of the above programs or other training programs appropriate for the type of driving the employees performs.

4.6.7 Special Vehicles and Driving Conditions

- Vehicles such as All-Terrain Vehicles (ATVs), four wheel drive vehicles, motorized carts, snowmobiles, box vans and trailers (towing) require specialized training and supervision. For ATVs, Refer to *S3NA-319-PR1 All-Terrain Vehicles* for additional information.
- Use of these types of vehicles is limited to AECOM projects, therefore training and qualification programs for drivers will be project specific. The Manager shall work with the SH&E Manager to tailor training to the specific needs of the project.

4.7 Personal Vehicles (additional requirements)

4.7.1 The requirements of this procedure apply to the use of a personal vehicle for AECOM business. Additional requirements are set forth in the *AECOM Global Travel Policy*.

4.7.2 Personal vehicles driven by Authorized Drivers for business use must satisfy the jurisdiction's registration and inspection requirements and may not be modified beyond manufacturer's specifications.

4.8 Rental Vehicles (additional requirements)

4.8.1 The requirements of this procedure apply to the use of a rental vehicle for AECOM business. Additional requirements are set forth in the *AECOM Global Travel Policy*.

4.9 Requirements for Authorized Drivers

4.9.1 Review the *S3NA-005-ATT1 Authorized Driver Safety Practices* for specifics.

4.9.2 Drivers are not to permit unauthorized persons to operate an AECOM-owned/leased/rented vehicle.

4.9.3 All Authorized Drivers shall perform a walk-around inspection of the vehicle prior to operation.

4.9.4 Pre-operation vehicle inspections shall be performed and documented by all Authorized Professional Drivers and all Authorized Hired Drivers. A sample vehicle inspection checklist is provided in *S3NA-005-FM2 Vehicle Inspection Checklist*.

4.9.5 Vehicles with deficiencies that affect or could potentially affect the safe operation of the vehicle shall be removed from service and promptly repaired as necessary to permit safe vehicle operation.

4.9.6 As applicable, arrange for and/or coordinate with appropriate AECOM personnel to facilitate preventive maintenance services for the vehicle. Maintain it in sound mechanical condition, as per the manufacturer's recommendations provided in the owner's manual.

4.9.7 Do not operate the vehicle if unsafe maintenance conditions exist that would likely result in vehicle damage or personal injury. This applies to vehicles owned or leased by AECOM and to personally-owned vehicles used for AECOM business. Escalate other maintenance issues for correction to appropriate authority (e.g., manager, rental car agency, supervisor, etc.).

4.9.8 Transport only persons on AECOM related business or those persons receiving transportation as a prescribed service. Only drive vehicles in conditions for which the driver has the appropriate training and experience.

4.9.9 AECOM-owned, rented, or leased vehicles are for official business use only and are not to be used for personal activities. Exceptions to this requirement can be made only with the specific written approval of the Manager of the office or location the vehicle is registered to.

4.9.10 Smoking (including the use of e-cigarettes) and chewing tobacco is not permitted in AECOM-owned, leased or rented vehicles.

4.9.11 Drivers are responsible for damage caused by abuse of the vehicle.

4.9.12 Secure the vehicle when left unattended.

4.9.13 Securing loads in the inside and outside compartments of the vehicle.

- Do not rely on weight/shape of load alone. Always use a cargo net, straps, containers or other mechanical device when necessary to confirm load is secure.
- Mark loads that extend the beyond the end of truck, trailer or similar edge with a red warning flag of at least 16 square inches.
- Red lights will be utilized at night to mark loads that extend the beyond the end of truck, trailer or similar edge.

4.9.14 Do not modify existing equipment (warning sounds, backing alarms etc.) or install aftermarket equipment including toolboxes, truck caps, specialty lights, or towing equipment) without approval from the Manager of the office or location the vehicle is registered to and AECOM Procurement Department.

4.10 Emergency Preparedness

4.10.1 AECOM-owned or leased vehicles are to have a “Safety Kit” that contains a first-aid kit, portable fire extinguisher, safety triangle, and two reflective safety vests. If not available, contact the Manager / Supervisor of SH&E Manager to determine how to obtain a kit.

4.10.2 The following suggested items should be kept in vehicles used for AECOM business in remote project locations:

- First aid kit, appropriate to the work and crew size, or per regulations.
- Fire extinguisher, safety triangle, and safety vest.
- Emergency equipment (e.g., flares, flashlight, blanket, drinking water, etc.) based on conditions.
- Means of communication (cell phone, radio or satellite phone), extra batteries or a charger.

4.10.3 To the extent possible, employees should refrain from changing tires or making repairs to vehicles in the field. A road side assistance service should be identified for vehicles used for AECOM business in advance travel.

4.10.4 Specific emergency procedures are to be identified in the applicable Emergency Response Plan, JMP or the THA. Refer to *S3NA-010-PR1 Emergency Response Planning*.

4.11 Vehicle Incidents

4.11.1 Vehicle incidents are to be managed in accordance with *S3NA-004-PR1 Incident Reporting, Notifications and Investigation* regardless of how minor the incident might be.

4.11.2 The Employee(s) involved in a collision shall follow the below guidelines:

- Assess the situation to confirm everyone is safe, and remove any vehicle occupants from harm’s way. Call, or have someone else call 911 immediately, if necessary.
- As appropriate, remain at the scene of a collision to contact the police. Ask another motorist to call the police if necessary; never leave the scene of a collision.
- As applicable, provide (if requested) to police and the other driver(s) the liability insurance information. Obtain the officer’s jurisdiction, name, and badge number and a copy of the police report.
- As applicable, consider moving the vehicle out of the traffic flow if it is safe to do so, the vehicle is operational, and/or no further damage to the vehicle can occur.
- Do not operate a damaged vehicle if its safety is questionable, its operating condition is illegal by applicable laws or its condition is such that further damage would likely result from its operation.
- Turn on the vehicle’s flashers to warn other motorists.
- Obtain:

- Names, phone numbers, and addresses of owner(s), driver(s), and occupants of the other car(s) involved.
- Other party's insurance company's name, address, phone number, policy number, and insurance agent.
- Names, phone numbers, and addresses of all witnesses.
- Photographs of the accident scene when safe to do so.

- Cooperate with AECOM Counsel if the incident results in unresolved risks or third party claims, or if the employee receives a summons, complaint or other legal documents relating to a traffic incident.
- DO NOT ADMIT LIABILITY, AGREE TO PAY FOR DAMAGE OR SIGN A DOCUMENT RELATED TO AN INCIDENT EXCEPT AS REQUIRED BY LAW.
  - Statements made in haste or anger may be legally damaging.
  - If contacted by a third party, do not answer any questions. Immediately report this contact to the Manager / Supervisor and/or Legal Counsel
- Employees shall report the incident to AECOM's Global Travel Department. If the incident involved a third party, the driver is responsible for obtaining a copy of the police report and providing to global travel

4.11.3 Employees must cooperate with the incident investigation team during any investigation of an incident meeting the investigation protocol.

4.11.4 Vehicle repairs shall be conducted at the authorization of the Manager / Supervisor.

4.12 Drug and Alcohol Testing

4.12.1 Testing for Alcohol and/or Drugs procedures shall be administered in accordance with the applicable policy and procedures.

4.12.2 In the event that a police/regulatory officer responding to a vehicle incident administers field and/or laboratory impairment testing AECOM reserves the right, as permitted, to obtain copies of such testing results for inclusion in the incident report and consideration in a subsequent incident investigation.

4.13 Driving Privileges, Citations and Violations

4.13.1 A violation of this vehicle safety standard is subject review by the appropriate AECOM Human Resources representative and may be subject to disciplinary action, up to and including termination. The applicable Manager / Supervisor will review all incidents involving AECOM-owned, rented, or leased vehicles.

4.13.2 Citations and violations which occur while driving for AECOM business are to be reported as a vehicle incident in accordance with *S3NA-004-PR1 Incident Reporting, Notification & Investigation* within 24-hours.

4.13.3 The AECOM Manager responsible for the employee, in consultation with the appropriate AECOM Human Resources representative, may suspend the privilege to operate vehicles on AECOM business due to noncompliance with the AECOM Vehicle and Driver Safety Program, involvement in a motor vehicle incident, or resulting citations or other legal actions associated with motor vehicle violations.

4.13.4 The employee's driving privileges will be suspended for any of the following:

- Accidents or legal action involving alcohol or drug use (e.g., driving under the influence).
- Driving without a license.
- Hit-and-run driving or leaving the scene of an accident.
- Unauthorized use of AECOM vehicles (e.g., using an AECOM vehicle for moving personal items, carrying passengers who are not associated with work activities, etc.).

4.13.5 The employee's driving privileges may be suspended for any of the following:

- Two or more at-fault accidents involving the same Authorized Driver within a 12-month period.
- Multiple complaints from other employees or members of the public about driving performance.
- Any accident caused by an AECOM Authorized Driver where damages exceed $2,500.
- Failure to comply with the distracted driving requirements.
- Gross misconduct or violation of policy.

4.13.6 An Authorized Driver's driving privileges may be reinstated as follows:

- For any suspension resulting from law enforcement agency legal action involving drugs and alcohol on the part of the former Authorized Driver, driving privileges may be reinstated only by concurrent agreement of the Vice President of SH&E for the applicable Business Group and Human Resources Manager.
- For those Authorized Driver's privilege suspensions that are not related to driving under the influence of drugs or alcohol, privileges may be reinstated with concurrent agreement by the AECOM Manager, the SH&E Manager, and Human Resources Manager upon completion of required remedial training.

4.13.7 Disciplinary action may include the following:

- Loss of AECOM driving privileges.
- Disciplinary warning.
- Termination.

4.13.8 The employee is personally responsible for payment of fines for moving violations and parking citations incurred while driving a vehicle on AECOM business and for reporting such incidents to his/her Manager / Supervisor. The Manager is responsible for notifying Counsel.

4.13.9 If an Authorized Driver receives a citation resulting in the license being suspended from driving or has his/her driver's license revoked, he/she is required to notify his/her Manager / Supervisor prior to start of the following work day. Failure to do so may result in disciplinary action up to and including termination.

5.0 Records

5.1 Documentation of employee training completed shall be retained in accordance with *S3NA-003-PR1 SH&E Training*.

5.2 As applicable, completed *S3NA-005-FM2 Vehicle Inspection Checklists* and/or *S3NA-005-FM1 Journey Management Plans* shall be retained in project files.

6.0 Attachments

6.1 S3NA-005-ATT1 Authorized Driver Safety Practices

6.2 S3NA-005-FM1 Journey Management Plan

6.3 S3NA-005-FM2 Vehicle Inspection Checklist

Americas

Vehicle Inspection Checklist

S3NA-005-FM2

Vehicle Tag No:	Mileage:	Date:	Time:	Driver Name:	Location:

Inspection Checklist: This Pre-Trip Vehicle Inspection Checklist is intended to be completed by the vehicle driver prior to departing on a trip. Checking boxes means that item is present and functioning. Deficiencies that affect or could potentially affect the safe operation of the vehicle shall be repaired or corrected prior to departure. This checklist should only be used in addition to an on-going vehicle maintenance program.

Item	Yes	No	N/A
1. General			
1-1 Proof of insurance and registration available and current?	☐	☐	☐
1-2 Is the date of the last regular maintenance known, or is the mileage/date of next scheduled maintenance known?	☐	☐	☐
1-3 Is the overall condition of the vehicle good (no body damage, unusual sounds, leaks, odors, etc.)?	☐	☐	☐
2. Tires			
2-1 Do all tires have sufficient tread for driving conditions? Legal limit: 2/32" (for rain/snow: > 4/32")	☐	☐	☐
2-2 Are tires sufficiently inflated for driving conditions?	☐	☐	☐
2-3 Are the lug nuts and stem caps present and tight for each tire?	☐	☐	☐
2-4 Is the spare tire and jack present and in good condition?	☐	☐	☐
3. Vehicle Interior			
3-1 Are the brake and accelerator pedal pads in good condition?	☐	☐	☐
3-2 Are the floor mats in good condition and not interfering with the brake or accelerator pedals?	☐	☐	☐
3-3 Is the seat properly adjusted (including the headrest)?	☐	☐	☐
3-4 Is the seatbelt in good condition?	☐	☐	☐
3-5 Are the mirrors in good condition (not broken, dirty)?	☐	☐	☐
3-6 Are the dashboard/instrument lights working?	☐	☐	☐
3-7 Is the dashboard free of warning lights and do the gauges appear to work when the car is started?	☐	☐	☐
3-8 Does the horn work?	☐	☐	☐
3-9 Are distractions such as cell phones and GPS units secured so they do not encourage use?	☐	☐	☐
4. Lights and Signals			
4-1 Do the headlights and high beams work?	☐	☐	☐
4-2 Do the tail lights function properly?	☐	☐	☐
4-3 Do the turn signals work (front and rear)?	☐	☐	☐
4-4 Do the brake lights work (including high light in the rear window if applicable)?	☐	☐	☐
4-5 Do the hazard lights (emergency flashers) work?	☐	☐	☐
4-6 Do back up / reverse lights work?	☐	☐	☐
4-7 If equipped with a back-up alarm can it be heard clearly?	☐	☐	☐
5. Mechanical			
5-1 Do the brakes work and feel solid (not soft)?	☐	☐	☐
5-2 Does the parking/emergency brake work?	☐	☐	☐
5-3 Is the steering in good working condition (not loose)?	☐	☐	☐
5-4 Is the engine oil level full or in the operating zone?	☐	☐	☐
5-5 Excessive vehicle bounce going over bumps reported (possible sign of worn shock absorbers)?	☐	☐	☐

Item	Yes	No	N/A
6. Windows and Windshield			
6-1 Is the windshield clean and unbroken?	☐	☐	☐
6-2 Are the wiper blades in good condition (front and rear)?	☐	☐	☐
6-3 Are all the windows clean and unbroken and windshield fluid available and operational?	☐	☐	☐
7. Emergency Equipment (as needed per conditions/project requirements)			
7-1 Is there a “Safety Kit” (fire extinguisher, first aid, safety triangle and 2 reflective vests)?	☐	☐	☐
7-2 Is there a first aid kit, has it been inspected recently?	☐	☐	☐
7-3 Is survival gear and equipment available (blanket, water, heat source, flashlight, etc.)?	☐	☐	☐
7-4 Is a means for emergency communication available?	☐	☐	☐
8. Other Equipment (as needed per conditions/project requirements)			
8-1 Is there a means to secured loads (cargo next, container)?	☐	☐	☐
8-2 Are cones or other warning devices available?	☐	☐	☐
8-3 Is weather specific equipment (snow chains, tired etc.)?	☐	☐	☐
8-4 Does the vehicle have a snow brush/ice scraper?	☐	☐	☐
8-5 Does the vehicle have a fire extinguisher?	☐	☐	☐
9. Comments			

Inspector Name:	Signature:	Date:

Americas

Housekeeping

S3NA-013-PR1

1.0 Purpose and Scope

1.1 This procedure provides AECOM's basic housekeeping requirements for offices and work sites, as well as establishes personal hygiene and sanitation standards for housekeeping.

1.2 This procedure applies to all AECOM Americas-based employees and operations.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3NA-208-PR1 Personal Protective Equipment

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers / Supervisors**

- Implementation of this procedure at all AECOM sites and offices.
- Confirm inspections are performed at appropriate intervals.
- Confirm the building Property Manager maintains leased facilities effectively.

4.1.2 **SH&E Managers**

- Monitor, assess, and report on housekeeping when visiting AECOM sites.

4.1.3 **Employees**

- Report any areas of concern to their Manager / Supervisor for prompt resolution.
- Maintain office locations that are free from debris, clutter, and slipping or tripping hazards.

4.2 General Housekeeping

4.2.1 All aisles, emergency exits, fire extinguishers, etc., will be kept clear (a minimum of three feet / 0.9 meters of either side) of material storage (temporary and permanent) at all times.

4.2.2 Areas in front of electrical panels will be kept clear and free of debris and materials storage for a minimum distance of 36 inches, or approximately 0.9 meters.

4.2.3 All work areas shall be kept clean to the extent that the nature of the work allows.

4.2.4 Spills shall be promptly cleaned up and resulting waste will be disposed of properly.

4.2.5 Storage areas will be maintained in an orderly manner at all times. When supplies are received, the supplies will be stored properly.

4.2.6 At all times, work areas will be kept free of debris and unused materials, tools and equipment that may affect the safety of employees and visitors.

4.2.7 All sharps, and sharp objects, shall be stored and/or guarded in a manner that prevents injury.

4.2.8 Recyclable material, debris and trash will be collected and stored in appropriate containers (e.g., recycle bins, plastic trash bags, garbage cans, roll-off bins) prior to disposal or recycling.

4.2.9 Containers maintained outdoors shall be provided with lids that are kept closed. Contents shall be removed at appropriate intervals (e.g. garbage weekly, garbage daily in areas with wildlife, monthly recyclable cardboard, etc.).

4.2.10 Take positive control measures for protection against vermin, insects, and rodents.

4.3 Smoking, Eating, and Drinking

4.3.1 Eating and drinking will be permitted in designated areas. These areas shall be located away from the work zone.

4.3.2 Operate and maintain food dispensing facilities established by AECOM in compliance with applicable health and sanitation regulations.

4.3.3 Buildings housing food dispensing facilities shall be floored completely, painted, well lighted, heated, ventilated, fly proof, and sanitary. Equip doors and windows with screens.

4.3.4 Microwave ovens shall be used for food only.

4.3.5 Use refrigerators designated for food storage for food only (i.e., no chemical or samples storage).

4.3.6 Hand washing stations shall be available nearby for employees entering the eating and smoking areas.

4.3.7 Smoking will be permitted only in areas:

- Designated in compliance with applicable local laws, regulations, legislation and ordinances;
- Not in the immediate vicinity of work-related activities or designated eating and drinking areas.
- Free of fire hazard;
- That will not contaminate indoor areas and HVAC systems. Specifically, there shall be no smoking within 5 metres (16 feet) around doorways, windows, air vents, and HVAC intakes and equipment; and
- Supervisors will designate each smoking area giving primary consideration to those employees who do not smoke.

4.3.8 Employees involved in the performance of certain activities will not be permitted to smoke, eat, drink, or use smokeless tobacco, except during breaks (e.g., HAZWOPER-controlled work areas).

4.3.9 Site employees will first wash hands and face after completing work activities which involve potential exposure or contact with hazardous substances and prior to eating or drinking.

4.4 Water Supply

4.4.1 Water will be available for use on all AECOM sites and will comply with the following requirements:

- Potable Water:
  - An adequate supply of drinking water will be available for site staff consumption.
  - Potable water can be provided in the form of approved well or city water, bottled water, or drinking fountains.
  - Water coolers and water dispensers shall be maintained in a sanitary condition and filled only with potable water.
  - Where drinking fountains are not available, individual use cups will be provided as well as adequate disposal containers. Do not use common drinking cups.
  - Potable water containers will be properly identified in order to distinguish them from non-potable water sources.
  - Laboratory-test drinking water obtained from streams, wells, or other temporary sources in accordance with applicable regulations, or often enough to ensure it is suitable for consumption. Maintain records of testing reports and results

- Non-potable Water:
  - Non-potable water will not be used for drinking purposes.
  - Non-potable water may not be used for hand washing or other personal hygiene activities but may be used for other types of cleaning activities.
  - All containers/supplies of non-potable water used will be properly identified and labelled as such.

4.5 Toilet Facilities

4.5.1 Clean and sanitary toilet facilities in good repair will be available for site and office staff and visitors. For locations without flush toilets readily available, one of the following shall be provided:

- Chemical toilets.
- Combustion toilets.
- Recirculation toilets.

4.5.2 A minimum of one toilet will be provided for every 20 site staff, with separate toilets maintained for each sex, except where there are less than five total staff on site or in an office.

4.5.3 Where toilet facilities will not be used by women, urinals may be provided instead of water closets in accordance with jurisdictional regulations.

4.5.4 Provisions for toilet facilities shall be considered as being met when mobile crews or employees working at normally unattended work locations have transportation immediately available (within 4 minutes travel time) to nearby toilet facilities.

4.5.5 Toilets shall be constructed so that the interior is lighted, by artificial or natural light, adequate ventilation is provided, and all windows and vents are screened.

4.5.6 A means for washing hands shall be provided next to or near toilet areas.

4.5.7 Release sanitary sewage into sanitary sewer lines or to other proper disposal channels.

4.6 Washing Facilities

4.6.1 Hand and Face: Site staff will wash hands and face after completing work activities and prior to breaks, lunch, or completion of workday.

4.6.2 Personal Cleaning Supplies: Cleaning supplies at all AECOM sites will consist of soap, water, and disposable paper towels or items of equal use/application (e.g., anti-bacterial gels, wipes, etc.).

4.7 Work Areas

4.7.1 Worksites which store chemical or environmental samples in refrigerators will clearly label the refrigerators that no food or beverages permitted and will locate refrigerators and sample coolers used for temporary sample storage, away from any food areas.

4.7.2 Every work area shall be maintained, so far as practicable, in a dry condition. Where wet processes are used, drainage shall be maintained and platforms, mats, or other dry standing places shall be provided, where practicable, or appropriate waterproof footgear shall be provided.

4.7.3 Protruding objects or placement of materials on paths or foot traffic areas creates the risk of slips, trips, falls, and puncture wounds. Employees shall eliminate slip, trip, and fall hazards where reasonably practicable.

4.7.4 At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.8 Break Areas and Lunchrooms

Site staff will observe the following requirements when using break areas and lunchrooms at AECOM sites:

4.8.1 All food and drink items will be properly stored when not in use.

4.8.2 Food items will not be stored in personal lockers for extended periods in order to prevent the potential for vermin infestation.

4.8.3 Perishable foods will be refrigerated whenever possible.

4.8.4 All waste food containers will be discarded in trash receptacles.

4.8.5 All tables, chairs, counters, sinks, and similar surfaces will be kept clean and free of dirt, waste food, and food containers at all times.

4.8.6 All ice dispensing machines for beverages shall be hands free/touchless design to prevent bacterial contamination (no ice scoops or ice bins permitted, closed beverage containers can be stored in portable ice coolers but the ice may not be used in the beverage).

4.8.7 Refrigerators used to store food items will be maintained at 40 degrees Fahrenheit (4 degrees Celsius) and emptied of all unclaimed food items weekly. Refrigerators used to store food will be labelled as such so that only food and drinks are stored within the refrigerator.

4.8.8 Routine cleaning of refrigerators will also be performed on a regular basis.

4.9 Change Rooms and Sleeping Facilities

4.9.1 Heated and ventilated change rooms shall be provided for changing, hanging, and/or drying clothing for operations subjecting employees to prolonged wetting or contact with hazardous materials.

4.9.2 Temporary sleeping quarters shall be heated, ventilated, lighted, and clean with all doors and windows screened.

4.9.3 Keep clean and sanitary, and periodically disinfect bunkhouses, bedding, and furniture.

4.10 Office Areas

Office areas are to be kept neat and orderly. The following general rules apply to prevent injuries and to maintain a professional workplace appearance.

4.10.1 All waste receptacles shall be lined with a plastic trash bag to avoid direct contact with waste during disposal. Employees shall use gloves when handling waste and may use a compaction bar to compress waste when necessary.

4.10.2 Keep file and desk drawers closed when not in use to avoid injuries. Open only one file drawer at a time to prevent tipping of file cabinets. Nothing should be stored on top of high filing cabinets without adequate support.

4.10.3 Telephone cords, electrical cords, wastebaskets, open file cabinets, and other ground-level hazards shall be managed in a manner that protects employees from tripping and obstruction hazards.

- Electrical cords and computer/phone cables will be bundled and stored.
- Cord covers should be used to protect temporary extension cords (used for presentations etc.) where they could be a tripping hazard.
- Small electrical appliances shall not be plugged into portable extension cords.
- Multiple appliances amperage should not exceed the circuit load limits.

4.10.4 Electrical appliances shall not be used in wet areas unless the circuit is equipped with ground fault circuit interrupters (GFCI).

4.10.5 File cabinets, desk drawers, safes, and other doors shall be fitted with handles or other hardware to protect employees from pinch points.

4.10.6 All materials shall be stored in a manner that prevents tipping of storage furniture (e.g. book shelves, file cabinets) and inadvertent falling of overhead material.

4.10.7 Do not stack excessive amounts of papers or other material on shelves to reduce possibility of shelf overload or falling items.

4.10.8 Workstations should be tidied, as a minimum, at the end of each day.

- Paperwork that is not currently needed should be filed appropriately
- Refrain from storing items on the floor as they may become falling or tripping hazards.

4.10.9 In public areas of the office:

- Maintain chairs in good repair.
- Keep rugs clean, in good repair, and free of tripping hazards.
- Clean up spills immediately.
- Pick up objects that may have been left on the floor by others.
- Report loose carpeting, damaged flooring, or other obstructions that are present in walkways.

4.10.10 Broken or damaged office furniture and equipment shall be removed from service. Office equipment shall be repaired and serviced by qualified personnel or contractors.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3NA-013-FM1 Housekeeping Inspection

Americas

Housekeeping Inspection

S3NA-013-FM1

Building or Location: _____

Inspection Conducted by: _____ **Date:** _____

Check Yes, No, or NA for Not Applicable.

General Site Housekeeping

1.	Exits, emergency equipment, and electrical panels unblocked?	☐ Yes	☐ No	☐ NA
2.	Equipment, materials, supplies properly stored and, as applicable, secured (e.g. chocked)?	☐ Yes	☐ No	☐ NA
3.	Drawers closed when not in use?	☐ Yes	☐ No	☐ NA
4.	Equipment, including desks and chairs, in good repair?	☐ Yes	☐ No	☐ NA
5.	Storage areas free from the accumulation of materials that constitute trip hazards?	☐ Yes	☐ No	☐ NA
6.	Recyclable material, debris and trash collected and stored in appropriate containers?	☐ Yes	☐ No	☐ NA
7.	Scrap materials and other debris from removed from work area?	☐ Yes	☐ No	☐ NA
8.	Combustible scrap and debris removed by safe means at regular intervals?	☐ Yes	☐ No	☐ NA
9.	Oily rags removed at the end of the day and stored in metal cans with tight fitting lids?	☐ Yes	☐ No	☐ NA

Visibility

10.	Worksite and, as applicable, halls, stairways and walkways are well lit?	☐ Yes	☐ No	☐ NA
11.	Well-designed light switches are present in areas where walkways are not always lighted?	☐ Yes	☐ No	☐ NA
12.	Dust, smoke or steam does not create poor visibility?	☐ Yes	☐ No	☐ NA
13.	Glare from floodlights or windows does not create poor visibility in work areas?	☐ Yes	☐ No	☐ NA

Stairs

14.	Handrails are tight and at the proper level?	☐ Yes	☐ No	☐ NA
15.	Handrails extend past the top and bottom step?	☐ Yes	☐ No	☐ NA
16.	White or yellow strips are painted on the first and last step for better visibility? (recommendation only).	☐ Yes	☐ No	☐ NA
17.	Steps are not rough or defective?	☐ Yes	☐ No	☐ NA
18.	Stair treads are wide enough and risers consistently spaced?	☐ Yes	☐ No	☐ NA
19.	Stairs are free of obstructions?	☐ Yes	☐ No	☐ NA

Floor Conditions

20.	Floors of every workroom are clean, and so far as possible, in a dry condition?	☐ Yes	☐ No	☐ NA
21.	Floors are not oily, overly waxed, or polished.	☐ Yes	☐ No	☐ NA
22.	Where wet floors or processes are present, proper drainage and false floors, mats, or other dry standing places are provided?	☐ Yes	☐ No	☐ NA
23.	Floor surfaces finished with non-slip coatings where spills are likely?	☐ Yes	☐ No	☐ NA
24.	Floors and passageways are free from protruding nails, splinters, holes, or loose boards?	☐ Yes	☐ No	☐ NA
25.	Floors are free of holes and depressions?	☐ Yes	☐ No	☐ NA
26.	Aisles or pathways are wide enough for easy passage and for carrying objects (48 inches is recommended)?	☐ Yes	☐ No	☐ NA
27.	Ramps are covered with non-slip surfaces or matting?	☐ Yes	☐ No	☐ NA

28.	Carpets or rugs free from loose or frayed edges that may catch boots or shoes?	☐ Yes	☐ No	☐ NA
29.	Extension cords, air hoses and cables removed from walkways, or otherwise managed to prevent trip hazards?	☐ Yes	☐ No	☐ NA
30.	Pathways free from boxes, containers, machine parts, or other tripping hazards?	☐ Yes	☐ No	☐ NA

Ground Conditions

31.	Trip hazards are not present?	☐ Yes	☐ No	☐ NA
32.	Fall hazards are not present?	☐ Yes	☐ No	☐ NA
33.	Holes or changes in ground elevation are either filled or guarded?	☐ Yes	☐ No	☐ NA
34.	Muddy or icy walkways are provided with traction material (e.g. sand, gravel) to reduce slipping?	☐ Yes	☐ No	☐ NA

Equipment

35.	Vehicle steps are free from debris or obstructions and of adequate size, and surface placement for safe dismounting?	☐ Yes	☐ No	☐ NA
36.	Hand grips or ladders are free from debris or obstructions and adequate for getting into and out of equipment?	☐ Yes	☐ No	☐ NA
37.	Ladders have been checked for damage and removed from service if found unsafe?	☐ Yes	☐ No	☐ NA

Chemicals

38.	Chemicals are properly stored to minimize a potential spill?	☐ Yes	☐ No	☐ NA
39.	Spill cleanup materials are available and appropriate for the type of potential spill?	☐ Yes	☐ No	☐ NA

Smoking, Eating and Drinking

40.	Smoking permitted in designated areas only?	☐ Yes	☐ No	☐ NA
41.	Designated smoking area appropriately placed?	☐ Yes	☐ No	☐ NA
42.	Appropriate and clean eating and drinking areas designated away from work areas?	☐ Yes	☐ No	☐ NA
43.	Food and drink items properly stored?			
44.	Potable water identified and readily available?	☐ Yes	☐ No	☐ NA

Sanitation

45.	Appropriate cleaning supplies available and properly stored?	☐ Yes	☐ No	☐ NA
46.	Hand and face washing facilities available and maintained with adequate supplies?	☐ Yes	☐ No	☐ NA
47.	Adequate toilet facilities available and maintained with sufficient supplies?	☐ Yes	☐ No	☐ NA

Identify areas that need attention and describe the corrective actions to be implemented:

_____

_____

_____

_____

_____

I certify that the above inspection was performed to the best of my knowledge and ability, based on the conditions present.

_____ _____

Signature Date

Americas

First Aid

S3NA-012-PR1

1.0 Purpose and Scope

1.1 The purpose of this procedure is to ensure employee accessibility to first aid personnel and supplies commensurate with the hazards of the workplace**.**

1.2 This procedure applies to all AECOM Americas employees and operations, except where legislation is more stringent.

2.0 Terms and Definitions

2.1 **Automated External Defibrillator (AED)** – A portable electronic device that automatically diagnoses the potentially life threatening cardiac arrhythmias of ventricular fibrillation and ventricular tachycardia in a patient, and is able to treat them through defibrillation, the application of electrical therapy which stops the arrhythmia, allowing the heart to re-establish an effective rhythm; are used in the resuscitation of a patient in full cardiac arrest.

2.2 **Cardiopulmonary Resuscitation (CPR) –** An emergency procedure in which the heart and lungs are made to work by:

- Manually compressing the chest overlying the heart, or
- Both manually compressing the chest and performing rescue breaths that force air into the lungs.

CPR is applied to a victim in respiratory distress and/or to maintain circulation when the heart stops pumping (cardiac arrest), which may be due to heart tissue damage (heart attack), disease, electrical shock, drug overdose, drowning, suffocation, stroke or trauma.

2.3 **First Aid Provider –** Is a First Aid, CPR, and AED trained employee who provides emergency first aid or treatment (including performing CPR and applying an AED) to someone who is injured or suddenly ill, before emergency medical services (EMS) arrives. This is a voluntary action and not an occupational duty assigned by AECOM. They may use a limited amount of equipment to perform initial assessment and provide immediate life support and care while awaiting arrival of emergency medical services.

2.4 **High Risk Task(s) –** For the purpose of this procedure, a work related task with the potential to cause traumatic injury/illness or immediate life threatening conditions.

2.5 **Occupational Exposure –** Reasonably anticipated skin, eye mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties. Employees will be considered to be potentially exposed, even though they are using the precautions specified for the project.

3.0 References

3.1 S3NA-003-PR1 SH&E Training

3.2 S3NA-004-PR1 Incident Reporting, Notifications & Investigation

3.3 S3NA-010-PR1 Emergency Response Planning

3.4 S3NA-018-PR1 Injury & Claims Management

3.5 S3NA-111-PR1 Bloodborne Pathogens

3.6 S3NA-208-PR1 Personal Protective Equipment

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 SH&E Manager

- Supporting the assessment of employees in the need for first aid, CPR and/or AED training and making training available to required employees.
- Assisting Managers with the assessment of each office or project site for adequate response time and availability of Emergency Medical Services (EMS).
- Assisting Managers with the development of the location specific emergency response plan. Refer to *S3NA-010-PR1 Emergency Response Planning*.
- Coordinating first aid/adult cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) training with the Manager.

4.1.2 Managers

- Ensure location specific emergency response plans are developed. Refer to *S3NA-010-PR1 Emergency Response Planning*.
- Coordinating weekly / monthly inspections of first aid kits and AEDs.
- Coordinating replacement supplies to re-stock first aid kits and AEDs.
- Ensuring debriefing and availability of counselling for any Employees, including First Aid Providers, who responded to the event, as well as any bystanders and co-workers who witnessed the event.
- Ensuring the appropriate investigations of incidents are conducted.
- Ensuring jurisdictional requirements, such as appropriate notifications, oversight and specific protocols are in place as necessary (e.g., requirements associated with Good Samaritan protection).

4.1.3 Employees

- Notifying supervisors of any injuries.
- Complying with emergency response procedures.
- Reporting all work related injuries in accordance with *S3NA-004-PR1 Incident Reporting, Notifications & Investigation*.

4.1.4 AECOM First Aid Providers

- Maintaining all required First Aid, CPR, and AED training.
- Providing emergency first aid or treatment if they so choose (including performing CPR and applying an AED) in accordance with training.

4.1.5 Designated Individual

- Ensuring First Aid Providers have been trained and maintain valid certificates in First Aid, CPR, and AED.
- Ensuring appropriate maintenance, testing and inspections of emergency equipment and supplies are completed as identified by this procedure and manufacturer requirements.
- Coordinating replacement supplies to re-stock first aid kits and AEDs.
- Ensuring appropriate documentation and reporting is completed as identified by this procedure and manufacturer requirements.

4.2 Requirements

4.2.1 An assessment shall be made by the Manager for each office or work site for first aid and medical requirements. The following factors should be considered:

- Types of incidents that could reasonably occur.
- Location of local clinics and hospitals.
- Response time for external emergency services (EMS).
  - Consult applicable legislation for minimum response time required as determined by hazards and distance to medical facilities.
- Corrosive or hazardous materials that may be used.
- Industry specific requirements.
- Types of training for Employees and First Aid Providers.
- First aid supplies required to be available.

4.2.2 A location specific emergency response plan must be developed and communicated to all affected personnel. Refer to *S3NA-010-PR1 Emergency Response Planning*.

4.2.3 The responsible Manager shall ensure adequate first aid supplies are available and an adequate number of trained First Aid Providers (but not less than one) are available during hours of normal operation or while performing work if either of these conditions cannot be met or relied on:

- High Risk Tasks: In workplaces locations where life-threatening injuries can reasonably be expected, emergency medical services must be available within 3-4 minutes. This generally means that community emergency medical services cannot be relied on since their response time is usually greater than 3 minutes.
- Remote Potential for Serious Injury: If no life-threatening work-related injuries can reasonably be expected, the response time for trained personnel is extended to 15 minutes.

4.2.4 The number of First Aid Providers and the type and quantity of first aid supplies will vary depending upon the number of workers, location of the office or project site, associated site hazards and legislation.

4.2.5 The trained First Aid Providers should be designated so that the other employees know who they are and how to contact them. Location specific emergency response plans shall include emergency contact lists that identify and provide contact information for the designated First Aid Providers. Refer to *S3NA-010-PR1 Emergency Response Planning*.

4.2.6 All on-site personnel must be aware of the First Aid Room (if applicable), First Aid Provider's location and contact information.

4.2.7 For certain long-term, heavily staffed, or high hazard projects, AECOM may opt to establish a first aid station on site. It should be staffed with a person who is a nurse, Emergency Medical Technician (EMT), or Emergency Medical Technician Paramedic (EMT-P) who may practice limited treatment under the direction of a physician.

4.3 First Aid Rooms

4.3.1 Where required by the applicable federal, provincial, or territorial legislation, every first aid room will:

- Be located in an area that is easily accessible to workers at all times;
- Be clearly identified as a first aid room;
- Be used exclusively for the purposes of administering first aid and medical examinations and to provide rest for persons who are ill or injured;

- Have adequate lighting, ventilation, and heating and be covered by a floor made of non-porous material;
- Be of an adequate size to accommodate all supplies;
- Be equipped with
- An appropriately sized First Aid Kit;
- Instructions on how and where to access a first aider,
- A communication system capable of communicating with the medical facility to which an injured worker would be transported,
- A permanently installed sink with hot and cold potable running water,
- A cot or bed with a moisture-protected mattress and two pillows;
- A stretcher.
- During working hours, be supervised by a first aid provider, who is readily available to provide first aid; and
- Be kept clean and sanitary.

4.4 First Aid Supplies

4.4.1 It is required that all AECOM locations maintain an adequate amount of first aid supplies in an easily identifiable and accessible location (this may by a vehicle in vehicle-based operations in remote locations). All locations (including vehicles) must be equipped with a complete first aid kit appropriate to the number of staff, location of work, and site hazards, as dictated by the applicable legislation and regulation.

4.4.2 First aid kits must be inspected to ensure contents meet jurisdictional requirements given the number of staff, work location, and potential hazards prior to being placed in the determined location or sent to site and, as a minimum, monthly thereafter.

- For construction operations, first aid kits shall be checked before being sent out to each job and at least weekly thereafter.
- An inventory (listing required and approved items) and weekly / monthly inspection form shall be included with each first aid kit. Any items not listed on the inventory (listed as required or approved for the kit) will be removed during the weekly / monthly inspection unless specifically approved by a health care professional for inclusion and added to the inventory. Refer to *S3NA-012-FM1 First Aid Kit / AED Inventory and Inspection* form.
- At no time will over-the-counter medications such as antacids, aspirin, cold or cough drops, or other sundry items be stored in the kits without the prior approval of a health care professional (where permitted by local legislation) and inclusion in the kit's listed inventory. Over-the-counter medications may be provided to employees with work-related injuries if recommended by a medical professional and/or a SH&E Manager.
- First aid kit content usage shall periodically be assessed for demand and supply inventory increased accordingly.

4.4.3 The Designated Individual identified on each individual project / location will be responsible for ensuring the weekly / monthly documented inspection of first aid kits for their assigned projects or locations, including all vehicles.

4.4.4 Each item in first aid kits shall be individually sealed to protect the contents from contamination. The first aid equipment and supplies shall be maintained in a clean, dry and serviceable condition, contained in a material that protects the contents from the environment, and clearly identified as first aid equipment and supplies.

4.5 First Aid Response

4.5.1 Any Employee who recognizes a medical emergency immediately initiates an emergency response in accordance with the location-specific Emergency Response Plan. Refer to *S3NA-010-PR1 Emergency Response Planning.*

4.5.2 First Aid Providers assess the emergency scene to determine and initiate the appropriate course of action based on their observations, the victim's condition, their training and according the location-specific Emergency Response Plan.

4.5.3 As is applicable to the victim's condition, First Aid Providers arrange for an escort to a suitable medical provider.

- For work related non-critical injuries and illnesses, Employees must follow procedures outlined in *S3NA-004-PR1 Incident Reporting, Notifications & Investigation*.
- Contact shall be made with their Manager, Supervisor or SH&E Manager prior to seeking any medical treatment for non-critical injuries/illnesses. Refer to *S3NA-018-PR1 Injury & Claims Management.*

4.5.4 As is applicable to the victim's condition, First Aid Providers transfer the victim's care to the EMS agency for appropriate advanced medical treatment and provides a report including: The initial time of the event.

- The initial time of the event.
- Any care given prior to the First Aid Provider's arrival.
- Victim's condition upon the First Aid Provider's arrival.
- Treatment rendered to the victim by the First Aid Provider.
- Available medical information about the victim.

4.5.5 If an AED was used, leave the defibrillator attached to the victim until instructed to remove it by EMS personnel or higher medical authority.

4.5.6 Reporting shall be completed in accordance with *S3NA-004-PR1 Incident Reporting, Notifications & Investigation* and *S3NA-018-PR1 Injury & Claims Management.*

4.6 Automated External Defibrillator (AED)

4.6.1 While locations are not mandated to acquire AEDs, an AED should be considered based on the number of employees, response time of local Emergency Medical Services (EMS), and access to other AED units (e.g., those provided by the office building management).

4.6.2 The selection of AED equipment will be based on the most current listing of approved AED manufacturers as provided by the American Heart Association, Heart and Stroke Foundation of Canada or country equivalent.

4.6.3 Many jurisdictions require Emergency Medical Services (EMS) notification as a requirement for placing an AED.

- This allows the servicing or responding agency to know that an AED is at a particular location. In some instances the 911 dispatcher will have that information and can advise callers as to its location.
- To meet this requirement, each location purchasing an AED will contact the local Emergency Response Services (EMS) or fire department to determine where notification(s) need to be sent.
- Some jurisdictions also require registration of AEDs. The Heart and Stroke Foundation, Department of Health or Office of Emergency Medical Services of the applicable jurisdiction may be helpful in this determination.

- Once it has been determined who must be notified, notification(s) will be made via certified mail, and records of notification will be delivered to the Designated Individual and maintained in the applicable project/ location files.
- Notification requirements shall be provided in AED procedures included in the location specific emergency response plan.

4.6.4 AEDs should be placed in a location that optimizes the fastest response time an individual walking at a rapid pace would incur to reach the victim. A general rule of thumb by the American Heart Association is that it should take no longer than 3 minutes to retrieve an AED and return to the victim. The AED should be in an easily accessible position with the location well-communicated to all staff.

4.6.5 In order to ensure readiness for use and integrity of the device, AEDs shall be inspected after use and on a monthly basis, and maintained, cleaned and tested according to manufacturer's specifications.

- Check equipment, supplies, accessories and spares for quantities, performance, expiration dates and defects. Additional items that should be stored and accessible with the AED:
  - Simplified written directions for CPR and the use of the AED.
  - Non-latex protective gloves (several pairs in various sizes).
  - Breathing barrier (CPR)
  - Disposable razor to shave chest hair if necessary.
  - Biohazard clean-up kit with two biohazard disposal bags.
  - Absorbent towels.
- AEDs shall be serviced according the manufacturer's specifications.
- After-use maintenance shall be performed according to manufacturer's specifications before it is returned to service.
- Inspections, cleaning, maintenance, tests and results shall be documented on *S3NA-012-FM1 First Aid Kit / AED Inventory and Inspection* form.
- All documentation (e.g. inspections, service records, etc.) will be delivered to the Designated Individual and maintained in the applicable project/ location files.

4.6.6 AEDs shall only be used by individuals with current and proper training.

4.6.7 Each location that has an AED will incorporate AED procedures into its location specific emergency response plan. Refer to *S3NA-010-PR1 Emergency Response Planning.*

4.6.8 AEDs shall be used in conjunction with CPR according to training and the equipment's operator directions when a victim is unresponsive and not breathing.

4.6.9 AEDs shall be applied to a victim and operated by a First Aid Provider in accordance with training and the equipment's instructions.

- Once the AED is turned on, it coaches the user through the steps for use. AEDs are completely safe. The device gives its users step-by-step instructions on what to do in an emergency situation and will only deliver a shock if the heart rhythm can be corrected by defibrillation.

4.6.10 Once an AED has been applied to a victim, it shall not be removed or turned off even if the device advises 'No Shock'. The AED will continue background monitoring of the victim's heart rhythm and alert the First Aid Provider(s) if a shock is required. The AED shall only be turned off or removed upon direction of the device itself, EMS personnel or higher medical authority.

4.6.11 When an AED has been used and has been detached from the victim, the First Aid Provider shall deliver the equipment as soon as possible to the Designated Individual who will download the data from its internal memory and, as necessary, subsequently erase the AEDs memory (ensures adequate memory space for future data).

4.6.12 Ensure any additional reporting or notifications required as per jurisdictional or client requirements is completed. Note: Jurisdictional requirements may specify additional actions, reports or notifications necessary in order for Good Samaritan protections to apply.

4.7 Eyewash and Body Flush (Shower) Facilities

4.7.1 If corrosive, irritating or otherwise hazardous materials are used, review applicable safety data sheets to assist in determining whether eyewash and body flush (shower) facilities must be provided.

4.7.2 Employees who may be exposed to corrosive, irritating or otherwise hazardous materials will be instructed in the location and proper use of emergency eyewash units and body flush (shower) facilities.

4.7.3 Eyewash and body flush (shower) facilities will be assembled and installed in accordance with the manufacturer's instructions.

4.7.4 These facilities should highly visible, clearly identified and, if possible, within 10 seconds of the hazard. The water source / flushing fluid must be tepid, pressure controlled, and maintained to prevent freezing and contamination of the fluid.

4.7.5 Eyewash facilities must be capable of flushing both eyes simultaneously and providing at least 15 minutes of potable water flow at a velocity low enough so as not to cause injury to the user (not less than 0.4 gallons per minute (gpm), or 1.5 liters per minute (lpm)).This generally requires between 7 and 15 gallons depending on flow.

4.7.6 Plumbed eyewash and body flush (shower) equipment will be activated weekly to verify operation and ensure that flushing fluid is available. Self-contained eyewash and body flush (shower) equipment will be visually checked regularly to determine whether the flushing fluid needs to be changed or supplemented.

4.7.7 Body flush (shower) facilities will be capable of delivering flushing fluid at a rate of not less than 20 gpm (75.7lpm) for 15 minutes.

4.7.8 Eye/face wash facilities will meet all the criteria outlined for facewash facilities, except the equipment will be capable of delivering flushing fluid at a rate of not less than 3.0 gpm (11.4 lpm) for 15 minutes.

4.7.9 All eyewash and body flush (shower) equipment will be included in site inspections as well as inspected annually for compliance with this procedure.

4.8 Training

4.8.1 First Aid Provider(s) shall possess a valid certificate in First Aid, CPR, and AED training from an approved provider for the applicable jurisdiction (e.g., the U.S. Bureau of Mines, the American Red Cross, St. John Ambulance, etc.), that can be verified by documentary evidence. Refer to *S3NA-003-PR1 Training.*

4.8.2 First Aid, CPR, and AED training will be renewed 30 days before expiration. Specific training may also be considered for such topics including wilderness survival and rescue for employees performing work in remote locations where access by EMT is limited by extreme terrain.

4.8.3 If there is potential for occupational exposure to bloodborne pathogens, requirements of *S3NA-111-PR1 Bloodborne Pathogens* will be followed (where regulatory required).

4.9 Providing Assistance to Injured Employees

4.9.1 In the case of an emergency, the First Aid Provider may provide injured workers with a level of care within the scope of the their training, objectively record observed or reported signs and symptoms of injuries and exposures to contaminants, and refer workers with injuries considered to be serious or beyond the scope of the provider's training to medical personnel.

4.10 Program Review

4.10.1 This program will be evaluated at least annually.

5.0 Records

5.1 Documented inspections shall be maintained in the office / location / project files.

5.2 Records associated with treatment will be filed and maintained with strict confidentiality.

5.3 Downloaded AED data shall be stored in a secure location.

6.0 Attachments

6.1 S3NA-012-FM1 First Aid Kit / AED Inventory and Inspection

Americas

First Aid Kit / AED Inventory and Inspection

S3NA-012-FM1

This form is to be used to record the required contents of the first aid kit as well as document monthly First Aid Kit / AED inspections. The column '**Quantity**' is to be completed according to jurisdictional requirements and/or approval prior to the first aid kit being delivered to its intended location and at the beginning of each calendar year thereafter. Any listed items that are not required by the given jurisdiction or approved to be included in the first aid kit shall have '**N/A**' entered in the corresponding '**Quantity**' box. If an AED is not on location, or inspection is included on another *S3NA-012-FM1 First Aid Kit / AED Inventory and Inspection* form, mark the AED content in this form with 'N/A'.

Project/Location/ Office Name:		**Address:**	
First Aid Kit Type:		**Kit Location:**	
First Aid Kit ID #:		**AED Location:**	
AED ID #:		**Date:**	

Monthly inspections require the inspector to record the actual quantity of required items in the corresponding monthly column. Items deficient in number must be restocked. Unapproved items shall be removed from the First Aid Kit.

Item (Year)	Quantity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
First Aid Manual *(current)*													
Adhesive Bandage													
Elastic Adhesive Bandage													
Gauze Roller Bandage													
Triangular Bandage													
Conforming Bandage													
Tensor Bandage													
Safety Pins													
Adhesive Tape													
Antiseptic *(solution/swabs)*													
Burn Treatment													
Medical Exam Gloves													
Dressing *(Sterile Pad)* Sz/ Type													
Dressing *(Sterile Pad)* Sz/ Type													
Dressing *(Sterile Pad)* Sz/ Type													
Dressing *(Sterile Pad)* Sz/ Type													
Dressing *(self-adherent roller)*													
Eye Pad *(with Shield / Tape)*													
Breathing Barrier *(CPR use)*													
Bandage Scissors													
Soap													

Item (Year)	Quantity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cold Compress													
Splinter Forceps													
Waterless Hand Cleaner													
Waterproof Waste Bag													
Eye Wash													
Tweezers													

AED inspected according to manufacturer specifications. Use '✓' as acceptable condition and 'x' as deficient. Deficiencies, corrective actions taken, and whether inspection was an 'After-Use' inspection recorded in monthly comments below.

AED Condition													
AED Tested													
AED Pads													
AED Battery													
AED Supplies *(razor, manual)*													
AED Other													

Inspector for the given month shall record his/her name, record any comments regarding the inspection (including items replaced) and initial once complete.

MONTH	Inspector Name	Comments	Initials
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
January			
December			

Americas

Personal Protective Equipment

S3NA-208-PR1

1.0 Purpose and Scope

1.1 Provide an effective Personal Protective Equipment (PPE) Program to protect AECOM employees from potential workplace safety and health hazards.

1.2 This procedure applies to all AECOM Americas-based employees and operations.

1.3 The proper use of appropriate PPE, in combination with effective engineering and administrative controls, can provide AECOM employees with protection against potential workplace hazards and can reduce the potential for workplace injury and illness.

2.0 Terms and Definitions

2.1 **ANSI** – American National Standards Institute

2.2 **CSA** – Canadian Standards Association

2.3 **PPE** – Personal Protective Equipment

2.4 **SDS** – Safety Data Sheets

2.5 **THA –** Task Hazard Assessment

3.0 References

3.1 S3NA-123-PR1 Respiratory Protection

3.2 S3NA-209-PR1 Risk Assessment & Management

3.3 S3NA-301-PR1 Confined Spaces

3.4 S3NA-304-PR1 Fall Protection

3.5 S3NA-315-PR1 Working On & Near Water

3.6 S3NA-317-PR1 Hand Safety

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers** or **Supervisors**

- Confirm the location specific SH&E Plan documents required hazard controls.
- Confirm Task Hazard Assessments (THAs) are conducted and hazards identified are eliminated through substitution, engineering, or administrative controls first before assigning PPE for hazard mitigation.
- Confirm appropriate subject matter experts, manufacturer's specifications, and regulatory requirements are consulted as necessary to assist with proper PPE selection.
- Match the appropriate PPE to those hazards that cannot be eliminated; support employees in exercising Stop Work Authority if the task is too hazardous to be mitigated
- Provide and document employee training on use and care of PPE.
- Determine which staff requires employee-issued PPE.

- If applicable, manage medical monitoring of employees using PPE (e.g. respirators, hearing protection, radiation, etc.).
- Approve the purchase of company-issued PPE.
- Confirm that appropriate PPE is utilized by employees when required or necessary. This may periodically be documented using *S3NA-208-FM2 Personal Protective Equipment Inspection*.
- Exercise Stop Work Authority if PPE is inadequate to address hazards

4.1.2 **SH&E Managers**

- Provide guidance to Managers, Supervisors, and staff on the assessment of hazards and the selection of PPE.
- Provide training materials to Managers and Supervisors for employee training

4.1.3 **Employee**

- Review all relevant SH&E Plans, THAs and applicable SDS prior to commencing work.
- Exercise Stop Work Authority if the task is too hazardous.
- In accordance with training and instructions, utilize appropriate PPE that has been issued when required or necessary.
- Inspect PPE prior to and after use to confirm that it is functional, and maintain PPE in a clean and functional condition.
- Follow instructions and manufacturers' guidance on the care, use, and storage of PPE.
- Replace PPE when worn out, expired or damaged.
- Refrain from wearing PPE outside of the work area for which it is required if doing so would constitute a hazard.

4.2 Hazard Assessment

4.2.1 The location specific SH&E plan and THA shall assess the hazards and identify the necessary control measures. Refer to *S3NA-209-PR1Risk Assessment & Management.*

4.2.2 These control measures shall include direction and guidance concerning the appropriate PPE required as the last line of defense to the anticipated hazards of the specific operations and tasks. A PPE specific assessment may assist in identifying PPE requirements. *S3NA-208-FM1 Personal Protective Equipment Assessment* may be completed and included in the SH&E Plan.

4.2.3 Various tasks and operations, including but not limited to, demolition, remediation, spill response, asbestos abatement, and lead removal, may require additional direction concerning selection, use, care, and disposal of PPE from a subject matter expert (e.g. protector manufacturer, industrial hygienist, asbestos professional, etc.).

- Obtained direction shall be included in the SH&E Plan.
- Consultation with subject matters may be limited to the planning phase or they may be retained to provide technical assistance for a portion of or duration of the project.

4.3 Training

4.3.1 All employees shall be informed of their right to Stop Work if the task is too hazardous to mitigate through use of elimination, substitution, engineering controls, administrative controls, and PPE.

4.3.2 Staff will receive adequate instruction on the correct use, limitations, and assigned maintenance duties for the equipment to be used. The following information, at a minimum, will be covered during PPE training:

- What PPE is required.

- When it is required.
- Why it is required.
- How to properly don, doff, adjust, and wear the PPE described.
- The limitations of the PPE, including its expected useful life.
- How to properly care for, maintain, and dispose of the PPE.

4.3.3 Staff are responsible for confirming that they have reviewed the operation manual/instructions for the PPE before work commences.

4.3.4 All staff will receive a location specific orientation to the hazards on the job site as well as appropriate PPE requirements.

4.4 Determining the Need for PPE

4.4.1 Prior to beginning work, the SH&E plan shall be consulted and THAs developed to identify the PPE requirements.

4.4.2 After the hazard assessments have been completed, the manager and/or employee shall select the appropriate PPE for each job category or task, as necessary. PPE will be provided to each employee appropriate for the hazards present. All PPE selected, purchased and used by AECOM will meet or exceed the appropriate ANSI/CSA standards or other standards as determined by federal, provincial, territorial, or state legislation

4.4.3 If the hazard can be mitigated through using appropriate PPE shall:

- Properly fit the employee's body.
- Be selected and used in accordance with recognized standards and provide effective protection.
- Not in itself create a hazard to the wearer (e.g., scratched safety glasses which could cause impaired vision should be replaced with clear safety glasses).
- Be compatible so that one item of PPE does not interfere with other PPE.
- Be maintained in good working order and in a sanitary condition.
- Not be altered in any way.

4.4.4 Prior to entering any controlled or restricted work area, employees shall review the SH&E plan and corresponding THA(s) to confirm that they are equipped with the applicable ANSI/CSA-approved PPE, appropriate to the specific work area's hazards.

4.5 Eye and Face Protection

4.5.1 AECOM employees shall use appropriate eye and face protection when eye or face hazards are present or potential from flying particles, molten metal, liquid chemicals, acid and caustic liquids, chemical gases or vapors, or injurious light radiation.

4.5.2 Safety glasses with side protection is the minimum eye protection requirement. Additional eye protection shall be suitable to the anticipated hazards (e.g. goggles, safety glasses with a face-shield, welder's helmet, etc.). Refer to *SN3NA-208-ATT1 Eye & Face Protection*.

4.6 Head Protection

4.6.1 Appropriate protective hardhats are required when employees are working in areas where there is any potential for injury to the head.

4.6.2 Head protection shall be suitable to the anticipated hazards (e.g. working near exposed electrical conductors requires hardhats designed to reduce electrical shock). Refer to *S3NA-208-ATT2 Head Protection.*

4.7 Foot Protection

4.7.1 AECOM employees shall use appropriate foot protection when hazards to feet are present or potential; including impact, puncture, cut, electrical, thermal or chemical hazards.

4.7.2 Refer to *S3NA-208-ATT3 Foot Protection.*

4.8 Hand Protection

4.8.1 Appropriate hand protection is required when employee's hands are exposed to hazards such as those from skin absorption of harmful substances, cuts and lacerations, abrasions, punctures, chemical burns, thermal burns, electricity, or harmful temperature extremes.

4.8.2 Refer to *S3NA-208-ATT4 Hand Protection* and *S3NA-317-PR1 Hand Safety*.

4.9 Chemically Resistant Clothing

4.9.1 Chemically resistant clothing is required when there is significant potential for the employee to come in direct contact with the chemicals being handled. Tasks that involve chemical handling will be evaluated for potential splashing or spilling. Refer to *S3NA-208-ATT5 Limb & Body Protection*.

4.9.2 The process for selecting chemical resistant clothing will be similar for the selection of chemical resistant gloves (refer to *S3NA-208-ATT4-Hand Protection* and *S3NA-317-PR1 Hand Safety*).

4.10 High-Visibility Apparel

4.10.1 “High visibility safety apparel” means personal protective safety clothing that is intended to provide conspicuity during both daytime and nighttime usage and that meets the Performance Class II or III requirements of ANSI/CSA standards. Refer to *S3NA-208-ATT6 High Visibility Safety Apparel.*

4.10.2 Color of apparel (orange or lime) may be client/project-specific. If there is a specific need to be visible to the passing public, to machine operators, or to other crew members, high visibility vests shall be worn (and retro-reflective striping on arms and legs at night).

4.10.3 Work conducted at night may require that the minimum level of apparel worn be, at minimum, ANSI/CSA Class III, and in accordance with the governing legislation.

4.11 Personal Clothing

4.11.1 Employees on a project site shall wear full length trousers and shirts that cover shoulders.

4.11.2 For personal safety on the job site, do not wear

- Loose or unsecured clothing or loose fitting cuffs;
- Greasy or oily clothing, gloves, or boots; or
- Torn or ragged clothing.
- Jewelry (e.g. rings, bracelets, neck chains) when working with moving parts or there is a risk or entanglement.

4.11.3 Long hair shall be tied back or otherwise confined when working with moving parts or there is a risk of entanglement.

4.11.4 Clothing made of synthetic fibers can be readily ignited and melted by electric flash or extreme heat sources. Cotton or wool fabrics are recommended for general use.

4.11.5 Footwear shall be suitable for the site conditions and task requirements. No athletic shoes, sandals, flip flops, permitted on active job sites.

4.11.6 It is recommended to use clothing with sun protection properties when working in high sun uv exposure

4.12 Specialized PPE

4.12.1 In addition to basic PPE, additional specialized PPE may be required to provide appropriate protection to the employee. Refer to applicable legislation and related SH&E procedures for additional information on PPE requirements.

- Fall Protection – Only full-body harnesses with shock-absorbing lanyards will be used for personal fall arrest. Refer to *S3NA-304-PR1 Fall Protection*.
- Respiratory Protection – Respiratory protection shall be selected based on the contaminant and concentration to which the employee will be exposed. Refer to *S3NA-123 PR1 Respiratory Protection*, the task- or project-specific hazard assessments and the applicable SDSs for specific requirements.
- Fire Resistant Clothing (FRC) – Approved fire-resistant outer clothing may be required at work locations with flammable or explosive materials or environments. Refer to *S3NA-208-ATT5 Limb & Body Protection.*
- Other Head Protection – Operators and passengers (if trained and permitted) of all-terrain vehicles and snowmobiles will wear approved helmets. Refer to *S3NA-208-ATT2 Head Protection.*
- Protection from Drowning – Appropriate personal floatation devices shall be worn when work working over and near water. Refer to *S3NA-315 Working On & Near Water*.
- Temperature Extremes – Work in cold environments may require additional layers and insulated clothing, gloves, boots and accessories such as balaclavas, hardhat liners. Confirm these items are approved and do not introduce additional unacceptable hazards (e.g. insufficient visibility, conductivity, etc.).
- Hearing Protection – Noise levels in the work environment that cannot be eliminated or reduced to acceptable levels requires worker be protected from exposure. Refer to *S3NA-118-PR1 Hearing Conservation.*
- Traction Devices – Traction devices applied to the base of work boots may be necessary if the employee may be walking on icy surfaces. Refer to *S3NA-208-ATT3 Foot Protection*.
- Rescue – Confined spaces hazards may necessitate the use of specific harnesses attached to retrieval lines to facilitate rescue. Refer to *S3NA-301-PR1 Confined Spaces*.

4.13 Maintaining PPE Supplies

4.13.1 Employees shall inspect their required PPE prior to use. Defective equipment shall be removed from service and replaced.

4.13.2 Each AECOM location will maintain a supply of safety equipment of appropriate types and sizes, including hard hats, high visibility vests, safety glasses, gloves, hearing protection and chemically resistant clothing based on the nature of their field activities. The Manager or designee will be responsible for maintaining this inventory.

4.13.3 Use of PPE by employees and adequacy of protection should be evaluated on a routine basis. This may periodically be documented using *S3NA-208-FM2 Personal Protective Equipment Inspection.*

4.13.4 At a minimum, locations will review their PPE program annually.

4.14 Obtaining Personalized Safety Gear

4.14.1 Employees are not expected to provide their own general PPE. Most basic PPE will be provided to the employee at no charge (e.g. safety glasses, hard hat, gloves, hearing protection, etc.) with the exception of the below personalized safety equipment (prescription safety glasses, safety-toed boots, any washable coveralls).

4.14.2 Certain personalized safety gear such as prescription safety glasses, safety-toed (capped) boots, and any washable coveralls will be ordered and sized specifically by the user. A partial cost reimbursement to the employee may be made if their location provides a specialized PPE purchase program.

4.14.3 All specialized PPE (e.g. fall protection equipment, respirators, helmets, etc.) will be provided by AECOM for employee use at no charge to the employee, with the exception of the above personalized safety equipment (prescription safety glasses, safety-toed boots, any washable coveralls).

5.0 Records

5.1 Completed SH&E plans, THAs documenting PPE requirements, and as applicable, PPE assessments and PPE inspections, will be maintained in the location's safety files.

6.0 Attachments

6.1	S3NA-208-ATT1	Eye & Face Protection
6.2	S3NA-208-ATT2	Head Protection
6.3	S3NA-208-ATT3	Foot Protection
6.4	S3NA-208-ATT4	Hand Protection
6.5	S3NA-208-ATT5	Limb & Body Protection
6.6	S3NA-208-ATT6	High Visibility Safety Apparel
6.7	S3NA-208-FM1	Personal Protective Equipment Assessment
6.8	S3NA-208-FM2	Personal Protective Equipment Inspection

Americas

Competent Person Designation

S3NA-202-PR1

1.0 Purpose and Scope

1.1 Outlines the process and minimum requirements necessary for classifying an AECOM employee as a "Competent Person" to oversee and/or self-perform activities involved with tasks listed in this procedure. Employee competency to perform work activities is addressed elsewhere.

1.2 This procedure applies to all AECOM Americas-based employees and operations where AECOM is self-performing the identified activities and where AECOM controls projects performing activities requiring a Competent Person. Client-mandated requirements may apply on a project-specific basis and shall be addressed in supplemental documents (e.g. Task Hazard Assessment, SH&E Plan, etc.).

1.3 It is recognized that local regulations and legislation may contain alternate definitions for Competent Person and it will be the responsibility of the manager responsible for the work (e.g. Manager, Superintendent) in conjunction with the local SH&E Manager to determine if conflicts exist between AECOM and applicable regulatory/legislative definitions and resolve the conflict.

1.4 When a qualified employee within AECOM is not available to be designated as the AECOM Competent Person, the Manager in coordination with their SH&E Manager may designate an appropriately qualified and trained Contractor employee as the Competent Person for the AECOM operations.

2.0 Terms and Definitions

2.1 **Competent Person –** An employee, through education, training and experience who has knowledge of applicable regulatory requirements, is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

3.0 References

3.1 S3-NA-213-PR1 Subcontractor Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 M**anager**

- Confirm that all assigned personnel, including personnel utilized from other offices to support their operations, comply with the requirements of this procedure. The manager responsible for the work shall:
  - Identify the need for a designated Competent Person or persons based on anticipated work activities.
  - Communicate competent person training/experience requirements with the employee and documenting completion of these requirements using *S3NA-202-FM-1 Competent Person Designation* or equivalent.
  - Identify supplemental employee training needs based on local/client requirements.
- For projects controlled by AECOM, when these activities are contracted to another party:
  - Confirm and secure the identity of the Contractor's Competent Person(s) for its activities. Refer to *S3NA-213-PR1 Subcontractor Management*.
  - *S3NA-202-FM1 Competent Person Designation* or equivalent may be used for this purpose.

- Provide the Contractor with a copy of this SH&E Procedure to verify the Contractor's capability to comply with the requirements within, and obtain documentation to support the designation of the Contractor employee as a Competent Person for AECOM.

- Verify the designation of the Competent Person for a specific activity is documented and effectively communicated to field personnel on site during daily tailgate safety meetings.

4.1.2 **Safety, Health and Environment (SH&E) Manager**

- Assist the Manager responsible for the work in assessing the competency of all designated persons based on specific requirements outlined in this procedure.
- Assist the Manager in:
  - Establishing competent person training/experience requirements and communicating these requirements to the supervisor.
  - Monitoring the overall implementation of this SH&E Procedure.
  - Monitoring field compliance of this procedure.
  - Providing technical assistance/support as requested.
  - Coordinating internal safety training classes as requested.
- Support the Manager in establishing minimum competent person requirements for regulated job activities based on individual job descriptions, applicable regulatory requirements, operational considerations, and management directives.
- Review as requested by designated operations representatives the Competent Person's qualifications for AECOM employees.

4.1.3 **Competent Person**

- Predict, identify, and control hazards when either AECOM self-performs associated field work or oversees and directs the work of subcontractors.
  - For operations where AECOM is providing oversight of subcontractors (e.g. drilling services), it is the subcontractor's employee who shall be designated as the Competent Person.
- Contractor Competent Persons - Unless AECOM is self-performing, the Contractor shall:
  - Determine the safe means and methods of its work activities.
  - Designate its Competent Person(s) for each category of work the Contractor undertakes and/or controls as required by this procedure.
  - If the contractor is unable to designate a Competent Person, AECOM may designate an appropriate AECOM employee as the contractor's Competent Person only if AECOM is contractually responsible for safety oversight of the contractor's activities.
- The Contractor's Competent Person shall:
  - Technically support the Contractor's site operations for the safe execution of its activities. Identify and remove any field hazards
  - Maintain appropriate knowledge about the work activities, the Contractor's work practices and procedures and compliance with the associated safety and health regulations.

4.2 General Requirements

4.2.1 The AECOM Competent Person project or worksite functions are dependent on the project activities and AECOM's project or worksite function.

4.2.2 Refer to each SH&E Procedure for the activities listed below and the associated legislative standards to determine the details of responsibility.

4.2.3 The following activities require an individual to be designated as a Competent Person:

- Asbestos
- Assured Equipment Grounding Conductor
- Blasting & Explosives
- Concrete & Masonry Construction
- Confined Spaces
- Control of Hazardous Energy (Lockout-Tagout)
- Cranes & Derricks
- Crane Assembly / Disassembly
- Demolition
- Electrical Wiring Design & Protections
- Elevated Work Platforms & Aerial Lifts
- Fall Protection
- Hearing Protection
- Heavy Equipment
- Ionizing Radiation
- Lead
- Material Hoists & Personnel Hoists
- Stairways & Ladders
- Respiratory Protection
- Rigging Equipment
- Scaffolds
- Steel Erection
- Trench & Excavations
- Underground Construction
- Welding & Cutting

4.2.4 Generally, it is the responsibility of the Competent Person(s) to be on site at all times when respective staff (AECOM, subcontractor) are performing work governed by this procedure, make daily inspections of the conditions and work activities, and take actions to control any hazards associated with those activities.

4.2.5 The *S3NA-202-FM1 Competent Person Designation* or equivalent shall be used for all programs or on all projects for documenting Competent Person designations. Documentation shall be filled out completely and updated as necessary.

4.2.6 *S3NA-202-ATT1 Competent Persons in General Industry (29 CFR 1910)* and *S3NA-202-ATT2 Competent Persons in Construction (29 CFR 1926)* include descriptions of various U.S. Occupational Safety and Health Administration requirements for competent persons. The list is not comprehensive and as such 29 CFR 1910 and 1926 shall be consulted for any additional competent person requirements.

5.0 Records

5.1 AECOM Competent Person Designation forms shall be maintained in the program / project file.

5.2 Documentation as to daily inspections and corrective measures by the AECOM Competent Person shall be maintained in the program / project file.

6.0 Attachments

6.1 S3NA-202-FM1 Competent Person Designation

6.2 S3NA-202-ATT1 Competent Persons in General Industry (29 CFR 1910)

6.3 S3NA-202-ATT2 Competent Persons in Construction (29 CFR 1926)

Americas

Medical Screening & Surveillance

S3NA-128-PR1

1.0 Purpose and Scope

1.1 Provides a streamlined process to determine if employees meet the physical requirements to perform assigned duties as defined by applicable regulations.

1.2 Designed to provide a means to collect data relevant to exposure to chemical and physical agents for the protection of the workers and to confirm the effectiveness of health and safety programs.

1.3 Applies to all AECOM Americas employees and operations.

2.0 Terms and Definitions

2.1 **Employee Exposure Record** - A record containing any of the following kinds of information:

- Environmental (workplace) monitoring or measuring of a toxic substance or harmful physical agent, including personal, area, grab, wipe or other form of sampling, as well as related collection and analytical methodologies, calculations and other background data relevant to interpretation of the results obtained.
- Biological monitoring results which directly assess the absorption of a toxic substance or harmful physical agent by body systems (e.g., the level of a chemical in the blood, urine, breath, etc.), but not including results which assess the biological effect of a substance or agent or which assess an employee's use of alcohol or drugs.
- Safety data sheets indicating that the material may pose a hazard to human health.
- In the absence of the above, a chemical inventory or any other record which reveals where and when used and the identity (e.g., chemical, common, or trade name) of a toxic substance of harmful physical agent.

2.2 **Medical Director –** A physician, board-certified in occupational medicine, employed by the Medical Services Provider (MSP). The Medical Director manages the services provided by the MSP and provides to AECOM guidance on medical matters.

2.3 **Medical Services Provider (MSP) –** Manages all occupational medical services, including medical surveillance programs, travel medicine, and injury intervention for first aid support for employees with occupational injuries or illnesses.

2.4 **Participating Employee** – Those employees required to participate in the medical screening and surveillance program will be identified by the Supervisor, Operations and SH&E Manager. Medical surveillance is required for employees who are or may be:

- Exposed to substances at or above the occupational exposure limits.
- Required to participate by regulatory provisions (e.g., asbestos, lead OSHA standards, designated substances).
- Fit-tested for or wearing a respirator in the field.
- Working on sites/projects with specific state, provincial/territorial or federal medical surveillance requirements.
- Driving a commercial motor vehicle.
- Performing safety sensitive tasks.

2.5 **Physical Activity Restriction –** To prevent aggravation of an existing condition, the Medical Doctor recommends a physical activity restriction to limit exposure to a chemical or class of chemicals (e.g., benzene, lead), a physical agent (e.g., noise), or an activity (e.g., heavy lifting).

2.6 **Safety Sensitive –** A task or position is designated as safety sensitive when the task or position is such that an action would endanger the lives of others. Examples, but not a complete list, of positions that have been designated "safety-critical" by regulations include:

- Drivers of Commercial Motor Vehicles (CMV)
- Workers on pipelines carrying fuels or toxic or corrosive substances
- Workers at nuclear power plants
- Employees that operate Nuclear Regulatory Commission -regulated devices (nuclear density gauges)
- Operators of industrial mobile equipment, including: cranes of more than 6,000-pound capacity, forklifts, loaders, etc.
- Laboratory technicians working with hazardous substances

3.0 References

3.1 S3NA-214-PR1 International Travel

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Employees**

- Ensuring that he/she maintains a current work clearance as required for the performance of assigned work duties.
- All employees designated to participate, called Participating Employees, in the medical surveillance program as a condition of employment or participate voluntarily and will be notified in advance if they will be assigned to a location, project or client which requires a Medical Surveillance and Surveillance program.
- If employee knows or suspects that he/she may have an adverse reaction to completing elements of the physical, (such as blood draws, physical limitation, etc.) then the employee should notify the MSP at the time they schedule the physical so that appropriate safeguards may be taken to protect the health of the employee.
- Communicate any change in medical condition (e.g. medications, pregnancy), to MSP to allow for evaluation of the need for additional precautions.

4.1.2 **Supervisors and Operations Managers**

- Evaluates the duties of each employee and prospective employee reporting to him or her for potential participation in the medical screening and surveillance program.
- Responsible for ensuring that the employee is enrolled in the medical screening and surveillance program if the employee's position requires participation. Consult with a SH&E Manager if assistance is needed in determining if an employee is required to participate in the program.
- Assures employees in positions that require medical surveillance in order to meet their job description may not be on site until they have satisfactorily completed the baseline or pre-employment medical examination.

4.1.3 **Safety, Health, & Environment (SH&E) Department**

- Serves as the primary point of contact between the employee, employee's supervisor, the MSP and the SH&E Department.
- Provides information regarding medical surveillance documentation, forms, and scheduling of services.
- Maintains a medical surveillance database and other associated documents.
- Assists employees with scheduling of exams with the MSP.

- Participates in initial SH&E training and subsequent reviews and updates that will provide guidance on exam protocols.

4.1.4 **SH&E Manager**

- Reviews employee assignments with managers to ensure that all employees who should be participating in the medical surveillance program have been enrolled.
- Provides all assistance necessary to ensure all required information is provided to the Medical Director.
- Report any change in requirements, protocols or concerns with the MSP to the Occupational Health Manager.

4.1.5 **Occupational Health Manager**

- Provide the MSP with appropriate references (e.g., a copy of this procedure, regulations).
- Designate other employees to participate in certain parameters of the medical screening and surveillance program after consultation with the Medical Director.

4.1.6 **Medical Director**

- Requires an exposure-specific examination when he/she has reason.
- Determine the frequency of the exposure-specific medical examinations.
- Consults with the Occupational Health Manager.

4.2 General Requirements

4.2.1 All AECOM employees whose work assignments involve potential exposure to harmful chemical and/or physical agents should participate in the medical surveillance program. Guidance as to harmful potential exposures is presented in *S3NA-128-FM1 Medical Surveillance Evaluation (MSE).* The form provides the primary guidance for determining whether medical screening is required for an employee and the frequency of periodic exams. The MSE is to be completed by the employee and his/her supervisor at the time of hire for any employee who may work outside an office environment. At each annual performance review, the MSE is to be reviewed for accuracy. Other reviews are required whenever there is a change in job tasks.

4.2.2 In addition, employees may be requested to participate in the medical surveillance program if they perform a task that requires an assessment for fitness for duty (e.g., lifting, climbing, etc.). The Supervisor, Operations Manager and SH&E Manager will identify activities/tasks that will require fit-for-duty assessments.

4.2.3 Medical screening and surveillance will only be performed were required by regulatory requirements or this procedure. Screening and surveillance provided at no cost to employees.

4.2.4 For medical screening and surveillance related to international travel, refer to *S3NA-214-PR1 International Travel*.

4.3 Types of Medical Examinations

The medical surveillance program consists of the following types of examinations:

4.3.1 **Baseline (initial)**

- The baseline medical examination is used to identify physical capabilities and medical limitations that may have an impact on the candidate's ability to perform in the position for which he/she is being considered and to provide a baseline against which periodic or project-specific monitoring can be compared. The baseline medical examination is used to determine the suitability of an existing employee for a new assignment (pre-placement) or a candidate's suitability to be hired (pre-employment) for a particular position.

4.3.2 **Periodic (annual or biennial)**

- The periodic medical examination is used to evaluate an employee's continued fitness for duty and to assess any impact occupational exposures may have on his/her health status. The periodic examination includes an update to the medical and work history, results of any occupational exposure assessments and a detailed medical examination tailored to the job description.
- The SH&E Manager will assist in determining the frequency of the periodic medical examinations based on regulatory requirements, the position held by the employee, and the level of exposure to physical, chemical, and biological agents.
- Employees performing work activities on HAZWOPER sites will receive exams based on the following schedule:

Annual	Working in an exclusion zone and the regulatory required exposure limit is exceeded for 30 or more days a year.
Biennial	Working in an exclusion zone more than 30 days a year and the regulatory required exposure limit is not exceeded.

4.3.3 **Exposure-specific**

- The exposure-specific examination consists of medical tests to assess the impact of occupational exposures associated with a particular activity or project. The Medical Director or SH&E Manager will require an exposure-specific examination when he/she has reason to believe occupational exposures are impacting or may be impacting the health of an employee.

4.3.4 **Exit/termination**

- Employees currently participating in an examination program will receive exit exams when they leave their work assignment as identified in *S3NA-128-ATT1 Exit Exam Determination.* In the event an employee declines the exit exam, the employee will be requested to sign *S3NA-128-FM2 Waiver of Exit Medical Surveillance Exam*.
- An exit medical examination is offered when an employee leaves the medical surveillance program, either because of termination of employment with AECOM or because of reassignment to a position not designated to participate in the medical surveillance program or if conditions in the workplace no longer constitutes the need for the medical surveillance (e.g., change in product).
- The exit examination assesses any impact occupational exposures may have had on the employee's health status.

4.4 Exam Protocols

4.4.1 *S3NA-128-ATT2 Exam Protocol* identifies the medical exam components of exam.

4.4.2 The evaluation will be confidential and provided during normal business hours. Employees will be offered the opportunity to discuss the results of the evaluation with the MSP. All exam results are considered personal and confidential information, and will not be stored in any unsecured records not transmitted without the employee's permission.

4.5 Participating Employee Guidance and Documentation

4.5.1 When necessary, based on the position being filled, the hiring Supervisor and Human Resources Representative informs the candidate that the offer of employment is contingent on the candidate being physically and medically qualified to perform the duties of the position for which he/she is being hired. The hiring Supervisor and Human Resources Representative may not allow the candidate to begin employment until the conditions of the offer letter have been satisfied.

4.5.2 When designated to participate in the medical surveillance program, the Employee completes and signs the following documents:

- Medical and Work History Questionnaire (provided by the MSP).

- Medical Records Release authorizing MSP to receive the work clearance certificate.

4.5.3 Any Employee that has not completed the required medical evaluation after 30 days of an expiration date will be issued a non-qualified statement. The Employee is not permitted to perform the associated task and/or work until the required medical evaluation is completed and a qualified statement is issued by the Medical Director.

4.5.4 If an exam becomes due during an employee's pregnancy, it is advised to defer the exam until after delivery and the employee returns to work from family/medical leave status.

4.5.5 Human Resources Representative

- Notifies the SH&E Manager or designee to arrange for exit medical examination, upon notification of termination or impending termination from the Supervisor. In the event an employee declines the exit exam, the employee will be requested to sign *S3NA-128-FM2 Waiver of Exit Medical Surveillance Exam*.
- Place the original waiver in the employee's Human Resources personnel file and send a copy the MSP.

4.5.6 Medical Services Provider (MSP)

- Provides notification approximately 30 days before subsequent periodic or exposure-specific medical examination is due.
- Notify employee 30 days before the periodic or exposure-specific medical examination is due.
- Provides notification of delinquent medical examinations.

4.5.7 Operations Manager

- Facilitate the management and exchange of documentation regarding the medical screening and surveillance program between AECOM (typically employee's supervisor) and MSP using the *S3NA-128-FM3 Scheduling Request Form*. If exams for multiple employees is required, the information from page 1 of the Scheduling Request Form and the requested exams can be placed in a spreadsheet and sent to the MSP.
- Schedule the initial exam for newly hired or re-assigned employees as needed. Special requests should be coordinated with the SH&E Manager, prior to contacting MSP to schedule.
- Assist employees with scheduling examinations as necessary.
- Coordinate medical surveillance program information exchange between Human Resources Representative and the MSP as necessary.
- Notify the candidate's manager and Human Resources upon receipt of the work clearance.
- Provide information from previous examinations that may not be readily available.

4.5.8 SH&E Manager

- Provides such assistance as is requested by the hiring Supervisor to ensure the job description for the position being filled adequately describes the physical, chemical, and biological stresses of the position, and the PPE used or which may be used, including respiratory protection.
- Provides all necessary assistance to ensure that required and appropriate information is provided with the request and authorization for medical examination.
- Provides assistance to the hiring Supervisor to interpret physical activity restrictions if such restrictions are noted on the work clearance certificate.
- Confirms that all relevant exposure assessments have been appropriately annotated to show the applicability to the employee and forwarded to the MSP.

- Confirms that employees on the delinquent medical examination list have been removed from designated assignments.
- Provides assistance to ensure that terminating and reassigned employees are offered the opportunity to take an exit medical examination.

4.5.9 Supervisor

- Arranges work assignments so that the employee is available to take the medical examination before the work clearance certificate expires.
- Removes the employee from the work assignment before the work clearance certificate expires until the medical evaluation is completed and a qualified statement is issued by the Medical Director.
- Contacts the Human Resources Representative, upon notification of termination or reassignment and requests they arrange for the MSP to perform an exit medical examination.
- Releases the terminating or reassigned employee from duties as necessary to complete the exit medical examination.

4.6 Reports

4.6.1 Report of Examination

- The MSP provides AECOM and the employee with a copy of the work clearance certificate, which will include any medical restrictions and address the employee's ability to use personal protective equipment. AECOM requires the employee to preserve the work clearance certificate in a safe place and provide copies to AECOM managers and clients as requested.
- The MSP will mail a confidential letter detailing the results of the exam to the employee's home address within 30 days of the exam date.

4.6.2 Examinations Due Report

- The MSP produces a list by organization code of employees due to be examined 30 days before the expiration of their work clearance certificate. This list is provided to SH&E Department, who ensures each Supervisor is notified of the employees in his/her charge who are due examinations so they may be scheduled appropriately.
- The MSP notifies each employee via email or phone to the office of record 30 days before the periodic or exposure-specific medical examination is due.

4.6.3 Delinquent Examinations Report

- The MSP distributes a report of delinquent medical examinations to the SH&E Department.
- When an employee's name appears on the delinquent examination report for two consecutive months, the SH&E Department must notify the SH&E Manager, who will bring this to the attention of the employee's Supervisor for resolution. If the delinquency issue is not resolved, the employee's regional management will be notified for final resolution.

4.6.4 Physical Activity Restriction Report

- The Supervisor maintains a list of employees who have physical activity restrictions.
- The SH&E Manager shall evaluate locations and projects periodically to ensure employees with physical activity restrictions are not exceeding their limitations. Concerns of an employee exceeding his/her physical activity restriction is brought to the attention of the employee's Supervisor for resolution.

4.6.5 Annual Reports

- The MSP provides annual reports of utilization, medical trends, and statistical analyses. These reports are prepared to improve the service, manage trends, and reduce the cost of the medical screening and surveillance program.

5.0 Records

5.1 Employees who participate in a medical surveillance or physical examination program or had exposure monitoring conducted will have access to all employee exposure and medical records maintained for that employee by AECOM and the MSP.

5.2 Upon an employee entering into a medical surveillance or physical examination program, the employee shall be informed of the following:

- The existence, location and availability of any records covered by this procedure
- The MSP responsible for maintaining and providing access to records and
- The employee's right of access to these confidential records.

5.3 Employees in medical monitoring programs are notified initially and annually thereafter, of the existence, location and ability to access medical records maintained by the MSP. Upon request, each employee (or designated representative) will have access to the employee's medical records. Prior to the release of health information to the employee (or designated representative), a specific written consent must be signed by the employee. Records will be provided in a reasonable time and manner at no cost to the employee.

5.4 Medical records must be preserved and protected in accordance with applicable legislative requirements for the duration of employment plus 30 years, verify local, state of federal regulations to confirm time period. Medical records contain information that is protected by the Privacy Act. To meet the obligations of preserving the medical records and protecting the information they contain, AECOM has arranged for the MSP to manage the medical records.

5.5 An employee or designated representative may request to review his/her medical. Such a request must be in writing and be signed and dated. The SH&E Manager or the SH&E Department will forward the request to the MSP, who will provide the employee with a copy of the medical records.

The MSP provides employees with a copy of their results after each physical. If employee would like a copy of their historical records, the MSP will supply the copy within 15 days after the request has been submitted by the employee or designated representative.

MSP performs quality control checks on all medical records to ensure examining physicians appropriately record the findings of the examination and tests. The MSP has access to all medical records to perform quality assurance checks to ensure proper recording and preservation

5.6 Projects that use local clinics or employer/client clinics may store records at that site, but at the termination of the project, all employee medical records must be transferred to long-term record retention.

5.7 If in the event AECOM ceases operations, medical records will be transferred to the successor employer. If no successor employer is available, records will be transferred to the National Institute for Occupational Safety and Health.

6.0 Attachments

6.1 S3NA-128-ATT1 Exit Exam Determination

6.2 S3NA-128-ATT2 Exam Protocols

6.3 S3NA-128-FM1 Medical Surveillance Evaluation

6.4 S3NA-128-FM2 Waiver of Exit Medical Surveillance Exam

6.5 S3NA-128-FM3 Scheduling Request Form

6.6 S3NA-128-FM4 Waiver of Medical Surveillance

Americas

Substance Abuse Prevention

S3NA-019-PR1

1.0 Purpose and Scope

1.1 This policy and procedure applies to all Americas - based employees and operations and is consistent with the U.S. Drug-Free Workplace Act of 1988 and in accordance with federal, state / provincial / territorial, and local laws and regulations. It sets out practices for a drug-free, healthy, productive, safe and secure workplace and provides guidance for employees and supervisors with respect to their responsibilities. Drug and alcohol abuse pose a serious threat to the health and safety of employees, clients, and the general public as well as the security of our job sites, equipment and facilities. The Company is committed to the elimination of illegal drug use and alcohol abuse in its workplace and regards any misuse of drugs or alcohol by employees to be unacceptable.

1.2 AECOM prohibits the use, possession, presence in the body, distribution, manufacture, concealment, transportation, promotion or sale of the following items or substances on company premises:

- Illegal drugs (or their metabolites), designer and synthetic drugs, mood or mind altering substances and drug use related paraphernalia unless authorized for administering currently prescribed medication;
- Controlled substances that are not used in accordance with physician instructions or non-prescribed controlled substances;
- Alcoholic beverages while at work or while on any customer or AECOM controlled property. This prohibition on alcohol applies whenever an employee is on-duty, including during meal or break periods, while on Company premises, or while representing AECOM. AECOM may make exceptions and permit the consumption of alcohol beverages at work-related events, such as Company-sponsored or approved business meals, conferences, or holiday events. Employees who choose to consume alcohol on approved occasions are expected to exercise good judgment and to refrain from becoming intoxicated or impaired. If an employee has consumed alcohol and needs transportation home, the Company will reimburse the cost of a taxicab or other reasonable costs of transportation so that the employee may avoid driving.
- This policy does not prohibit lawful use and possession of current medication prescribed in the employees name or over-the-counter medications. Employees must consult with their health care provider about any prescribed medication's effect on their ability to perform work safely. An employee who has work restrictions due to his or her consumption of a prescribed medication must disclose these restrictions to their supervisor.

1.3 Substance abuse testing procedures shall meet requirements of various U.S. regulatory agencies and / or those of the applicable jurisdiction, with regard to testing employees for the possession and use of illegal drugs (and their metabolites),mood or mind altering substances, synthetic and designer drugs, unauthorized use of prescription drugs and the unauthorized use of alcohol on AECOM or client premises or during working hours. The procedures will also comply with applicable laws and regulations by federal, state and local law. If the law of a particular location differs from the practices expressed in this policy and procedure, AECOM will implement this policy and procedure in accordance with applicable law.

1.4 Although some states may pass laws legalizing medical or recreational marijuana use, the use, sale, distribution and possession of marijuana are violations of federal law. Similarly, the use sale, distribution, presence in the body and possession of marijuana or the presence of marijuana on company premises or while on duty including during lunch and breaks violates the *S3NA-019-ATT1 Substance Abuse Policy Statement* (policy), and will subject an employee to disciplinary action up to and including termination in accordance with controlling law.

1.5 This policy and procedure has been developed to provide employees, managers, supervisors and administrative support personnel with guidelines and procedures for the implementation, administration, and enforcement of this policy and procedure. The company policy statement for substance abuse prevention is included as Attachment 1 of this document and a copy of the included policy statement shall be posted on employee information boards. New employees shall receive and sign *S3NA-019-FM1 Acknowledgement and Consent Form* upon hire or transfer between sites or clients as acknowledgement of the program requirements. A signed or electronic copy of this form should be kept as part of the employee personnel file.

1.6 This policy and procedure does not prohibit employees from the lawful use and possession of current prescribed or over-the-counter medications. Employees must consult with their health care providers about any prescribed medication's effect on their ability to perform work safely. Employees must disclose any relevant work duty restrictions to their supervisor. Employees are required only to provide information necessary for the Company to make an informed decision regarding the ability to perform required work safely, and to evaluate whether the employee may be entitled to a reasonable accommodation. Employees who must bring current prescribed medications to work must carry the medication in the original packaging bearing a current label from a licensed pharmacist for the person in possession of the drugs.

1.7 Compliance with this policy is a condition of initial and continued employment. Failure to comply with these requirements will be grounds for disciplinary action, up to and including termination of employment.

1.8 This procedure will be administered by the Corporate Substance Abuse Program Manager in conjunction with Safety, Health & Environment (SH&E) and Human Resources (HR).

2.0 Terms and Definitions

2.1 **Adulterated Sample** – A urine sample provided by an applicant, employee or contractor that has been intentionally altered to mask the analysis for illegal substance use. Any applicant or employee who knowingly provides a false sample or attempts to adulterate a sample will be terminated or disqualified from employment.

2.2 **Breath test for alcohol (BrAC)** – A method of measuring the breath alcohol concentration (BrAC) of an individual using an approved analyzer performed by a certified analyst using test protocol described in the SAP Procedures.

2.3 **Confidentiality** – The principle in medical ethics that the information a patient reveals to a health care provider is private and has limits on how and when it can be disclosed to a third party.

2.4 **Employees/Applicants** – The SAP program will apply to all individuals who may be: regular full-time, part-time, probationary, temporary, craft (direct hires), casual, contract or leased employees, and applicants of employment as permitted by applicable laws

2.5 **Employee Assistance Program (EAP)** – All salaried employees and their immediate family members are eligible for the EAP assistance limited to five paid counselling sessions per calendar or benefit year. Hourly employees may be eligible on projects, plants and mines or in offices where a substance abuse testing program is implemented. Separate EAP brochures and telephone cards are available through the HR Department. Check with your HR manager for eligibility for EAP.

2.6 **Illegal Drugs, Controlled Substances and Unauthorized Items** – Illegal drugs, designer and synthetic drugs, substances that impair job performance or safety and drug-related paraphernalia: Controlled substances such as medications when usage is abused; Unauthorized alcoholic beverages

2.7 **Medical Review Officer (MRO)** – The MRO is a designated Medical Doctor (MD) with experience and certification in the interpretation of urinalysis test results for drug testing. The MRO examines the positive test results with consideration of whether there is a legitimate medical reason for the result. This is accomplished by telephone interviews with the donor and also with their prescribing physician or pharmacist when prescription or over the counter medications are possibly involved.

2.8 **Negative Drug Test** – A personal sample (urine, blood, hair, breath, swab or other permitted by law) that indicates a concentration(s) of any drug on the panel which is below the cut-off limit and also meets all quality control requirements (e.g., temperature, pH) and no evidence of adulterants.

2.9 **Positive Test Result** – A personal sample (urine, blood, hair, breath, swab or other permitted by law) that indicates a concentration(s) of any drug on the panel which is above the cut-off limit and/or the GCMS confirmation level of that applicable regulation or requirement.

2.10 **Prohibited Substances** – Illegal or unprescribed drugs (or their metabolites), controlled substances and mood or mind-altering substances (i.e. any synthetic derivative/product that produces a marijuana-type high and any herbal products not intended for human consumption); or any prescribed drugs used in a manner inconsistent with the prescription, and alcoholic beverages.

2.11 **Reasonable Suspicion** – Suspicion based upon the observation of objective facts or specific and articulable behavior. May also be warranted based on search or disclosure of evidence obtained on a work site or company controlled property. Supervisor should complete a Reasonable Suspicion training course and document the process and observations.

2.12 **Refusal to Test** – Refusing to provide a sample or refusing to accept and sign the testing consent form, is considered a breach of company policy and subject to disciplinary action up to termination of employment.

2.13 **Safety Sensitive** – A task or position is designated as safety sensitive when the task or position is such that an action would endanger the lives of others. AECOM business groups may further define safety sensitive as it applies to their applicable line of work. Examples, but not a complete list, of positions that may be designated “safety-sensitive” by regulations include:

- Drivers of Commercial Motor Vehicles (CMV)
- Workers on pipelines carrying fuels or toxic or corrosive substances
- Workers at nuclear power plants
- Employees that operate Nuclear Regulatory Commission -regulated devices (nuclear density gauges)
- Operators of industrial mobile equipment, including: cranes of more than 6,000-pound capacity, forklifts, loaders, etc.
- Laboratory technicians working with hazardous substances.

2.14 **Swab Alcohol Test** – A swab test may be required by a client instead of the Breath test for alcohol (BrAC).

3.0 References

3.1 None

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Supervisors and Managers**

- Observe and document employee behavior which appears to violate this policy and procedure and refer employees for drug and alcohol testing as required.
- Ensure all employees have been orientated to this procedure and are knowledgeable about, and in compliance with this procedure, associated policy and applicable programs.
- Make appropriate referrals for a drug and/or alcohol test as per this procedure as well as any client contractual agreements or governmental regulation.
- Be current with the Employee and Supervisor Training and education programs so as to be knowledgeable about the use of alcohol and drugs and be able to recognize the signs and effects of alcohol and drug uses.

- Alert and involve Human Resources (HR), the Corporate Safety, Health and Environment (SH&E) Occupational Health Manager and the Substance Abuse Program Administrator when an employee is believed to be unfit for duty due to drugs or alcohol use in violation of this policy and/or if an employee is tested for a reasonable suspicion use of drugs or alcohol.
- If any illegal drugs or drug paraphernalia are located on company premises, do not handle the items and immediately notify the following as necessary: HR, Resilience Group, the police department and the Corporate Substance Abuse Program Manager.
- Guide employees who voluntarily seek assistance for a personal substance abuse problem to appropriate resources such as the EAP or other local resource.

4.1.2 **Employees**

- Commit to a safe and drug-free workplace by complying with this policy and procedure and understanding their responsibilities.
- Read and understand the *S3NA-019-ATT1 Substance Abuse Policy Statement* detailing the Company's commitment to a drug free workplace. The signed *S3NA-019-FM1 Acknowledgement and Consent Form* attests that they have reviewed and are familiar with this procedure and understand that compliance is a condition of employment. Any questions should be directed to the Substance Abuse Administrator or HR.
- Follow the instructions of their supervisor or Substance Abuse Administrator when informed that they have been chosen for a random or client drug test as allowed by federal, state or local law and regulations. Failure to do so may result in discipline up to and including termination.
- Participate in substance abuse training programs as directed.
- Report for work Fit for Duty and remain Fit for Duty while on Company premises and worksites and adhere to the standards set out in this procedure and any applicable program.
- Notify your supervisor, HR or SH&E representative if you believe another employee or subcontractor is not Fit for Duty or exhibits conduct suggesting substance abuse.
- If having a valid driver's license is a condition of employment, report any loss of license related to drug or alcohol use immediately (no later than 24 hours after losing the license) to your supervisor.
- Consult with health care provider about any prescribed medication's effect on the ability to perform work safely and disclose work restrictions due to consumption of prescribed medications to their supervisor to determine if reasonable accommodation is needed.
- Bring legally prescribed medicine in the original packaging bearing a current label in the employee's name from a licensed pharmacist if the employee carries more than a single day of prescribed medications to work.
- Notify management of any criminal drug or alcohol conviction for a violation no later than five (5) days after such conviction.

4.2 Types of Testing

4.2.1 Employees undertaking Safety-Sensitive tasks or in a Safety Sensitive position may be required to undergo drug and alcohol testing.

4.2.2 Pre-employment Testing - Applicants extended a conditional offer of employment may be required to take, and pass, a pre-hire drug test before beginning work. Individuals who test positive or refuse the test will not be hired and will be ineligible to reapply for a period of six months. Employees who transfer from one company business group or project to another are not required to take a pre-employment drug test if their employment is without interruption, they are not subject to client testing or safety sensitive testing requirements, and they would have been expected to have taken a pre-hire or client mandated drug test.

4.2.3 Random and Annual Testing - Employees may be subject to random drug and/or alcohol testing in accordance with federal, state and local laws. In addition, employees may be subject to random or annual drug tests to meet contract requirements.

- Selections for random testing will be made by the Substance Abuse Program Administer or a Certified Third Party Administrator using employee identification numbers and a random selection process. They will be unannounced and once selected for testing, an individual may not be waived from the testing process.
- Employees will be notified to report for random tests at a time when they should be able to stop working and report immediately to the collection site. Failure to report for a test promptly when instructed to do so may be considered a refusal to test.
- Employees who may be required to submit to random or annual tests will be so notified at the time that they are hired into a covered position, when they transfer into such a position, or when random or scheduled testing becomes applicable to their position.

4.2.4 Reasonable Suspicion Testing - Employees are subject to drug and/or alcohol testing whenever AECOM supervision has reason to believe that the employee has violated this policy and procedure. Requests for tests will be based upon contemporaneous, articulable observations from supervisors suggesting that the employee may be under the influence of illegal drugs, controlled substances, or alcohol.

- Examples of observations that may lead to a test can include the employee's appearance, behavior, speech, body odors, absenteeism, job performance, tardiness, etc. Whenever possible, observations will be documented and reviewed by HR before the individual is asked to submit to a test.
- An employee asked to take a drug and/or alcohol test will be suspended without pay until test results are received. They may use Paid Time Off (PTO) time during this period. An employee who has negative test results will be returned to work status and the employee will then be paid or have their PTO restored for any lost time during that period.

4.2.5 Post Incident/Accident Testing - Employees are subject to drug and alcohol testing in accordance with state / provincial / territorial and local law whenever:

- An employee sustained or caused an injury necessitating off-site medical treatment;
- They have caused or contributed to an accident that results in property damage estimated (including to Company vehicles or equipment) of $2,500 or more (a lower cost of damage requiring testing may be identified in Business Group specific programs);

In either of these instances, the investigation and substance abuse testing must take place immediately following the incident, except that no investigation or request for test will delay the provision of urgent medical care to any person in need of assistance. Employees will not be allowed to return to work until a negative drug/alcohol test result is received.

4.2.6 Return-to-Work and Follow-up Testing - Employees who test positive for drugs or alcohol or who have otherwise violated this Policy and Procedure are subject to discipline, up to and including discharge. Depending on the circumstances, the Company may offer an employee who violates this Policy and Procedure the opportunity to seek assistance in lieu of termination through the Employee Assistance Program ("EAP") or another approved counseling program. Employees offered this opportunity will be required to be evaluated by a substance abuse professional, and to complete any course of education or treatment prescribed before returning to work. In addition, employees must have a negative drug/alcohol test prior to their return to work and follow-up drug and/or alcohol testing may be required as a condition of continued employment, for a period of up to two years following the return to work. If subject to a client-specific substance abuse policy, employees who have had a positive test result will not be permitted to return to work on the client site or facility. Return-to-Work Agreements will be tailored to the individual's circumstances and job responsibilities.

4.3 Collection and Testing

4.3.1 Consent and Refusals to Test: No sample will be collected, or test conducted on any sample, without the consent of the person being tested. However, a refusal to submit to a test will be treated as an admission of a policy violation and will usually result in termination of employment. Job applicants who refuse a test will have their job offers withdrawn.

- Attempts to tamper with, substitute, adulterate, dilute or otherwise falsify a test sample are considered refusals to submit to a test, as is a refusal to accept transportation to the testing facility, failure to appear at the testing location promptly after being asked to submit to a test, or other conduct that has the effect of frustrating the testing process. AECOM will pay the costs of all drug and/or alcohol tests it requires.

4.3.2 Test Methods: Drug test samples may include urine, hair, swab or saliva (oral fluids). All drug test samples will be screened and all presumptive positive drug tests will be confirmed using gas chromatography/ mass spectrometry (GC/MS) (or an equally accurate methodology). Drug tests will be performed by a laboratory certified by the U.S. Substance Abuse and Mental Health Services Administration for federal workplace testing, or as required by the applicable jurisdiction. Breath, blood, swab or urine tests may be used to detect the presence of alcohol. An alcohol test will be considered positive if it shows the presence of .04 percent or more alcohol in a person's system.

- Dilute or invalid results will require a recollection, and the Company may require the individual to provide an alternative test specimen as may be available and consistent with the underlying purpose of the test.

4.3.3 Collection and Chain-of-Custody: Persons being tested will be asked to provide a test sample to a trained collector. Procedures for the collection of specimens will allow for reasonable individual privacy. Urine specimens will be tested for temperature, and may be subject to other validation procedures as appropriate. The collector and the person being tested will follow chain-of-custody procedures for specimens at all times. Tests will seek only information about the presence of drugs and alcohol in an individual's specimen, and will not test for any medical condition.

4.3.4 Notification and Medical Review: Any individual whose test sample is confirmed positive for a drug or drugs will be contacted by a Medical Review Officer ("MRO") (a medical professional with an expertise in toxicology) and offered an opportunity to explain in confidence any legitimate reasons he or she may have that would explain the positive test (such as, for example, evidence that the individual holds a prescription for the substance detected). The MRO may also review suspected adulterated, substituted, and dilute specimens and make determinations about their validity.

- If the individual provides an explanation acceptable to the MRO that a drug test result is due to factors other than the consumption of illegal drugs, the MRO will order the positive test result to be disregarded and will report the test as negative to AECOM. Otherwise, the MRO will verify the test as positive and report that test result.

4.3.5 Right to Explain and Retest: Within three working days after notice of a verified positive drug or alcohol test result on a confirmatory test conducted under this Policy, the tested individual may submit information to the MRO to explain the positive result. An individual who tests positive for drugs also may ask to have his or her remaining or split test sample sent to an independent certified laboratory for a second confirmatory test, at the individual's expense, and provided that a written request is made within five business days of the date the individual of the positive test result. AECOM will notify the original testing laboratory that the employee or applicant has requested that the laboratory conduct a confirmatory retest or arrange for transfer of the sample to the laboratory selected by the individual to perform the confirmatory retest. Tested individuals will be required to pay the testing laboratory for any confirmatory retest they request. AECOM may suspend, transfer, or take other appropriate employment action against an employee pending the results of any such re-test. However, if the re-test fails to confirm as positive the individual will be reimbursed for the cost of the re-test and the prior test results disregarded.

4.3.6 The Company will provide drug and alcohol tests results to candidates and employees automatically, where state law so requires, and otherwise upon written request as may be required by law.

4.4 Inspections

4.4.1 The Company reserves the right to inspect and search all portions of its premises for drugs and other contraband. All employees, contract workers, and visitors may be asked to cooperate in inspections of their persons, work areas, and property brought on site in connection with an inspection. Employees who refuse to cooperate in any such inspections are subject to discipline, up to and including discharge.

4.5 Confidentiality

4.5.1 Information and records relating to drug screen test results, drug and alcohol dependencies and medical information shared with the Company in the course of administering this Policy and Procedure shall be treated as confidential and shared with HR and managers on a need-to-know basis. Information will not be released to third parties except with the consent of the individual or where relevant to a grievance, charge, claim, or other legal proceeding initiated by or on behalf of an employee or applicant, or as may be required by law or legal process.

4.6 Employee Assistance Program and Drug Free Awareness

4.6.1 Illegal drug use and alcohol misuse result in a number of adverse health and safety consequences. Information about those consequences and source of help for drug/alcohol problems is available from HR representatives who can also refer employees to the EAP for assistance with drug/alcohol related problems. Information about the EAP program is available on the Company intranet.

4.6.2 The Company will provide support to employees who voluntarily seek help for drug or alcohol problems. Depending upon the circumstances, the employee may be referred for evaluation and allowed to use accrued paid time off or be placed on leave as may be necessary to complete any prescribed education and/or treatment. Employees also may be required to document that they are successfully following a prescribed education and/or treatment plan and pass return to duty and follow-up drug and/or alcohol testing. A request for assistance will be considered voluntary only if made before the employee becomes subject to disciplinary action for violating this or another Company policy, and cannot excuse substandard performance, so AECOM encourages employees who may need assistance to seek it promptly:

4.6.3 In conjunction with the EAP, the Company will promote a drug-free awareness program to inform employees about:

- The dangers of substance abuse in the workplace.
- Available counseling, rehabilitation, and EAPs (both for self-referral or supervisory referral).
- The penalties that may be imposed for violations of this procedure.
- The Company's commitment to promoting a drug-free workplace.

5.0 Records

5.1 None.

6.0 Attachments

6.1 S3NA-019-ATT1 Substance Abuse Policy Statement

6.2 S3NA-019-FM1 Acknowledgement & Consent Form

Americas

Emergency Response Planning

S3NA-010-PR1

1.0 Purpose and Scope

1.1 Providing the requirements for preparation and planning for potential emergencies that may occur while AECOM staff are working.

1.2 Applies to all AECOM Americas-based staff working inside and outside an AECOM office, including location and project environments.

1.3 The intent of this plan is to:

- Enable prompt, informed emergency responses.
- Promote the safety of workers, visitors, and those responding to an emergency.
- Reduce the potential for destruction of goods and other property.
- Reduce the magnitude of environmental and other impacts.
- Help those responding to an emergency quickly determine and initiate proper remedial actions.
- Reduce recovery times and costs.
- Provide confidence to workers, visitors, and those responding to an emergency that emergencies will be properly managed.

1.4 This procedure represents AECOM's minimum requirements and should be augmented by more stringent local regulatory requirements and/or client requirements.

1.5 Location Specific Emergency Response Plans are to be included in the respective Office Safety, Health and Environment Plan (refer to *Global Office Safety, Health & Environment Plan*) or the location specific SH&E Plan (refer to *S3NA-209-PR1 Risk Assessment & Management).*

1.6 Emergency Response is an initial response which may require additional actions as detailed in *RS2-003-PR1 Disruptive Event Response Standard*.

2.0 Terms and Definitions

2.1 **Emergency –** An unplanned situation or event (including natural disasters) resulting in involvement of the public emergency services, police, fire, paramedic, or the environmental regulatory authorities.

2.2 **Emergency Response Coordinator –** An individual in a worksite or project environment designated to lead and direct the immediate emergency response.

2.3 **Local Resilience Coordinator (LRC)** – A manager designated as the Office or Worksite lead for local level organizational resilience who may or may not be the emergency response coordinator. The LRC is the point of contact with the Region Resilience Team in determining further action, including notifications, following an initial emergency response. Refer to *RS2-003-PR1 Disruptive Event Response Standard*.

2.4 **First Aid Provider** – Is a First Aid, CPR, and AED trained, volunteer, AECOM employee who provides emergency first aid or treatment (including performing CPR and applying an AED) to someone who is injured or suddenly ill, before emergency medical services (EMS) arrives. This is a voluntary action and not an occupational duty assigned by AECOM. They may use a limited amount of equipment to perform initial assessment and provide immediate life support and care while awaiting arrival of emergency medical services. Refer to *S3NA-012-PR1 First Aid*.

2.5 **Floor Marshall** – An individual in the office environment designated to lead and direct the immediate emergency response.

2.6 **Floor Warden** – An individual in the office environment, as required by building design and employee numbers, designated to assist the Floor Marshall in directing the immediate emergency response.

3.0 References

3.1 GRG-001-RP4 Operational Security Plan

3.2 RS2-003-PR1 Disruptive Event Response Standard

3.3 Global Office Safety, Health & Environment Plan Template

3.4 S3NA-004-PR1 Incident Reporting, Notifications & Investigation

3.5 S3NA-011-PR1 Fire Protection

3.6 S3NA-012-PR1 First Aid

3.7 S3NA-111-PR1 Bloodborne Pathogens

3.8 S3NA-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers**

- Develop and implement Location Specific Emergency Response Plans and security standards for the applicable office, location and/or project personnel.
- Confirm Location Specific Emergency Response Plans and security standards are included in the respective Office Safety, Health & Environment Plan or location specific SH&E Plan.
- Confirm appropriate training of employees as determined by the potential emergency situations, regulatory requirements and, if applicable, client requirements.
- Confirm the emergency response plan is communicated to all affected personnel.
- Confirm that necessary training and resources appropriate to the potential emergencies is provided to AECOM employees.
- Confirm that necessary and appropriate emergency response equipment is readily available.
- Confirm that emergency drills are completed annually or more frequently as appropriate to the risk of the potential emergency or as required by legislation. Confirm the effectiveness of the procedure and, as needed, take corrective action. The *S3NA-010-FM1 Emergency Response Drill Report* or equivalent shall be used to confirm the completion and effectiveness of the drill.

4.1.2 **Safety, Health &Environment (SH&E) Manager**

- Assist in the development and implementation of emergency response plans and security standards for the applicable office, location and/or project personnel.
- Review and, as necessary, implement emergency response plans and security standards.

4.1.3 **Supervisors**

- Review and, as necessary, implement emergency response plans and security standards.
- Confirm employees have completed any required training associated with the identified potential emergencies.
- As applicable, confirm that employees have access to communication devices that are in good working order. Maintain current rosters of employees under their supervision.

4.1.4 **Employees**

- Participate in any required training and drill exercises.
- Report any potential or actual threatening situations to the Manager, Supervisor and/or Emergency Response Lead.
- As applicable, oriented to the potential risk of violence and instructed how to identify and respond to violent situations.
- Report an injury or adverse symptom as a result of an incident of violence and when appropriate consult a physician for treatment or referral
- Review and, as necessary, implement emergency response plans and security standards.

4.2 Emergency Response Plan (ERP)

4.2.1 An assessment shall be completed by the Manager of each location to determine the potential emergency situations and the adequate number of First Aid Providers, first aid supplies and medical requirements, including determining the response time and availability of Emergency Medical Services (EMS). Refer to *S3NA-012-PR1 First Aid.*

4.2.2 Managers will establish and implement the location specific ERP using *S3NA-010-FM2 Location Specific Emergency Response Plan Template*. The ERP shall be communicated to all affected employees.

4.2.3 The location specific ERP will include:

- The location of the muster point, first aid, fire extinguishers, fire exits, AED, and other emergency equipment.
- Defined roles and responsibilities in the event of an emergency.
- A contact list that includes, as applicable, fire, police, ambulance, poison control, First Aid Providers on location, fire wardens on location, Site Safety Officer, security, SH&E committee, SH&E Reporting number for reporting all AECOM incidents, and other required emergency contacts.
- Procedures appropriate to the potential emergency situations.
- As applicable, maps to appropriate services, such as hospital or medical clinic.
- *S3NA-010-FM2 Location Specific Emergency Response Plan Template* shall be completed according to the office or worksite's needs.

4.2.4 The location specific Emergency Response Plan (ERP) will comply with all governing regulations.

4.2.5 The location specific ERP shall be included in the location specific Office Safety, Health & Environment Plan (refer to *Global Office Safety, Health & Environment Plan*) or the location specific SH&E Plan (refer to *S3NA-209-PR1 Risk Assessment & Management*).

4.2.6 If the hazard assessment for the location indicates a need for planned evacuation or rescue, appropriate written procedures will be developed and implemented.

- Depending upon the various contributing factors to the potential emergencies, the procedures may require coordination with a third party rescue provider, or preparations for mass evacuation away from a site.
- If applicable, procedures should be developed to assist any personnel with disabilities in the event of an evacuation.

4.2.7 The location specific emergency plan will be readily available to personnel.

- Worksites shall post the ERP at all worksite entrances and/or develop alternate methods to confirm ERP accessibility, such as placing the ERP at muster points, on appropriate vehicle dashboards, driver door pockets, glove boxes, muster points, etc.

- In offices and shop locations the plan will be posted at all entrances and other suitable locations throughout the workplace, such as the SH&E noticeboard or first aid room.

4.2.8 Appropriate methods to account for AECOM employees and visitors shall be established.

- Visitor registers, tailgate/toolbox sign-in sheets and/or staff listings shall be available in the event of evacuation.
- Employees leaving location should alert appropriate personnel (supervisor, reception, or other responsible party) prior to departure, as applicable, provide expected time of return and alert the appropriate personnel upon return.

4.2.9 Staff will be trained for involvement in an emergency evacuation or rescue; however, all evacuations may require special preparation and arrangements with third party rescue providers in the following circumstances:

- work at high angles,
- work in confined spaces or where there is a risk of entrapment,
- work with hazardous substances,
- underground work,
- work on or over water,
- work in remote isolation, and
- workplaces where there are persons who require physical assistance to be moved.

4.2.10 The ERP will address a clear path of travel to and from a working area, as applicable:

- The access will be made obvious and most direct with adequate illumination.
- The access will remain clear and unobstructed at all times.
- No material or equipment may be stored or temporarily left in path of egress.
- A traffic barrier will be used for facilitating vehicle and pedestrian traffic.
- Parking areas shall not restrict access by emergency personnel and vehicles.
- The access route will have a clear line of vision into oncoming traffic lanes.

4.2.11 All staff will be advised of the location of first aid services, equipment, and supplies.

4.2.12 The ERP shall be tested for deficiencies through emergency response drills annually or more frequently as required by legislation. Emergency drills such as man-down, hurricane/tornado drill, security, first aid are recommended to be conducted and lessons learned documented quarterly.

4.2.13 The ERP shall be reviewed annually or more frequently as required by legislation.

4.3 First Aid

4.3.1 Refer to *S3NA-012-PR1 First Aid* and *S3NA-111-PR1Bloodborne Pathogens* for additional information.

4.4 Other Emergency Response Equipment

4.4.1 Portable fire extinguishers shall be provided of appropriate class, size, and quantity in accordance with local legislation and *S3NA-011-PR1 Fire Protection*.

4.4.2 Provide eye wash stations (where appropriate to hazards).

4.4.3 Maintain an ERP and emergency kit appropriate to the hazards associated with the location (e.g., earthquakes, tornadoes, hurricanes, etc.).

4.5 Communications

4.5.1 Supervisors are responsible for confirming that crews have access to communication devices that are in good working order, have reception in the area in which the crews will be working, and meet the needs of the planned check-in and emergency response procedures. This may include:

- 2-way radios,
- Cellular phones (or combination cell phone/2-way radio),
- Satellite phones,
- Car phones, or
- Personal Locator Beacons.

4.5.2 The Manager will be responsible for confirming that crews have the appropriate means of communication before leaving for the worksite. The type of communication device will depend on the location and circumstances of the job task.

4.5.3 All staff is responsible for maintaining the communication devices in good working order before leaving for the field and for ensuring that battery-operated electronic devices have been recharged or have fresh batteries.

4.5.4 All staff is responsible for keeping communication devices clean and dry to facilitate their effective operation.

4.6 Visitors

4.6.1 All visitors to the location shall receive a safety orientation that includes ERP information.

- Visitors to worksite shall review the location specific SH&E Plan or Task Hazard Analysis (THA) and attend/review and sign the applicable tailgate/toolbox meeting.
- Visitors to offices and shop locations shall sign a Sign In/Out register as this record will be used to check and make sure all visitors are accounted for in the event of an emergency (e.g. evacuation to muster point). Refer to *S3NA-010-FM5 Office / Shop Visitor Register*.

4.6.2 In the event of an evacuation, visitors working directly with an AECOM host will be the escorted by their host to the muster point.

4.6.3 For in-house meetings, safety orientations will be delivered before the meeting begins so all visitors are aware of the evacuation routes and procedures

4.7 Emergency Response

4.7.1 Employees responding to emergency situations should take no unnecessary risk. In the case of an emergency, the First Aid Provider will promptly provide injured workers with a level of care within the scope of the attendant's training, objectively record observed or reported signs and symptoms of injuries and exposures to contaminants, secure medical treatment for workers with injuries considered by the first aid attendant as being serious or beyond the scope of the attendant's training.

4.7.2 All incidents will be reported in accordance with *S3NA-004-PR1 Incident Reporting, Notifications & Investigation*.

4.7.3 If emergency action is required to correct a condition that constitutes an immediate threat to workers, only those qualified and properly instructed workers necessary to correct the unsafe condition may be exposed to the hazard and every possible effort will be made to control the hazard while this is being done.

4.7.4 In the event of an evacuation, all employees and visitors will gather together at the muster point for a roll call. Upon evacuation or dismissal, no unauthorized or nonessential personnel are allowed access to the facility or project area during an emergency.

4.7.5 All accident and emergency sites will be immediately secured to prevent unauthorized access or the possibility of further risk to workers, property, or the public at large.

4.7.6 All emergencies will be managed by the AECOM emergency management personnel identified in the ERP. This may include security personnel.

- The Local Resilience Coordinator (LRC) shall be the key point of contact with the Region Resilience Team in order to obtain further direction following an initial emergency response.
- Additional response via Resilience Teams shall be in alignment with *RS2-003-PR1 Disruptive Event Response Standard.*

4.7.7 During an emergency, AECOM Employees shall take direction from AECOM members of the emergency team, (e.g. emergency coordinator, floor wardens, etc.) and outside professional responders, as appropriate, who are in control of the situation.

4.7.8 Employees should render assistance in the safest possible manner, using appropriate personal protective equipment and precautions.

4.7.9 Other actions that may be necessary shall be included as applicable in the location's specific ERP. These include, but are not limited to:

- Notification of local authorities.
- Contact with appropriate AECOM security personnel for assistance.
- Notification of client representatives and any security group having authority on the worksite.

4.8 Post-Emergency Follow Up

4.8.1 If Regional, Geography or Enterprise Resilience Teams were convened, follow up response will be at the Team's direction.

4.8.2 Prior to resuming operations, the work area will be inspected to confirm that conditions are under control and no longer pose a hazard to employees. In the case of a fire or bomb threat, this inspection is to be done by the ranking public emergency responder. Management approval to return shall then be obtained in order to return to work.

4.8.3 The Emergency Response Procedure Action Checklist shall be completed (Contained in *S3NA-010-FM2 Location Specific Emergency Response Plan Template)*.

4.9 Security

4.9.1 Conduct an evaluation of the worksite or location, local conditions, and contract stipulations to determine a need for:

- Access Control
- Vehicle Registration
- Identification badges for employees and visitors
- Fencing
- Security Guards
- Outside Lighting
- Secure Storage Areas
- Alarm Systems

4.9.2 *S3NA-010-FM3 Site Security Checklist* may be used to evaluate a location's need for specific security and to subsequently develop appropriate measures. This form may also be used at intervals for a given location to evaluate the need for any change to the security measures in place.

4.9.3 Where physical security of a location is required, management, with the assistance of SH&E personnel, will be responsible for organizing and supervising security guards. A local bonded security force may be used for this purpose. As an alternative, an in-house security organization may be established.

4.9.4 On many projects, identification badges or numbers are provided for employees. It may be necessary to provide a qualified security officer or team to provide the following services:

- Orientation to the location for new hires and visitors.
- Substance abuse testing for new hires.
- Issuance of badges for new hires and visitors.
- Briefing and debriefing for visitors.
- Monitoring of location activities to prevent theft, espionage, and malicious damage.

4.9.5 When a security program is established, the location specific ERP, including the procedures, and fire prevention and protection programs, shall be planned and coordinated with the program's security force.

4.9.6 On many projects involving military installations, nuclear work, and defense contracts, it may be necessary to provide a qualified security officer or team to monitor activities to prevent espionage, theft, malicious damage, and any compromise of classified information.

4.9.7 Contact the Human Resources Department for assistance if personnel security clearances are required.

4.10 Violence

4.10.1 Violence in the workplace training will be conducted where there is an elevated exposure to violence or, if required by regulation. Refer to *S3NA-003-PR1 SH&E Training*.

4.10.2 A risk assessment, refer to *S3NA-010-FM3 Potential Violence Assessment Form,* will be performed in any workplace in which there exists a risk of injury to workers from violence arising out of their employment or where required by regulation.

4.10.3 The risk assessment will include the consideration of:

- Previous experience in that workplace,
- Occupational experience in similar workplaces, and
- The location and circumstances in which the work will take place.

4.10.4 If an assessment identifies a risk of injury to workers from violence, the employer will establish procedures and work environment arrangements to eliminate or minimize the risk to workers from violence.

4.10.5 Controls will be implemented and communicated to employees to address the violence hazard. Control may include, but is not limited to, working in pairs, being assisted by police or other authority, having a clear emergency response procedure, and having access to a communication device.

4.10.6 Risk Assessment/Potential Violence Inspection Forms conducted for violence will be distributed to Managers and the applicable health and safety committees.

4.10.7 Workplace violence may include:

- Threatening behavior such as shaking fists, destroying property, or throwing objects.
- Verbal or written threats—any expression of intent to inflict harm.
- Harassment—any behavior that demeans, embarrasses, humiliates, annoys, alarms, or verbally abuses a person and that is known to be or would be expected to be unwelcome. This includes words, gestures, intimidation, bullying, or other inappropriate activities.
- Verbal abuse—swearing, insulting, or condescending language.
- Physical attacks—hitting, shoving, pushing, or kicking.

4.10.8 The risk of violence may increase during certain times of day and location. Be sure to plan ahead and take into account time of day, what tasks will be conducted, location(s), method of travel, and who might be accompanying.

4.10.9 Be prepared. Always carry electronic communications, such as mobile phones with emergency services numbers in speed dial list. If 911 is the emergency number, confirm that both mobile signal coverage and the 911 service work from the work location(s).

4.10.10 Public Meetings or Presentations:

- Facilitate and/or provide proper instruction to project employees on this procedure and how to identify and avoid potentially violent situations in public meetings or presentations.
- Identify community and emergency contacts.
- Determine whether a community leader should accompany employees to the public meeting or presentation.
- Ask a community leader or local police if there are any homes/areas to be avoided.
- Work with community leaders to make community residents aware of the work being undertaken. If in doubt, err on the side of caution. Do not expose employees to potentially violent situations.
- Send out advance notice to area residents about the nature and purpose of the visit.

4.11 Public Visitations

4.11.1 Before entering any home or sampling site, employees shall assess the risk of violence and confirm safety of and proper protection of themselves and co-workers. If there is any doubt about individual or group safety, do not enter the premises/area.

- Where possible, work with someone from the community who is known by and knows the residents.
- Have easily visible identification available.
- Be sensitive to cultural, social, and economic differences.
- Attempt to learn about potential problems before entering the area.
- Employees may not enter premises posted with Beware of Animal signs unless the owner has confirmed employees will be safe.

4.11.2 Employees shall report all acts of violence to their Supervisor, SH&E Manager or Human Resources Manager.

4.11.3 All acts of violence will be reported by the employee to their Supervisor or Region Human Resources Manager.

- Report any physical contact or any violent threats to the local authorities immediately, and summon help.
- Any reported incidents of violence will be held in confidence and will be handled with integrity and discretion. All incidents will be handled in accordance with *S3NA-004-PR1 Incident Reporting, Notifications & Investigation* procedure. Any injuries or results of exposure to violence will be handled in accordance with AECOM policies and procedures.

5.0 Records

5.1 The Location Specific ERP will be filed in the project file.

5.2 ERPs shall be part of site SH&E audits.

5.3 Emergency Response Drill Reports, Security Checklists and Potential Violence Assessment Forms shall be maintained in the location or project safety files.

6.0 Attachments

6.1 S3NA-010-FM1 Emergency Response Drill Report

6.2 S3NA-010-FM2 Location Specific Emergency Response Plan Template

6.3 S3NA-010-FM3 Site Security Checklist

6.4 S3NA-010-FM4 Potential Violence Assessment Form

6.5 S3NA-010-FM5 Office / Shop Visitor Register

Americas

Risk Assessment & Management

S3NA-209-PR1

1.0 Purpose and Scope

1.1 This procedure requires hazard identification, risk evaluation, control measures, and documentation to manage safety, health and environment (SH&E) risks associated with work activities.

1.2 The objective is to establish and enhance SH&E performance, to mitigate and reduce losses due to injury, illness, property damage, or environmental impairment incident, and maintain regulatory compliance.

1.3 This procedure applies to all AECOM Americas-based employees and operations.

2.0 Terms and Definitions

2.1 **Control Measure** - Actions that can be taken to reduce the potential of exposure to the hazard. The control measure could be to remove the hazard or to reduce the likelihood of the risk of the exposure to that hazard being realized.

2.2 **Hazard** - An object, condition or behavior that has the potential to cause human injury or illness, property damage, damage to the environment, business interruption, or a combination of these.

2.3 **Risk** – The possibility of loss or injury.

2.4 **Task Hazard Assessment (THA) –** A THA is a tool for evaluating work activities for the purpose of:

- Identifying the SH&E hazards and risks associated with the activity being performed;
- Identifying and implementing control measures to eliminate or reduce hazards and risks; and,
- Evaluating the effectiveness of control measures and making modifications as needed.

3.0 References

3.1 S3NA-002-PR1 Stop Work Authority

3.2 S3NA-010-PR1 Emergency Response Planning

4.0 Procedure

4.1 Roles & Responsibilities

4.1.1 **SH&E Manager**

- Assisting management personnel to identify any necessary SH&E planning documentation required.
- Assisting in the preparation of necessary SH&E risk assessment documentation.
- Reviewing and approving SH&E risk assessment documentation prior to its implementation for work activities.
- Providing SH&E technical and regulatory input as necessary.

4.1.2 **Manager**

- Confirming the completion of SH&E risk assessment documentation as required, that addresses the full range of work activities, SH&E risks and that all requirements and procedures are implemented and enforced during the work activities.
- Confirming SH&E requirements are implemented successfully, including but not limited to:
  - Subcontractor evaluations

- SH&E training
- Personal protective equipment
- First aid and emergency response
- Client requirements

- Contacting the SH&E Manager to discuss SH&E risk assessment documentation needs/ requirements at the start of each new project involving AECOM and at designated intervals or:
  - When changes occur to the work operations or work location/ conditions
  - When work activities are modified/ changed, or
  - When additional tasks are added to the work scope.
- Confirming that the SH&E Plan has been reviewed and approved by the SH&E Manager prior to its use by AECOM personnel or prior to release to clients, outside agencies or organizations.
- Making appropriate resources available to protect the health and safety of AECOM employees, the environment and to comply with occupational health and safety, and environmental legislation and for the effective implementation of this procedure.
- Identifying and reporting to a Manager/Supervisor when changes occur to the work operations or work location/conditions.
- Identifying appropriate and applicable SH&E regulatory requirements, and implement into respective SH&E Plan.

4.1.3 **Employee**

- Obtaining necessary training identified in the SH&E Plan and associated documents.
- Understanding the potential hazards and controls of the task before work commences.
- Complying with all required controls as identified in the SH&E Plan and associated documents. Reporting any program, SH&E plan or regulatory variances to their Supervisor.

4.2 Risk Assessment Strategy

4.2.1 Hazard Identification

Hazard identification is the precursor to being able to assess risk. Before undertaking any activity, the hazards shall be identified by persons competent to recognize them using professional experience and training including the following:

a. Utilization of a formal hazard identification process;
b. Information from review and improvement processes;
c. Consideration of hazardous materials required for task(s);
d. Location of work and proximity to outside hazards or equipment;
e. Anticipation or possible change of conditions;
f. Consideration of risk of human error;
g. Identifying level of training required for task; and
h. Any other factors that can introduce hazard or risk into the activity.

4.2.2 Hazard identification should consider:

a. Routine and non-routine activities;
b. Activities of all persons having access to the workplace (including contractors and visitors);
c. Human behavior, capabilities and other human factors;

d. Identified hazards originating outside the workplace capable of adversely affecting the health and safety of persons under the control of AECOM within the workplace;

e. Hazards created in the vicinity of the workplace by work-related activities under the control of AECOM and neighboring activates not under AECOM control;

f. Infrastructure, equipment, and materials at the workplace, whether provided by AECOM or others;

g. Changes or proposed changes in the organization of AECOM, its activities, or materials;

h. Modification to the SH&E management system, including temporary changes, and their impacts on operations, processes, and activities;

i. Any applicable legal obligations relating to risk assessment and implementation of necessary controls;

j. The design of work areas, processes, installations, machinery/equipment, operating procedures, and work organization, including their adaptation to human capabilities; and

k. Driving and travel activities.

4.2.3 Risk Assessment

a. Evaluate the work area for hazards as defined above. This applies to field, office, and travel settings.

b. Determine whether identified hazards could affect employees, subcontractors, members of the public, visitors, or others.

c. Assess the severity and probability of any identified hazard occurring. This is generally based on experience, although incident statistics are available for most industries. The assessment of probability must also take into consideration the frequency with which exposure to a particular hazard will take place (e.g., the probability of occurrence is much greater if the activity is a daily event involving a number of individuals, compared with the same activity carried out twice a year by few individuals as part of a maintenance procedure).

d. Severity

Be realistic when considering how severe the result of exposure to a hazard could be. For example, it is remotely possible that someone tripping over a cable in an office may be killed, but the most probable result is bruising or a fractured bone. If, however, the cable is trailing across the top of a very busy stairway, a more severe injury is possible.

The following table shall be used to evaluate severity:

Severity – Potential Consequences				
	People	**Property Damage**	**Environmental Impact**	**Public Image/Reputation**
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost Time /Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

e. Probability

Determining the probability of a hazard actually causing harm can be much more difficult than determining the severity. The factors affecting the analysis of probability are:

- The number of times the situation occurs
- The position of the hazards
- Distractions
- The duration of exposure
- Quantities of materials involved
- Environmental conditions
- Competence of the people involved
- Condition of equipment.

In analyzing the probability of harm, it will be necessary to take into account the possibility of the control measures not being used because of human error, lack of maintenance, difficulty in compliance, complexity, etc.

The following table shall be used to determine probability:

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

4.2.4 Risk Matrix

A quantitative risk rating can be derived for each hazard using the following table.

Probability	**Severity**				
	5 - Catastrophic	4 – Critical	3 – Major	2 – Moderate	1 - Minor
5 – Frequent	**25**	**20**	**15**	**10**	**5**
4 – Probable	**20**	**16**	**12**	**8**	**4**
3 – Occasional	**15**	**12**	**9**	**6**	**3**
2 – Remote	**10**	**8**	**6**	**4**	**2**
1 - Improbable	**5**	**4**	**3**	**2**	**1**

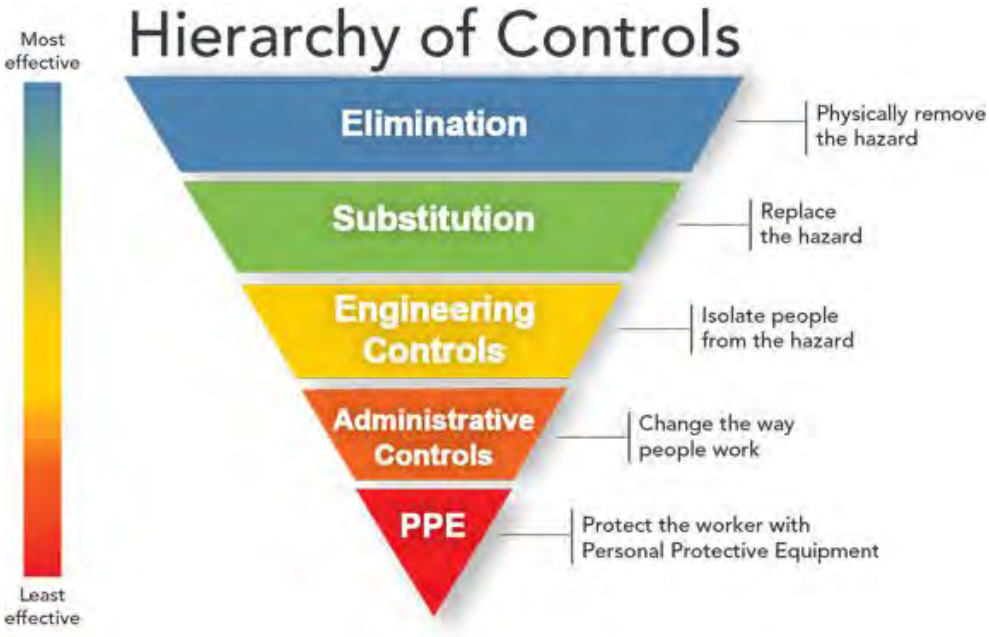
Use of the quantitative risk table shown above can help to determine whether or not the level of risk is tolerable. This can assist in deciding priorities for action. In general, higher risks (yellow and red) may require the provision of considerable additional resources involving special equipment, training, high levels of supervision, and consideration of the most effective methods of eliminating or controlling hazards. Lower-level risks may be considered as acceptable, but actions should still be taken to try to reduce them further, if possible. The risk rating for a project should be revised if the scope of work changes and at a minimum, the risk rating should be re-assessed on an annually basis.

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

4.2.5 Hierarchy of Controls

Controlling exposures to hazards is the fundamental method of protecting workers. Traditionally, a hierarchy of controls has been used as a means of determining how to implement feasible and effective control solutions.

The idea behind this hierarchy is that the control methods at the top of graphic are potentially more effective and protective than those at the bottom. Following this hierarchy normally leads to the implementation of inherently safer systems, where the risk of illness or injury has been substantially reduced.



Source: http://www.cdc.gov/niosh/topics/hierarchy/

Eliminating a hazard is the most effective means to manage a hazard. Substitution and engineering strategies include replacing a hazardous substance with a safer one, reducing the hazard (e.g., ventilation), or isolating it from where employees are working (e.g., enclosing a noisy machine).

Administrative controls include policies, training, job rotation, signage, or temporary barriers to warn of a hazard or describe safe procedures.

Personal protective equipment (PPE) such as safety glasses and hardhats place a barrier between the worker and the hazard, but do not prevent the occurrence of the incident. PPE is considered the least effective method of controlling a hazard because it depends on proper selection and fit, employee compliance, and availability.

4.3 Preplanning for Development of Risk Assessment Documentation

4.3.1 Coordination must be made by management with representatives of the client, regulatory authorities (if needed), and other appropriate personnel to determine and coordinate such items as:

a. Measures to protect the public and/or other persons exposed to the work operations.

b. Client requirements and local, state, and/or federal laws and regulations that are applicable to the project.

c. Procedures for handling and reporting incidents, property damage, and other emergencies.

d. Disciplinary policies and management of restricted access for company employees and subcontractors/vendors.

4.3.2 As soon as possible, conduct an initial review of the work location and review the proposed work activity to determine, to the extent possible, existing or probable hazardous conditions and restricted areas.

4.4 Risk Assessment Documentation

Risk assessment documentation includes SH&E Plans, Pre-Job Hazard Assessments, Daily Tailgate Meetings and Task Hazard Assessments.

4.4.1 **SH&E Plan.** All AECOM office locations are required to prepare an SH&E Plan using *S3NA-209-FM1 Office SH&E Plan Template*. A SH&E Plan is required for work activities outside of an AECOM office. The SH&E Plan is often required by regulation, insurance policy requirements, or client requirement. A template is provided in *S3NA-209-FM2 Industrial Site / Project SH&E Plan Template*. In addition, *S3NA-209-FM3 Procedure Checklist* can be used to assist in determining which AECOM SH&E procedures apply to the scope of work. Applicable procedures shall be attached to the SH&E Plan. A typical SH&E Plan includes the following components:

a. Descriptions of roles and responsibilities for the activity.

b. Hazard analysis for each task and operation found in the work plan.

c. Supplementary information to the attached procedures (e.g., jurisdiction-specific requirements, client requirements, etc.)

d. Supervision.

e. Training requirements.

f. Personal protective equipment requirements for the separate tasks or operating areas.

g. Medical surveillance requirements (for chemical exposure, noise, radiation, etc.).

h. Frequency and types of monitoring for physical and chemical hazards.

i. Pre-entry briefings requirements for visitors and workers.

j. Location-specific Emergency Response Plan. Refer to *S3NA-010-PR1 Emergency Response Planning.*

k. Client requirements that are more stringent than AECOM's SH&E requirements.

l. In California, the SH&E Plan must also address the Injury Illness Prevention Program. Refer to *S3NA-209-ATT1* for additional information.

m. A SH&E Plan for hazardous waste operations may also include:

- Site access and control measures.
- Site specific information on chemical, biological or radiation hazards.
- Decontamination procedures.
- Confined Space Entry plan.
- Spill containment plan.
- Waste management.

n. A SH&E Plan for construction activities may also include:

- Traffic plan and site access controls.
- Electrical and machinery protective measures.
- Trench and excavation safety.
- Fall protection and rescue plans.
- Storage for combustible and flammable materials.
- Sediment and community noise control plans.

o. A SH&E Plan for a demolition project may also include:

- Materials movement plan.
- Critical task sequencing.
- Explosives safety.
- Dust control measures.
- Removal of asbestos and lead-containing materials.

4.4.2 **Pre-Job Hazard Assessment.** Pre-Job Hazard Assessment is essential to ensure that hazards and risks are recognized. A Pre-Job Hazard Assessment describes the task being performed, the inherent risks, and the control measures for those risks.

- Pre-Job Hazard Assessments are completed before the work activities commence and are updated based on lessons learned.
- Workers involved in the task should participate in the hazard assessment process so that best practices are shared and all possible hazards of the task are identified.

Pre-job Hazard Assessments are performed by:

- Identifying the principle steps of each task being performed.
- Potential hazards are identified for each step and the initial risk rating is determined using the Risk Matrix.
- Control measures are then identified including PPE for each hazard.
- Each hazard is then re-evaluated and assigned a final risk rating using the Risk Matrix.
- If the final risk rating is a 5-9 (medium risk) or 10-25 (high risk), additional hazard controls shall be identified and applied until the final risk rating is reduced to 4 or below. If the final risk rating cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin.

Pre-Job Hazard Assessments may be completed as a stand-alone document, or may be incorporated into an SH&E Plan. Pre-Job Hazard Assessments are similar to Activity Hazard Analysis (AHA), Job Hazard Analysis (JHA), Job Safety Analysis (JSA) and other terms and formats; however, unless otherwise indicated by client requirement, *S3NA-209-FM4 Pre-Job Hazard Assessment* shall be utilized.

Information collected during the Pre-Job Hazard Assessment must be referenced as part of the site- specific SH&E Plan. In addition Pre-Job Hazard Assessments must be communicated to employees and subcontractors on-site. Copies of the Pre-Job Hazard Assessments will be kept on-site for review.

4.4.3 **Daily Tailgate Meeting.** A tailgate meeting for all project personnel will be held daily (excluding fixed-facility locations where AECOM employees permanently work full time). A record of the meetings will include the name of all attendees, items discussed, and date/time of meeting. *S3NA-209-FM5 Daily Tailgate Meeting Form* may be used to document the meeting.

At a minimum, the meeting will involve representatives from all organizations with a direct contractual relationship with AECOM on the project site. Other contractors working in the area of AECOM's activities should also be invited to the meeting when possible. All members of the meeting should be engaged and encouraged to participate and provide input and feedback. Objectives for the meeting should include:

- Eliminating injuries, illnesses, and damage to the environment or property.
- Review planned work activities.
- Clarify roles and responsibilities.
- Confirm work crew is fit-for-duty.
- Assess, identify and mitigate hazards.
- Share lessons learned and observations.
- Review simultaneous operations with other non-AECOM controlled activities (e.g., other contractors performing work in the vicinity of AECOM's operations, fuel delivery at the location, utility company working near AECOM operations).

4.4.4 **Task Hazard Assessment (THA).** A THA is the most important element in an effective hazard identification and risk reduction program. *S3NA-209-FM6 Task Hazard Assessment* shall be completed before every assigned task at the work location. The focus of the analysis shall be on the specific assigned task and the evaluation of risks and assignment of control measures based on actual work conditions.

A THA is a portion of the overall job scope, focused at the specific foreman and/or crew level. Task Hazard Assessments must be completed prior to the start of work. Re-assessment must also be completed when a significant change of scope occurs or if conflicting work is being done. Completion of the THA involves both the site supervision and employees involved in the work.

Task Hazard Assessment steps:

- Assemble employees involved in the work.
- Review the scope of work being performed.
- Break the task into individual steps.
- Identify actual and potential hazards.
- Rank the risk using the Risk Matrix.
- Develop appropriate controls measures for each hazard.
- Rank the post control measure risk using the Risk Matrix.
- Review the assessment.
- Confirm communication of the THA to all affected employees.
- Confirm the THA is reviewed by any visitors or additional or new personnel brought on to perform the task.

If the final risk rating is a 5-9 (medium risk) or 10-25 (high risk), additional hazard controls shall be identified and applied until the final risk rating is reduced to 4 or below. If the final risk rating cannot be reduced to 4 or lower, additional approvals are required before the activity can begin.

Employees shall monitor the activities for compliance with the THA. Workers should stop any work on a task if conditions change from the planned and agreed approach to the work. The THA should be updated to reflect new conditions or changes in task methods.

4.5 Key Elements in Risk Management at a Site

4.5.1 Regularly, or at least once per month, conduct safety meetings for supervisory personnel, including those of other contractors and subcontractors. Suggested action items for these meetings include:

a. Reviewing of the safety procedures and policies applicable to the project.

b. Identifying responsibilities of the various parties, including contractor(s) and subcontractor(s) obligations.

c. Reviewing noted and anticipated hazards, and plan methods to eliminate or control them.

d. Discussing incidents and near misses to determine causes and steps necessary to prevent reoccurrence.

e. Discussing suggestions and ideas for improving the project's safety program.

f. Maintaining a record of these meetings; this will be done by the safety representative or supervisor.

4.5.2 Regular inspections of active work areas will be made by the project supervisors and the site SH&E representative. To be effective, such inspections should occur on all shifts, should be unannounced, and should occur at varied intervals.

a. Imminent danger situations must be stopped and corrected immediately. Refer to *S3NA-002-PR1 Stop Work Authority.*

b. Inadequate or deficient protective measures and unsafe or unhealthy work practices must be brought to the immediate attention of the appropriate supervisor and/or manager for correction and disciplinary action, as required.

c. Inform the manager of all deficiencies not immediately correctable, and/or that may result in damage to facilities, equipment, or work in progress, or that create hazardous exposures to employees or the public.

4.5.3 Signs and posters of appropriate size and design, and bearing standard pertinent regulations, will be used to convey warnings, directions, and instructions to personnel and the public, as required by the client and other applicable regulations. The observance of such safety and incident prevention signs will be strictly required of company employees and visitors while on the project site.

4.5.4 Consideration must be given to make the project environmental protection plan effective. The type and extent of the measures needed for pollution control, hazardous materials handling, hazardous waste control and disposal, and for relating occupational health issues will depend upon the contract stipulations, hazard involved, type of operation, and the mandatory requirements of regulatory authorities. Such measures will include appropriate control methods necessary to prevent or reduce to safe levels exposure to hazardous substances.

4.5.5 It is the practice of AECOM to commend and reward employees and their supervisors for achieving excellence in their field of work, particularly when that work is performed safely. Project management is encouraged to promote and participate in safety recognition programs by developing project-specific safety goals and including safety incentive programs in project budgets. Project goals should include proactive goals such as training participation and training support, safety observations conducted, and management participation in safety reviews (e.g., safety walk-downs).

4.5.6 All employees are empowered and expected to stop work or not start work when it is unsafe. Employees will be trained on stop work authority upon initial assignment. Refer to *S3NA-002-PR1 Stop Work Authority*.

4.6 Other Requirements

4.6.1 The following requirements apply to SH&E risk assessment documentation:

- Preparation of the SH&E documentation may be performed by a member of the project team or SH&E.
- SH&E documentation (including draft versions of documents) will be reviewed by a SH&E Manager prior to release for outside agency review (e.g., clients, regulatory agencies, etc.) and prior to its field implementation.

- Changes to approved SH&E documentation require concurrence from a SH&E Manager (or designee). This includes those made in response to changing field conditions or operational requirements and those made in response to regulator/client comments. Any written responses made to regulator/client comments also must be reviewed by the SH&E Manager.
- The SH&E documentation for any project lasting twelve (12) months or longer will be reviewed at periodic intervals, but at least annually. The SH&E Manager will review the changes and determine whether modifications are required to the existing SH&E planning documentation. This confirms that the documentation continues to reflect the current scope of work and knowledge of site conditions, and that any revised regulatory requirements are properly addressed. The Manager will provide a master copy of the SH&E documentation to be maintained on site for reference by personnel, together with copies of any required SH&E-related records or operational documentation. The master copy must be current in all respects, and will include any changes or modifications made as work progresses.
- Managers will confirm that SH&E documents have been reviewed with affected personnel prior to implementation of field work. Sign-off and concurrence is mandatory and to be kept in the project records.

5.0 Records

5.1 Completed SH&E Plans, Pre-job Hazard Assessments, Tailgate Meeting Forms and Task Hazard Assessment will be filed in the appropriate project file.

6.0 Attachments

6.1	S3NA-209-ATT1	California Injury & Illness Prevention Program
6.2	S3NA-209-FM1	Office SH&E Plan Template
6.3	S3NA-209-FM2	Industrial Site / Project SH&E Plan Template
6.4	S3NA-209-FM3	Procedure Checklist
6.5	S3NA-209-FM4	Pre-Job Hazard Assessment
6.6	S3NA-209-FM5	Daily Tailgate Meeting Form
6.7	S3NA-209-FM6	Task Hazard Assessment
6.8	S3NA-209-FM6-A	Task Hazard Assessment – Management Services Group
6.9	S3NA-209-FM7	Office Relocation Plan

Radiation

1.0 Purpose and Scope

1.1 The primary aim of AECOM's Radiation Safety Program is to provide an appropriate standard of protection for employees without unduly limiting the beneficial practices that result in radiation exposure. This procedure provides AECOM requirements for:

- Limiting occupational and public exposure to ionizing radiation;
- Developing plans to control occupational exposure to radioactive materials, and
- Implementing radiological exposure assessment activities whenever employees are working with ionizing radiation or radioactive materials.

1.2 The Radiation Safety Program is intended to prevent the occurrence of deterministic effects, by keeping doses As Low As Reasonable Achievable (ALARA), and to confirm that all reasonable steps are taken to reduce the probability of stochastic effects.

1.3 This procedure applies to all AECOM Americas-based employees and operations.

1.4 Any exceptions to this procedure must be approved in writing by the Business Group Radiation Safety Officer (RSO).

2.0 Terms and Definitions

2.1 **Absorbed dose** – The energy imparted by ionizing radiation per unit mass of irradiated material. The units of absorbed dose are the rad and the gray (Gy): 1 Gy = 100 rad.

2.2 **Activity** – The rate of disintegration or transformation or decay of radioactive material. The units of activity are "disintegrations per second (or minute)" (dps or dpm), curie (Ci) and the Becquerel (Bq).

- 1 Ci = 37,000,000,000 dps (3.7 x 1010 dps)
  1 Ci = 2,220,000,000,000 dpm (2.22 x 1012 dpm)
  1 Bq = 1 dps

2.3 **Administrative Exposure Limit- (AL)** Established to support implementation of the ALARA philosophy and confirm compliance with regulations.

2.4 **Adult** – An individual 18 years of age or more.

2.5 **Agreement State** – A state that has executed an agreement with the U.S. Nuclear Regulatory Commission (NRC) transferring to the state the responsibility for regulating uses of certain radioactive materials within its borders.

2.6 **Airborne radioactive material** – Any radioactive material dispersed in the air in the form of dusts, fumes, particles, mists, vapors or gases.

2.7 **ALARA (As Low As is Reasonably Achievable)** – Means making every reasonable effort to maintain exposures to radiation as far below regulatory dose limits as is practical, consistent with the purpose for which the licensed or registered activity is undertaken, as well as activities with occupational radiation exposures, taking into account the state of technology, the economics of improvements in relation to benefits to public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of ionizing radiation.

2.8 **Background radiation** – Radiation from cosmic sources; non-technologically enhanced naturally occurring radioactive material, including radon, except as a decay product of source or special nuclear material, and including global fallout as it exists in the environment from the testing of nuclear explosive devices.

2.9 **Bioassay** – The determination of kinds, quantities, or concentrations, and, in some cases, the locations of radioactive material in the human body, whether by direct measurement, in vivo counting, or by analysis and evaluation of materials excreted or removed from the human body.

2.10 **Business Group Radiation Safety Officer (Business Group RSO) –** The member of the Safety, Health and Environment (SH&E) Department designated by the Business Group Vice President of SH&E to manage all AECOM radiation issues related to ionizing radiation and/or radioactive materials.

2.11 **Committed Dose Equivalent** The dose equivalent to organs or tissues of reference (T) that will be received from an intake of radioactive material by a person during the 50-year period following the intake.

2.12 **Committed effective Dose Equivalent** The sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues (HE,50 = SWT HT,50).

2.13 **Declared Pregnant Woman** – A woman who voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman withdraws the declaration in writing or is no longer pregnant.

2.14 **Deterministic Effects** – Health effects, the severity of which varies with the dose and for which a threshold is believed to exist.

2.15 **Derived Air Concentration (DAC)** – The concentration of a given radionuclide in air which, if breathed by Reference Man (1.2 cubic meters of air per hour) for a working year of 2,000 hours under conditions of light work, results in an intake of one annual limit of intake (ALI).

2.16 **Disintegration per Minute (dpm)** - The rate of emission by radioactive material as determined by correcting the counts per minute observed by a detector for background, efficiency, and window size associated with the instrument.

2.17 **Dose** – A generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, total organ dose equivalent or total effective dose equivalent.

2.18 **Dose equivalent (HT) –**means the product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and Sievert.

2.19 **Dosimeter** – Devices designed to be worn or carried by a single individual for the assessment of dose equivalent. Examples of individual monitoring devices are film badges, thermoluminescent dosimeters (TLD) and pocket ionization chambers.

2.20 **Embryo/fetus** – The developing human organism from conception until the time of birth.

2.21 **Entrance or access point –** Any opening through which an individual or extremity of an individual could gain access to radiation areas or to licensed or registered sources of radiation. This includes portals of sufficient size to permit human access, irrespective of their intended use.

2.22 **Exposure** – being exposed to ionizing radiation or to radioactive material. A measure of ionization produced in air by x- or gamma radiation. The unit of exposure is the coulomb per kilogram (C/kg) or the roentgen (R): 1 R = 2.58 x 10-4 C/kg.

2.23 **Exposure rate** – The exposure per unit of time, typically milliroentgen per hour (mR/h).

2.24 **External dose** – That portion of the dose equivalent received from any source of radiation outside the body.

2.25 **Extremity** – Hand, elbow, arm below the elbow, foot, knee, and leg below the knee. The arm above the elbow and the leg above the knee are considered part of the whole body.

2.26 **Fixed Contamination** - Radioactive material that cannot readily be removed from surfaces by nondestructive means such as causal contact, wiping, brushing, or washing.

2.27 **Frisking** - Process of monitoring personnel for contamination.

2.28 **Five-year Dosimetry Period** – The period of five calendar years beginning on January 1 of the year following the year in which the Canadian Radiation Protection Regulations came into force (2000) and every period of five years after that period (e.g., 2000 – 2005, 2005- 2010, 2010 – 2015, etc.).

2.29 **Gray (Gy)** – The System International (SI) unit of absorbed dose. One Gy is equal to an absorbed dose of 1 joule per kilogram (100 rad).

2.30 **High radiation area** – Means an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.1 rem (1 millisievert) in 1 hour at 30 centimeters from any source of radiation or from any surface that the radiation penetrates.

2.31 **Internal dose** – That portion of the dose equivalent received from radioactive material taken into the body.

2.32 **Ionizing radiation** – Any electromagnetic or particulate radiation capable of producing ions, directly or indirectly, in its passage through matter. Ionizing radiation includes gamma rays and x rays, alpha and beta particles, high-speed electrons, neutrons, and other nuclear particles.

2.33 **License** – A form of permission given by an Agreement State, the NRC, or the Canadian Nuclear Safety Commission (CNSC) to an applicant who has met the requirements for licensing set out by that Agency

2.34 **Licensed material –** Radioactive material received, possessed, used or transferred under a license issued by a regulatory agency.

2.35 **Licensee** – Any person or organization that is licensed by a regulatory agency.

2.36 **Member of the public –** Any individual, except an individual who is performing assigned duties for a licensee or registrant involving exposure to sources of radiation.

2.37 **Minor** – An individual less than 18 years of age.

2.38 **Natural radioactivity** – Radioactivity of naturally occurring nuclides whose location and chemical and physical form have not been altered by man.

2.39 **Naturally Occurring Radioactive Material (NORM) -** Includes radioactive elements found in the environment. Long-lived radioactive elements of interest include uranium, thorium and potassium, and any of their radioactive decay products, such as radium and radon. These elements have always been present in the earth's crust and within the tissues of all living beings.

2.40 **Non-ionizing Radiation** – Any type of electromagnetic radiation that does not carry enough energy per quantum to ionize atoms or molecules. Near ultraviolet, visible light, infrared, microwave, radio waves, and low-frequency RF (longwave) are all examples of non-ionizing radiation. Sources of non-ionizing radiation include lasers, communication devices and towers, and high-voltage power lines.

2.41 **Nuclear Energy Worker** – See “Radiation Worker.”

2.42 **Occupational dose –** The dose received by an individual in the course of employment in which the individual’s assigned duties involve exposure to sources of radiation. Occupational dose does not include dose received from background radiation, as a patient from medical practices, from voluntary participation in medical research programs, or as a member of the public.

2.43 **One-year Dosimetry Period –** The periods of one calendar year beginning on January 1.

2.44 **Personnel Dosimetry** - Devices designed to be worn by a single person for the assessment of dose equivalent such as film badges, thermoluminescent dosimeters (TLDs), and pocket ionization chambers.

2.45 **Radiation Producing Device** – Any device capable of producing ionizing radiation except those devices with radioactive material as the only source of radiation [e.g., x-ray fluorescence devise].

2.46 **Radiation Protection Program (RPP)** – This radiation safety program also functions as a General RPP used to address the radiation safety needs associated with a general set of operational activities involving the use of or exposure to radioactive materials, or ionizing radiation. A project or site-specific RPP is used to address the radiation safety needs associated with a specific work location or field activity or to supplement the requirements of the general RPP.

2.47 **Radiation Safety Officer (RSO)** – The person appointed to oversee and manage the specific radiation safety issues associated with a particular use or contact with radioactive material or exposure to ionizing radiation, in accordance with an established RPP.

2.48 **Radiation Work Permit (RWP) –**Permit that identifies radiological conditions, establishes worker protection and monitoring requirements, and contains specific approvals for radiological work activities. The RWP serves as an administrative process for planning and controlling radiological work and informing the worker of the radiological, health, and safety issues.

2.49 **Radiation Worker –**Worker whose job assignment requires work on, with, or in the proximity of radiation production machines or radioactive materials. A radiological worker has the potential to be exposed to more than 100 mrem per year, which is the sum of the dose equivalent to external irradiation and the committed effective dose equivalent to internal irradiation.

2.50 **Radioactive material** – Any material (solid, liquid, or gas) that emits ionizing radiation spontaneously.

2.51 **Radioactivity** – The disintegration of unstable atomic nuclei with the emission of radiation.

2.52 **Radon Progeny** – Includes the following radioactive decay products of radon-222: polonium-218, lead-214, bismuth-214, and polonium-214.

2.53 **Removable Contamination -** Radioactive material that can be removed from surfaces by nondestructive means, such as casual contact, wiping, brushing, or washing.

2.54 **Restricted area** – An area, access to which is limited by the licensee or registrant for the purpose of protecting individuals against undue risks from exposure to sources of radiation. Restricted area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.

2.55 **Sealed source** – Radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent release and dispersal of the radioactive material under the most severe conditions that are likely to be encountered in normal use and handling.

2.56 **Stochastic effects** – Health effects that occur randomly and for which the probability of the effect occurring, rather than its severity, is assumed to be a linear function of dose without threshold. Hereditary effects and cancer incidence are examples of stochastic effects.

2.57 **Survey** – An evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, and/or presence of sources of radiation. When appropriate, such evaluation includes, but is not limited to, tests, physical examination of location of materials and equipment, and measurements of levels of radiation or concentration of radioactive material present.

2.58 **Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)** – Any naturally occurring radioactive materials not subject to regulation under the Atomic Energy Act whose radionuclide concentrations or potential for human exposure have been increased above levels encountered in the natural state by human activities.

2.59 **Total Effective Dose Equivalent (TEDE**) means the sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

2.60 **Total Organ Effective Dose Equivalent (TODE**) The sum of the deep dose equivalent (for external exposures) and the committed dose equivalent to an individual organ or tissue (for internal exposures).

2.61 **Unrestricted area** – An area, access to which is neither limited nor controlled by the licensee.

2.62 **Whole body** – For purposes of external exposure, head, trunk (including male gonads), arms above the elbow, or legs above the knees.

2.63 **Working level** – The concentration of radon progeny in 1 cubic meter that has a potential aloha energy of 2.08 x 10-5 joules.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-121-PR1 Non-Ionizing Radiation

3.3 S3AM-122-PR1 Gauge Source Radiation

3.4 S3AM-123-PR1 Respiratory Protection

3.5 S3AM-208-PR1 Personal Protective Equipment

3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedures

4.1 Roles and Responsibilities

4.1.1 **Business Group RSO**

A person to whom the VP of SH&E has delegated the responsibility for the Radiation Safety Program. The RSO may designate employees with experience and appropriate radiation credentials to support the radiation safety program. Confirm that Project Managers understand their responsibilities for development and implementation RPPs as applicable to the planned work activities. Further Business Group RSP responsibilities include:

- Review and approve all initial and renewals applications for radioactive material/special nuclear material license prior to submittal.
- Approve the appointment of each AECOM license/site RSO.
- Provide AECOM management and operations personnel with technical assistance in the identification, control, and safe handling of radioactive materials.
- Investigate any employee radiation exposures above the administrative limits.
- Review annual activity summary reports submitted by the License/Program/Site RSO.

4.1.2 **License/Program/Site Radiation Safety Officer (Site RSO)**

The Business Group RSO will designate or approve a qualified employee to be a Site RSO. The Site RSO will be responsible to the Project Manager and to the Business Group RSO for implementation of Radiation Protection Programs (RPP) and performance of project radiation safety responsibilities. The Site RSO receives radiation safety technical guidance from the AECOM Business Group RSO. Responsibilities of the Site RSO include:

- Manage all license, program, or project radiation safety procedures as specified in the applicable RPP.
- Review real-time monitoring results to determine compliance with the RPP-specified requirements.
- Maintain administrative and operational compliance with all license conditions and requirements.
- Identify individuals or work groups containing individuals who are likely to receive doses exceeding 0.1 rem/year, to the responsible Manager.
- Manage site dosimetry program, if applicable.
    - Evaluate the need for bioassay; ensure they are completed if required.
    - Confirm Employees are trained in the proper wear, handling, and storage of dosimeters.
    - Distribute and collect dosimeters, and review results.
    - Provide Employees with their annual dose reports.

- Provide copies of all dosimetry results to the Business Group RSO on an annual basis.

- Notify the Business Group RSO of any suspect personnel exposures above administrative limits.
- Confirm that Employees working with radioactive material or ionizing radiation sources have received all necessary safety-related training, certifications and/or licenses.
- Conduct and document all ALARA dose assessment investigations and lost dosimeter investigations.
- Confirm that the presence of radioactive materials, ionizing radiation sources, radiation-producing devices, radiologically controlled areas, contamination areas, airborne radioactivity areas, and radiation areas at project work sites are identified (where reasonably possible) prior to commencing field activities.
- Notify the Employee if he or she is likely to exceed their ALARA goal and discuss options for managing the situation.
- Submit an annual summary report to the Business Group RSO which includes the following.
  - Exposure monitoring (cumulative project dose).
  - Exposure trends or ALARA issues.
  - Annual audit findings.
  - Licensing actions.

4.1.3 **Manager (Operations)**

- Notify and get approval from the Business Group RSO of possession of or intent to acquire radioactive material under any general or specific radioactive material license or conduct field work at sites with the potential for employee radiation exposures.
- Notify the Business Group RSO of the intent to renew, or amend an existing AECOM radioactive materials license.
- Provide the Business Group RSO with the names and qualifications of individuals who may be designated as AECOM License/Program/Site RSOs.
- With the support of the Site RSO, identify individuals or work groups containing individual who are likely to receive doses exceeding 0.1 rem/year.
- Confirm Project Managers/ Site Supervisors, are aware of his/her Radiation Protection Program responsibilities.
- Operations Managers, Project Managers, and Project Safety Professionals are responsible for implementing any required radiological exposure assessment procedures in their work activities.

4.1.4 **Project Manager** / **Site Supervisor**

Confirms that the project is conducted in accordance with the requirements of contract documents, applicable regulations, radioactive material license conditions and ALARA requirements. . He/she has authority over all work activities of AECOM employees and subcontractors both on the job site and involved in off-site project support. The Project Manager is responsible for organizing the field team, including the Site Supervisor, Site RSO, and the Site Safety Officer. The Project Manager is responsible for communication and information exchange with the client and regulatory authorities and will officially represent AECOM in all project-related coordination. Further responsibilities include:

- Consult with the Business Group RSO or designee to determine if a site-specific RPP will be required.

- Identify project sites that do not involve direct exposure to or work with radioactive materials, but have the potential for incidental exposure to radiation.
- Involve the Site RSO in the planning phase of radiological work to be accomplished.
- Confirm that all radiation safety issues associated with their projects are properly addressed, and worker safety is confirmed through development of appropriate radiological safety requirements and procedures.
- Confirm that RPPs are prepared, reviewed, and approved in accordance with this procedure.
- Confirm that Employees working with radioactive material or ionizing radiation sources have received all necessary safety-related training, certifications and licenses.
- Facilitate compliance with client-required radiation safety programs in coordination with the Site RSO.

4.1.5 **Employees**

Before an Employee (including subcontractor personnel) may engage in handling or processing radioactive material or radioactive contaminated materials or perform the decontamination activities at the site, he or she will receive site-specific radiation safety training and acknowledge receipt of that training by signing a statement to that effect. Each Employee will comply with this AECOM Radiation Safety Program and all RPP provisions, guidance, and procedures. Further responsibilities include:

- Work in accordance with all established RPP requirements, and radiation work permits.
- Will not disturb or handle any radioactive material or work in any identified radiation area without appropriate training and safety procedures.
- Notify the Project Manager of the presence or suspected presence of previously unidentified radioactive material or ionizing/non-ionizing radiation sources in the workplace, and cease all work activities involving potential exposure to ionizing/non-ionizing radiation until further direction is received.
- Be generally aware of their current, annual, dose-to-date.
- Participate in ALARA evaluations, as requested.
- Implement the ALARA controls specified in plans and procedures,
- Immediately report to the Program/Site RSO or Project Manager any situations where they believe that they or another employee may have had an internal deposition of radioactive material.
- Properly wear, handle, and store any dosimeter or other dose assessment device issued to them.

4.2 Restrictions

4.2.1 This Radiation Safety Program was developed with the premise that the success of any program designed to minimize exposures and avoid accidents must necessarily rely on the experience, ability, and forethought of the user. The policies and procedures contained in the Radiation Safety Program are designed to achieve a reasonable and practical standard of safety in compliance with government regulations and codes and a degree of safety awareness for those who work with radiation devices.

4.2.2 This Radiation Safety Program, including the related policy, manual, and safe job procedures, must be adhered to for all tasks which involve nuclear densometers. Specific requirements for the safe management of nuclear densitometer and gauge sources are provided in AECOM procedure *S3AM-122-PR1 Gauge Source Radiation*.

4.2.3 Only Employees trained in the use and handling of nuclear densometers are authorized to handle or receive these devices. This includes technicians using the devices or anyone shipping them by ground transportation or by air.

4.2.4 Specific safety requirements related to non-ionizing radiation are provided in *S3AM-121-PR1 Non-Ionizing Radiation*.

4.2.5 This Radiation Safety Program does not apply to AECOM Employees who are working full-time under another client-supported radiation safety program. For example, AECOM Employees working on a Department of Energy site who are actively monitored under the site's program are not subject to the requirements of this AECOM Radiation Safety Program. However, Employees visiting a site or working temporarily under a client-supported program should provide dose monitoring reports to the Site RSO, if they are also working under this AECOM Radiation Safety Program.

4.3 Training Requirements

4.3.1 Training requirements for a project or program shall be provided in or referenced in the applicable RPP.

4.3.2 AECOM Employees shall receive radiation safety training and certifications commensurate with their job duties. Employees may require training to a level such that occupation (non-public) dose limits apply. These persons will then be qualified as Radiation Workers (U.S.), Nuclear Energy Workers (Canada) or Naturally Occurring Radioactive Material (NORM) Surveyors.

4.3.3 Records shall be maintained to demonstrate compliance with the training requirements, refer to *S3AM-003-PR1 SH&E Training*. Training records shall include either a copy of an examination showing a passing score of 80 percent or higher or a certificate from an outside vendor. For Radiation Awareness (RA) training, no test or certificate is required. RA training can be documented with a training sign-in sheet, e-mail acknowledgement from the trainer, or similar documentation.

4.3.4 Radiation safety training is required under the following circumstances:

- Before being permitted unescorted access to radiologically controlled areas (i.e., areas posted with the radiation trefoil symbol);
- Before exceeding public dose limits during access to radiologically controlled areas (i.e., areas posted with the radiation trefoil symbol);
- Before handling, storing, or transporting nuclear gauge sources;
- When there is a significant change to radiation protection policies and procedures that may affect the individual;
- When specified in the program-specific or license-specific RPP;
- When required by a state permit or other regulation for the possession of a radiation-producing devise; and
- When required by a client for site access to perform a specific task.

4.4 Training Topics

4.4.1 Radiation safety training shall be detained in the RPP and should include the following topics to the extent appropriate to each individual’s prior training, work assignments, degree of exposure to potential radiological hazards, and applicable program or license:

- Risk of exposure to radiation and radioactive materials, including prenatal radiation exposure;
- Basic radiation fundamentals and radiation protection concepts;

- Controls for both routine and emergency actions implemented at the local level to manage and maintain doses ALARA (e.g., physical design features, administrative controls, limits, policies, procedures, alarms, radiation survey instrumentation, dose monitoring devices and other measures);
- Transportation and storage of radioactive materials;
- The individual's rights and responsibilities for implementing the facility's radiological protection program;
- The individual's responsibilities for implementing ALARA measures; and
- Reports the individual may request.

4.5 Training Courses

4.5.1 AECOM recognizes multiple training levels that are commensurate with an Employee's job functions as described below. For these descriptions, Radiation Worker training is considered the same as Nuclear Energy Worker training.

4.5.2 RA – This course contains the basics in radiation protection and should be site/project specific.

- This training is for AECOM Employees that may require non-routine or short-term unescorted access to radiological controlled areas (excluding Radiation Areas and Airborne Radiation Areas) to perform work functions.
- This training is also acceptable for short-term site assessment activities for sites with known low-levels of radiation and contamination or where a qualified health physics or radiation protection technician has control of site access.
- RA training is also given to personnel who work in areas where radioactive materials are stored but do not have authorized access to the materials or areas where radioactive materials may be inadvertently encountered (such as during environmental sampling in uncontrolled areas).
- Personnel who receive RA training are NOT considered Radiation Workers or Nuclear Energy Workers and public dose limits apply. To exceed public dose limits, Employees must be trained to one of the requirements below.

4.5.3 Site-Specific Radiation Worker Training- This course is designed to provide the OSHA 1910.1096 (i)(2) and site-specific training necessary to work in a radiation area or exposed to radioactive materials.

- The instruction shall include safety problems resulting from exposure to materials, instructed in the applicable provisions on exposure protection, and where individuals can get information on their radiation exposure.

4.5.4 NORM Surveyor – This course is designed to provide surveyor training for individuals performing "NORM" surveys. Topics include why survey, types of surveys, types of equipment surveyed, and techniques in the operation, use, and handling of various radiation survey instruments.

4.5.5 Radiation Worker I (RWI) – This course contains the core academics and the appropriate practical factors.

- This training is for radiological workers whose job assignments require routine access to Radiological Buffer Areas and Radiation Areas.
- RW I training is also suggested for unescorted entry into Radioactive Material Areas containing either sealed radioactive sources or radioactive material labelled in accordance with 10 CFR 20, 10 CFR 835, or applicable Agreement State regulations.
- RW I training alone does not prepare the Employee to work around higher radiation levels or with contaminated materials. It is suggested that RW I tasks be limited to inspections, tours and activities that involve work on non-radiological systems.

4.5.6 Radiation Worker I Training with High/Very High Radiation Area Training – This course contains the core academics, the High/Very High Radiation Area (HR/VHR) module, and the appropriate practical factors.

- The HR/VHR Area lesson plan may be added to the RW I course to give personnel unescorted entry into High Radiation Areas where contamination is not a concern.

4.5.7 Radiation Worker II Training (RW II) – This course consists of the core academics, the HR/VHR module, the Contamination Control module, and the appropriate practical factors.

- This training is recommended for the radiological worker whose job assignments involve unescorted entry into High Radiation Areas, Contamination Areas, High Contamination Areas, and Airborne Radioactivity Areas.
- Further, Employees who have potential contact with hot particles or use glove boxes with high contamination levels should complete RW II training.
- RW II training prepares the Employee to work around higher radiation levels and with contaminated materials normally associated with radiological facilities/activities.

4.5.8 Nuclear Gauge Training – All Employees asked to work with nuclear gauges will be trained in safe radiation work practices and procedures in accordance with *S3AM-122-PR1 Gauge Source Radiation*.

4.5.9 Other Instrument-Specific Training – All Employees asked to work with devises that emit ionizing or non-ionizing radiation will be trained in safe work practices and procedures.

4.6 ALARA

4.6.1 Even though current occupational exposure limits provide a very low risk of injury, it is prudent to avoid unnecessary exposure to radiation. AECOM's objective is thus to reduce occupational exposures as far below the specified limits as is reasonably achievable by means of good radiation protection planning and practice, as well as commitment to policies that foster vigilance against departures from good practice.

4.6.2 In addition to maintaining doses to individuals ALARA, the sum of the doses received by all exposed individuals should also be maintained at the lowest practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.

4.6.3 Two basic assumptions are considered necessary in this program for keeping occupational exposures as far below the specified limits as is reasonably achievable. Those two conditions are management commitment to maintaining exposures as low as is reasonably achievable, and the personnel responsible for radiation protection should be continuously vigilant for means to reduce exposure.

4.6.4 ALARA Policy Statement and Implementation

- It is AECOM's policy to plan and conduct its radiological activities safely and in such a fashion as to protect the health and safety of its employees, subcontractors, members of the public, and the environment. To achieve this, AECOM shall confirm that efforts are taken to reduce radiological exposures and releases to the environment ALARA, taking into account social, technical, economic, practical and public policy considerations. AECOM is committed to implementing a radiological control program that reflects this policy.
- To implement this policy, AECOM shall:
    - Review radiological operations and analyze the hazards;
    - Develop and implement controls that reduce or eliminate unnecessary dose and keep the necessary doses low and document the controls in the RPP or other work document.
    - Document areas surveyed for radioactive material and retain record of the survey.

- Establish ALARA goals for individuals or work groups.
- Provide feedback to Employees and Managers by tracking an individual's dose (from all operations) relative to his/her ALARA goal.
- Re-evaluate the situation if it appears an individual is likely to exceed his/her ALARA goal.

4.6.5 ALARA Committee

- Form an ALARA Committee for each site for which ALARA goals will be developed and when there is a potential for exposure to ionizing radiation at levels that significantly exceed natural background.
- At a minimum, this Committee will be made up of the Site RSO, the Project or Site Manager, the Health Physics Supervisor (if applicable), and one representative of the site labor force.
- The Committee will meet periodically to review previous site radiation exposure, air monitoring, effluent monitoring, and contamination level data to assess the presence of unacceptable trends.
- The Committee will also assess the success of the radiological controls, serve as a forum for recommendations for improvements, and maintain a written record of the Committee's activities in the project files. The Committee will also support the development of project or site-specific ALARA goals.

4.6.6 ALARA Goals and Evaluations

- ALARA goals shall be established for individuals who may be involved in operations that could result in exposures greater than 100 mrem (1 mSv) from all operations in a calendar year. The Program/Site RSO shall work with the radiation safety committee to establish ALARA goals in conjunction with the Project Manager or Program Manager. The ALARA goals should be:
  - Based on historical values for this type of work or on estimations of dose and should be modified either up or down depending upon the nature of the work involved.
  - Approved by the Project Manager or Program Manager and exposed individual's supervisor.
  - Periodically evaluated relative to accrued dose received by the worker.
  - If it is observed that an individual is approaching 100 mrem (1 mSv) for the year and no ALARA goal has been established, then the Program/Site RSO will notify the Business Group RSO of this and provide an ALARA goal.
- The License/Program/Site RSO shall:
  - Conduct and document a post-job review/critique if the program ALARA goal of 0.5 rem or 40 DAC- hours in a year is exceeded.
  - Notify the Employee if they is approaching his/her ALARA goal;
  - Complete an ALARA re-evaluation prior to allowing an Employee to exceed an ALARA goal or raising an ALARA goal;
  - Inform the Business Group RSO of any increased ALARA goals; and
  - Evaluate and respond (as appropriate) to increasing dose, airborne, or contamination trends and other indicators that could be precursors to unnecessary dose.
- An ALARA evaluation (see form *S3AM-120-FM1 ALARA Evaluation*) is required for individuals or work groups who have an ALARA goal of 500 mrem (5 mSv) or more for a given calendar year. As part of the evaluation, the Program/Site RSO is responsible to the Business Group RSO to provide names of individuals who have ALARA goals greater than 500 mrem (5 mSv).

4.7 RPP and Radiation Work Plans

4.7.1 AECOM projects shall comply with the SH&E procedures with respect to project planning, hazard identification, and communication.

4.7.2 The project SH&E documents should identify radiation hazards and mitigate the risk through the use of proper engineering and administrative controls to minimize the spread of contamination and maintain low exposure levels.

4.7.3 Manager (Operations)/Project Managers will confirm that a General RPP or Site RPP is completed by or approved by the Corporate RSO prior to initiating operations if required as described below.

4.7.4 General RPP – This Radiation Safety Program will function as a general RPP.

4.7.5 Site RPP shall be prepared on a project-by-project basis for field operations where:

- AECOM Employees may enter any radiation area;
- AECOM Employees may enter a radiologically controlled area without an escort operating under a separate RPP;
- AECOM Employees may enter areas where radionuclide airborne concentrations exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the ALI or 12 DAC-hours, and respiratory protection is not in use.

4.7.6 The Site RPP must be a stand-alone document, or may be incorporated into other project health and safety documentation (e.g., health and safety plans). (Refer to *S3AM-209-PR1 Risk Assessment & Management*.) The RPP must:

- Be prepared by the designated Site RSO or other radiation safety professional, and reviewed by the Business Group RSO or designee*;*
- Address all radiological hazards associated with the identified use of licensed radioactive material, exposure/contact with radioactive material, or exposure to ionizing radiation;
- Provide appropriate and applicable training requirements, monitoring procedures, dosimetry requirements, protective equipment requirements, operational safety procedures and limitations for each identified radiological hazard;
- Identify specific minimization procedures consistent with AECOM's ALARA requirements; and
- Address storage and transportation issues, security and operator qualification requirements, device maintenance requirements, leak testing requirements, and any other radioactive material license compliance needs when prepared for a radioactive material license.

4.7.7 Radiation Work Permit (RWP)

- An RWP is issued for short, non-routine tasks to provide inform Employees of the radiological controls and entry requirements for a specific work activity and is valid only for the duration of the activity.
- If RWPs are expected to be used during a project or to implement a specific program, the RPP must define the terms of issuance, approval, and implementation. Generally the RWP is prepared by the Site RSO and approved by the Manager. (Refer to S3AM-120-FM2, *Radiation Work Permit*.) Employees must be trained on the RWP, read it, and signed-off on it before performing a task described in the RWP

4.7.8 Hazardous Work Permit (HWP)

- An HWP is a combination document issued to inform Employees of both radiological and hazardous material exposure and entry requirements for short, non-routine tasks on to provide additional protection under a project/program RPP.

- If HWPs are expected to be used during a project or to implement a specific program, the RPP must define the terms of issuance, approval, and implementation. Generally the HWP is prepared by the Site RSO and approved by the Manager. (Refer to S3AM-120-FM3, *Hazardous Work Permit*.) Employees must be trained on the HWP, read it, and signed-off on it before performing a task described in the HWP.

4.8 Considerations for Non-Radiological Hazards. Implementation of a radiation safety control may introduce unintended consequences that may negatively impact the overall safety of the operation. For example:

4.8.1 Excessive protective clothing or equipment used to control dose or personnel contamination events may have deleterious consequences, such as heat stress and ergonomic impacts.

4.8.2 Respirators used to reduce intakes of radionuclides may impair visual acuity and communications capabilities among Employees.

4.8.3 Protective clothing and equipment used to protect Employees from chemical hazards may slow down work, leading to increased worker dose.

4.9 Radiation Protection Standards

4.9.1 The U.S. and Canadian government agencies have established limits on annual radiation exposure for occupationally exposed workers, including exposures to radon (10 CFR 20, SOR-2000/203).

4.9.2 These limits have been shown to prevent deterministic effects of radiation exposure while limiting the probability of stochastic effects.

4.9.3 Additionally AECOM has established its own set of administrative limits to confirm compliance with Federal regulations and to implement the AECOM ALARA philosophy.

4.10 Occupational Dose Limits

4.10.1 Tables 1 and 2 provide the legal U.S. and Canadian dose limits as well as AECOM's administrative dose limits.

4.10.2 Note that doses from background radiation, therapeutic and diagnostic medical and dental exposures, and those resulting from participation as a subject in medical research programs are not included in dose records or when assessing compliance with the occupational dose limits.

4.11 Occupationally Exposed Minors

4.11.1 AECOM policy is no worker under 18 years of age will be allowed to work on site where there is the potential for exposure to radiation. This requirement is consistent with EM-385-1-1, Section 6E, which does not allow the occupational radiation exposure of minors.

Table 1 – Occupational Dose Limits (English units)

	United States	Canada	AECOM
	10 CFR 20, Subpart C	**SOR-2000/203, Sect. 13**	**Administrative Limit**
Total Effective Dose Equivalent (TEDE)	5 rem/yr	5 rem/yr	500 mrem/yr
Total Organ Dose Equivalent (TODE)	50 rem/yr	NA	5 rem/yr
Shallow Dose Equivalent (SDE)	50 rem/yr	50 rem/yr	5 rem/yr
Extremity Dose Equivalent	50 rem/yr	50 rem/yr	5 rem/yr
Lens of Eye Dose Equivalent	15 rem/yr	15 rem/yr	1.5 rem/yr
Individual Member of the Public	2 mrem/hr	NA	2 mrem/hr
	100 mrem/yr	100 mrem/yr	100 mrem/yr
Occupational Dose to Minors	10% of above limit	NA	NA
Dose to Embryo/Fetus of a Declared Pregnant Worker	500 mrem	400 mrem	100 mrem/ gestation

Table 2 – Occupational Dose Limits (SI units)

	United States	Canada	AECOM
	10 CFR 20, Subpart C	**SOR-2000/203, Sect. 13**	**Administrative Limit**
TEDE4	50 mSv/yr	50 mSv/yr	5 mSv/yr
TODE	500 mSv/yr	NA	50 mSv/yr
SDE	500 mSv/yr	500 mSv/yr	50 mSv/yr
Extremity Dose Equivalent	500 mSv/yr	500 mSv/yr	50 mSv/yr
Lens of Eye Dose Equivalent	150 mSv/yr	15 rem/yr	15 rem/yr
Individual Member of the Public	0.02 mSv/hr	NA	0.02 mSv/hr
	1 mSv/yr	1 mSv/yr	1 mSv/yr
Occupational Dose to Minors	10% of above limit	NA	NA
Dose to Embryo/Fetus of a Declared Pregnant Worker	5 mSv	4 mSv	1 mSv/gestation

4.12 Embryo/Fetus of a General Employee

4.12.1 A special situation arises when a Radiation Worker or Nuclear Energy Worker becomes pregnant. Under these conditions, radiation exposure could also involve exposure to the embryo or fetus. A number of studies have indicated that the embryo or fetus is more sensitive than the adult, especially during the first trimester of pregnancy. This can be a concern since many users are unaware of their pregnancy during the first month or two of gestation. Hence, the NRC and the CNSC require that all occupationally exposed Employees be instructed in the potential health risks associated with prenatal radiation exposure.

4.12.2 As defined in 10 CFR 20.1003, a "declared pregnant woman" (refer to S3AM-120-FM4, *Declaration of Pregnancy*) means a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception. The maximum permissible exposure to the fetus of a declared pregnant worker during the gestation period is 10 percent of the NRC's annual limits or 500 mrem. An effort should be made to avoid substantial variation of uniform monthly exposure rate. There are very few locations within AECOM where radiation levels are high enough that a fetus could potentially receive a dose that approaches these limits.

4.12.3 The National Council on Radiation Protection and Measurements (NCRP) Report No. 116 recommends a monthly equivalent dose limit of 0.05 rem (0.5 mSv) to the embryo/fetus once the pregnancy is known. In view of the NCRP recommendation, any monthly dose of less than 0.1 rem (1 mSv) is not a substantial variation above a uniform monthly dose rate and as such will not require justification (specified in NRC Regulatory Guide 8.13).; however, a monthly dose greater than 0.1 rem (1 mSv) should be justified (specified in NRC Regulatory Guide 8.13)

4.12.4 If a Radiation Worker or Nuclear Energy Worker becomes pregnant, she shall declare her pregnancy in writing. This can be done by email or by letter to the Site RSO applicable, using form S3AM-120-FM4, *Declaration of Pregnancy*, or the equivalent. It is recommended the Worker's applicable human resources representative be notified. A member of the Site RSO staff will assess her potential radiation exposure and measures to keep her exposures ALARA and make any appropriate accommodations. (See form S3AM-120-FM5, *Embryo/Fetus Initial Dose Calculations*.) Early declaration of a pregnancy is encouraged and confidentiality is maintained at all times.

4.12.5 AECOM's administrative limit of 500 mrem (5 mSv) based on CNSC regulations. If notification of a pregnancy is not made in writing, the radiation exposure limits remain at the occupational limits of 5 rem (50 mSv) per year. An individual may also "un-declare" her pregnancy in writing at any time (using form S3AM-120-FM6, *Withdrawal of Declaration of Pregnancy*, or the equivalent).

4.13 Planned Special Exposures (PSE)

4.13.1 PSE are not practiced at AECOM.

4.14 Means of Exposure Control

4.14.1 Means of controlling Employee exposures for a project or program shall be provided in the applicable RPP.

4.14.2 There are three basic ways in which Employees can control exposure to a radioactive source: limit exposure time, increase their distance from the source, and the interposition of a shielding material.

4.14.3 These concepts are thoroughly presented in AECOM radiation safety training but should also be continuously reinforced through daily or weekly radiation safety briefings. AECOM projects shall use postings, labels, project/task plans, "dry-runs," engineering controls, and PPE as appropriate to limit occupational exposures.

4.15 Postings

4.15.1 Access to radioactive materials is controlled by posting areas containing radiation fields, radioactive materials, and/or radioactive contamination.

4.15.2 AECOM's policy shall be to post areas as required below based on U.S. radiation protection regulations (10 CFR 20).

4.15.3 Projects in Canada shall also post in accordance with these requirements unless Canadian regulators or the client require that areas only display postings based on Canadian regulations (SOR-2000/203).

4.15.4 Warning signs shall be durable and legible and shall bear the radiation warning symbol (tri-foil) and the applicable caution. The three blades and the central disk of the tri-foil symbol shall be:

- Magenta or black; and
- Located on a yellow background

4.15.5 Postings shall be displayed at the boundary of and at every point of access to an area, room or enclosure and bare the applicable words below.

4.15.6 Signs and postings should be removed by health physics only and only when conditions no longer warrant that posting.

4.15.7 Where physical barriers do not exist, pole barriers shall be erected using yellow and magenta or yellow and black rope.

4.15.8 Postings shall include the following language:

- "Caution (or Danger) Contamination Area" – Any area where removable contamination levels exceed or are likely to exceed those specified in Table 3 (from 10 CFR 835, Appendix D).
- "Caution (or Danger) Radiation Area" – Any area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 5 mrem in 1 hour at 30 centimeters from the source of radiation or from any surface that the radiation penetrates (i.e., dose rates in the area exceed 5 mrem/hr or 50 µSv/hr).
- "Caution (or Danger) High Radiation Area" – Any area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 100 mrem in 1 hour at 30 centimeters from the source of radiation or from any surface that the radiation penetrates (i.e., dose rates in the exceed 100 mrem/hr or 1.0 mSv/hr).
- "Caution (or Danger) Very High Radiation Area" – Very high radiation area means an area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in 1 hour at 1 meter from a radiation source or 1 meter from any surface that the radiation penetrates (i.e., dose rates exceed 500 rads/hr or 5 Gy/hr). No AECOM personnel shall have access to a Very High Radiation Area without written approve from the Site RSO.
- "Caution (or Danger) Airborne Radioactivity Area" – Any area, accessible to individuals in which airborne radioactivity levels could result in an individual being exposed to a concentration in excess of the following concentrations. Work in an Airborne Radioactivity Area must be conducted in accordance with a Respiratory Protection Program approved by the Site RSO or designee.
    - In excess of the DAC specified in appendix B, to 10 CFR 20.1001-20.2401, 10 CFR 835 or
    - To such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the ALI or 12 DAC-hours.

4.15.9 The following postings are required only on Canadian project sites (SOR-2000/203):

- "RAYONNEMENT-DANGER-RADIATION" – when there is a radioactive nuclear substance in a quantity greater than 100 times its exemption quantity in the area, room or enclosure or there is a reasonable probability that a person in the area, room or enclosure will be exposed to an effective dose rate greater than 2.5 mrem/hr (25 µSv/hr).

4.15.10 No Employee shall post or keep posted a sign that indicates the presence of radiation, a nuclear substance, or prescribed equipment at a place where the radiation, nuclear substance, or prescribed equipment indicated on the sign is not present.

Table 3 – Surface Contamination Values[1] in dpm/100 cm2 (60 dpm = 1 Bq)

Radionuclide	Removable[2,4]	Total (Fixed + Removable)[2,3]
U-nat, U-235, U-238, and associated decay products	[7]1,000	[7]5,000
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20	500
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above[5]	1,000	5,000
Tritium and STCs[6]	10,000	See Footnote 6

[1]The values in this appendix, with the exception noted in footnote 6 below, apply to radioactive contamination deposited on, but not incorporated into the interior or matrix of, the contaminated item. Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides apply independently.

[2]As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[3]The levels may be averaged over one square meter provided the maximum surface activity in any area of 100 $cm^2$is less than three times the value specified. For purposes of averaging, any square meter of surface shall be considered to be above the surface contamination value if: (1) From measurements of a representative number of sections it is determined that the average contamination level exceeds the applicable value; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100 cm^2area exceeds three times the applicable value.

[4]The amount of removable radioactive material per 100 $cm^2$of surface area should be determined by swiping the area with dry filter or soft absorbent paper, applying moderate pressure, and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. (Note—The use of dry material may not be appropriate for tritium.) When removable contamination on objects of surface area less than 100 $cm^2$is determined, the activity per unit area shall be based on the actual area and the entire surface shall be wiped. It is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

[5]This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

[6]Tritium contamination may diffuse into the volume or matrix of materials. Evaluation of surface contamination shall consider the extent to which such contamination may migrate to the surface in order to confirm the surface contamination value provided in this appendix is not exceeded. Once this contamination migrates to the surface, it may be removable, not fixed; therefore, a “Total” value does not apply. In certain cases, a “Total” value of 10,000 dpm/100 cm^2may be applicable either to metals, of the types which form insoluble special tritium compounds that have been exposed to tritium; or to bulk materials to which particles of insoluble special tritium compound are fixed to a surface.

[7]These limits only apply to the alpha emitters within the respective decay series.

4.16 Labelling

4.16.1 In the U.S., the Site RSO shall confirm that each container of licensed radioactive material bears a durable, clearly labelled with:

- The radiation symbol and the words “CAUTION, RADIOACTIVE MATERIAL” or “DANGER, RADIOACTIVE MATERIAL.”

- A label containing the name, quantity, contamination levels, dose rates, date of measurement and form of the radioactive substance in the container or device.

4.16.2 In Canada, the Site RSO shall confirm that no person shall possess a container or device that contains a radioactive substance unless the container or device is labelled with the following.

- The radiation warning symbol and the words “RAYONNEMENT — DANGER —RADIATION.”
- A label containing the name, quantity, contamination levels, dose rates, date of measurement and form of the radioactive substance in the container or device.

4.17 Personal Protective Equipment

4.17.1 PPE is the least effective control for minimizing the exposure to high-energy beta radiation and gamma radiation and should be used in conjunction with other PPE requirements, typically required for construction sites. Refer to *S3AM-208-PR1 Personal Protective Equipment*, including:

- Long sleeves & pants;
- Boots;
- Hard hats and safety eyewear (where required); and
- In some cases protective materials containing a shield such as lead (e.g. common during X-rays) should be used.

4.17.2 PPE can be effective in protecting against alpha radiation and low-energy beta radiation and respiratory protection should be considered for work in areas with known or potential airborne contamination. PPE requirements are included in the RPP and/or the RWP.

4.18 Visitors

4.18.1 To control exposures to site visitors, site visitors must be escorted at all times.

4.18.2 Visitor escorts must point out any hazardous area that a visitor may be entering and must confirm that all AECOM radiation safety rules and precautions are observed.

4.18.3 The arrival and departure of site visitors should be recorded in a visitors log and on the RWP if applicable.

4.18.4 Visitors shall be provided temporary dosimetry in accordance with the RPP and dosimeter results shall be recorded in a visitor log.

4.19 Surveys and Instrumentation

4.19.1 Radiation surveys are used to identify and quantify radiological hazards and to document compliance administrative and regulatory limits.

4.19.2 The Site RSO and all field Employees must work together to confirm safety in the workplace and to protect both the public and the environment from the harmful effects of radiation.

4.19.3 The Site RSO is responsible to make or cause to be made, surveys that:

- May be necessary for the licensee to comply with the requirements of the AECOM Radiation Safety Program or Site/Program RPP;
- Are reasonable under the circumstances to evaluate;
- The magnitude and extent of radiation levels;
- Concentrations or quantities of radioactive material; and
- The potential radiological hazards.

4.19.4 The Site RSO shall confirm that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) are calibrated periodically for the radiation measured.

4.19.5 The Site RSO shall confirm that a licensed (Canada) or certified (U.S.) dosimetry service is used to measure and monitor the doses of AECOM personnel that may receive any dose in excess an AECOM administrative dose limit.

4.19.6 For U.S. operations, all personnel dosimeters (except for direct and indirect reading pocket ionization chambers and those dosimeters used to measure the dose to the extremities) that require processing to determine the radiation dose and that are used to comply with applicable regulations must be processed and evaluated by a certified dosimetry processor:

- Holding current personnel dosimetry accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology and
- Approved in this accreditation process for the type of radiation or radiations included in the NVLAP program that most closely approximates the type of radiation or radiations for which the individual wearing the dosimeter is monitored.

4.20 Types of Surveys

4.20.1 Radiation surveys may be performed to measure exposure or dose rates from sources of radiation that are in buildings, soil, or water. Surveys shall be conducted as necessary to prevent exposures from exceeding occupational dose limits and to confirm areas are posted in accordance with action levels.

4.20.2 Exposure and dose rate calculations may be substituted for actual radiation surveys if based on reliable scientific, peer-reviewed assumptions/historical data.

4.20.3 Contamination surveys may be performed to monitor the magnitude and extent of loose surface and/or fixed contamination on building floors/walls/surfaces, equipment, materials, supplies, or personnel.

4.21 Selection of Instruments

4.21.1 The selection of a proper radiation detection instrument is extremely important in implementing a proper radiation protection program and for measuring the proper types and levels of radiation required to meet project objectives.

4.21.2 Those selecting instruments must consider the minimum level of detection, the type of radiation measured, the energy level of the radiation source and the detector's ability to measure it, and durability of the instrument to perform in the prescribed field conditions.

4.21.3 Personnel using radiological instrumentation shall be trained in the proper operation, use and instrument limitations.

4.21.4 Project Managers and Site Supervisors should consult with the Site RSO, the Business Group RSO, or designee before purchasing, renting or using radiation detection instruments.

4.21.5 Personnel using radiological instrumentation shall be trained in the proper operation, use and instrument limitations.

4.22 Instrument Calibration and Maintenance

4.22.1 All instruments will be calibrated by a qualified calibration/repair facility at least annually in accordance with manufacturers' instructions. A calibration certificate will be maintained on site for each instrument and included in the project file (maintained for 3 years) and in the final report.

4.22.2 Each instrument shall be checked at the beginning and end of each shift with check sources to verify that it's responding adequately. Unless more stringent site-specific criteria have been established satisfactory performance test results will be within +/- 20% of the expected response. If the instrument fails the post-survey source check, the Site RSO will review all data collected during that time period with the instrument and will adjust it or discard it, as appropriate. The affected data shall be flagged and later studied by the Site RSO to determine if they are useable.

4.22.3 Control charts shall be maintained to monitor the performance of field instruments for the duration of the project. If survey equipment requires repair during a workday, it shall be repaired and its proper function verified before it is returned to use.

4.22.4 Project or group-specific procedures may be developed to provide more detailed procedures and forms for instrument calibration and maintenance.

4.23 External Dose Monitoring

4.23.1 Use of external dosimetry or other method of estimating worker exposure for a project or program shall be described in the applicable RPP. All contact with the radiation badge service company for a new project or program is to be made through the Site RSOs and will coordinate delivery and receipt of dosimeters and dose reports.

4.23.2 External radiation dosimeters such as TLDs or optically stimulated luminescent dosimeters appropriate for the radiations to be monitored shall be issued by the Site RSO to the individual and shall be required to be worn by:

- Adults, minors and declared pregnant women likely to receive, in one year, a dose from sources external to the body in excess of 10 percent of the administrative dose limits, or Individuals entering a HR/VHR Area; and
- Individuals responding to emergencies involving radioactive material or ionizing radiation.

4.23.3 Individuals who are likely to exceed 10 percent of the applicable extremity-absorbed dose limit must wear ring dosimeters.

4.23.4 The Site RSO shall determine the “likely to exceed 10 percent” status of an individual, the dosimeter type, the wear period, exchange period, etc. Any AECOM Employee shall immediately notify the Site RSO of changes in site conditions or radiation producing device procedures that could significantly increase or decrease radiation doses to personnel or which could otherwise affect the need for external dosimetry.

4.23.5 Radiation dosimeters shall:

- Not be issued for wear periods greater than 3 months;
- Not be deceptively exposed;
- Be issued to only one person and not shared;
- Not be stored near sources of radiation when is storage;
- Not be exposed to high heat, chemical or physical insults, or washed in a washing machine;
- Not be worn during medical or dental x-ray examinations; and
- Not be worn after medical administration of radioactive materials (thyroid ablation therapy, cardiac stress tests, diagnostic nuclear medicine tests, etc.) until approved by the Site RSO.

4.23.6 No person shall wear dosimeters issued by AECOM while working for another employer or institution without prior approval from the Site RSO. Employees shall notify the Site RSO if they are concurrently working for another (non-AECOM) employer and working with sources of ionizing radiation or radioactive material.

4.23.7 Employees shall notify the Program/Site RSO immediately upon learning of possible deceptive exposures of dosimeters. Intentional deceptive exposures of dosimeters are forbidden and may result in enforcement actions.

4.23.8 Lost or damaged dosimeters shall be reported to the Site RSO as soon as possible. Persons who have lost or damaged their dosimeters shall be required to provide documentation of doses.

4.24 Wearing Dosimeters

4.24.1 Whole body dosimeters shall be worn at the location on the whole body likely to receive the highest dose. Normally this is the mid-section of the torso unless otherwise specified. The “whole body” is defined as the area between the knees and the neck including the upper arms.

4.24.2 Whole body dosimeters shall be worn inside PPE such as coveralls and leaded aprons.

4.24.3 For fetal monitoring for declared pregnant females, whole body dosimeters should be worn on the abdomen. If a leaded apron is worn (as in radiology), the dosimeter should normally be placed on the abdomen, under the apron.

4.24.4 Extremity dosimeters shall be placed on the applicable hand or foot. Ring dosimeters shall be placed on the dominant hand facing in (palm side of the hand). Extremity dosimetry requirements are provided in the RWP.

4.24.5 If multiple dosimeters are required, the procedure for wearing these dosimeters shall be described in the RPP or RWP.

4.25 Reporting Dose

4.25.1 Employees of AECOM that are assigned dosimetry badges shall collect and return used dosimeters to the Site RSO promptly prior to receiving replacement dosimeters at the beginning of a new wear period. The Site RSO will then send the Employee dosimeters, along with the control dosimeter, to the contracted dosimetry provider. Upon receiving the results from them, the Site RSO shall notify the Employees of their reported dose and place copies of the reports in the project files. Dose records are copied and summaries provided to the employee on an annual basis or at the end of project that lasts less than one year.

4.25.2 AECOM Employees may make a written request to obtain a copy of his/her dose records at any time. These records are maintained by and are available from the Site RSO.

4.25.3 After termination of employment, the Site RSO shall provide the former employee with a dose report (termination report) in the recorded dose exceeded 10 percent of any radiation dose limit in the applicable reporting period.

4.26 Internal Dose Monitoring

4.26.1 Use of internal monitoring for a project or program shall be described in the applicable RPP. This section identifies the procedure to be followed when determining if and when Employees are to be included in an internal radiation dose monitoring program. An internal radiation dose monitoring program helps verify that the implemented radioactive material controls maintain internal employee exposures ALARA.

4.26.2 This section applies to AECOM operations and should be used as guidelines for subcontractors who perform radiological investigation, characterization, and remediation work for AECOM. The term Employee refers only to AECOM personnel and the requirements apply only to them and not to subcontractor personnel.

4.26.3 Initial Employment

- New Employees beginning work with AECOM whose job duties specifically require working with and/or exposure to loose or airborne radioactive materials routinely shall inform the Site RSO of their previous radiation exposure history, if any. NRC Form 4 or equivalent may be used.
- Applicable Employees with a previous radiation exposure history who cannot provide documentation of their previous internal exposure shall submit a urine specimen for radiological analysis and/or submit to having a whole body radiation count if requested by the Site RSO.

- Employees without previous radiological exposure experience shall be required to initially submit a urine specimen or have a whole body count accomplished prior to beginning work with radioactive materials.

4.26.4 Initiation of a Project

- Employees assigned to work in a radiologically controlled area where there is loose and/or airborne radioactive material and there is a potential for internal deposition of radionuclides, shall, at the direction of the Site RSO, submit either a 24-hour urine specimen for radiological analysis prior to being permitted in the radiologically controlled area. This requirement establishes the individual's internal radionuclide deposition baseline.
- No Employee shall be permitted in an area where there is the potential for internal deposition of radioactive material without having a baseline bioassay established.
- Bioassays shall only be required if radionuclide(s) present can be effectively monitored for using bioassay methods.

4.26.5 Routine Bioassays

- For Class D (Absorption Type F) radionuclides, a weekly, bi-monthly, or monthly specimen(s) will be collected. A change in sampling frequency may be performed if the Site RSO determines that more sampling is necessary.
- For Class W (Absorption Type M) radionuclides, monthly to quarterly specimens will be collected. A change in sampling frequency may be performed if the Site RSO determines that more sampling is necessary.
- For Class Y (Absorption Type S) radionuclides, quarterly or annual specimens will be collected. A change in sampling frequency may be performed if the Site RSO determines that more sampling is necessary.
- Any Employee who has reason to believe that he/she may have had an internal deposition of radioactive material shall note the time of the suspected intake and promptly notify the Site RSO and Project Manager as soon as possible. When an investigation by the establishment that internal deposition could have occurred, the Employee shall provide a urine specimen for radiological analysis.

4.26.6 Termination of a Project/Exit Bioassay

- At the completion of the project, upon demobilization from the radiologically controlled area, upon termination of employment, or at a time determined by the Site RSO, each Employee who participated in a routine bioassay program shall submit either a urine specimen for radiological analysis or submit to a whole body count at the direction of the Site RSO.

4.26.7 Exceptions to Exit Bioassay

- The Site RSO may request from the Business Group RSO an exception to the above requirement be made. At a minimum, the written request for exception should include measurements and/or calculations that demonstrate that no legal or administrative dose limit was exceeded. The Business Group RSO will approve or disapprove of the request for exception and provide the decision in writing to the Site RSO.

4.26.8 Emergency Response Projects

- Some projects, by their nature, require emergency response personnel to assist in mitigating and/or removing conditions that exist outside normal operating parameters. These responses usually require immediate attention.
- Applicable procedures for emergency response bioassays are found in *S3AM-120-ATT1 Bioassays Procedure*.

4.27 On-Site Management of Radioactive Materials

The on-site management of radioactive materials for a project or program shall be described in the applicable RPP. The safe and efficient management of radioactive material (RAM), low-level radioactive waste (LLRW), and limited generation of Mixed LLRW is paramount to the success of many of field projects. General controls that should be in place for the storage of RAM, LLRW and MLLW include:

- Materials and waste should be segregated and only be stored in a designated Radioactive Material Area.
- Storage of non-radioactive materials in a Radioactive Materials Area is discouraged.
- Each Radioactive Material Area should be approved by the Site RSO.
- The Site RSO or Site Supervisor should conduct walkthroughs of the Radioactive Materials Area to ensure material and waste is properly segregated and stored.
- Generally outdoor storage of RAM is discouraged. However outdoor storage of waste and contaminated equipment may be necessary. Ensure all material is properly stored and contained to prevent the release of radioactivity. Additionally ensure the area is properly secured from inadvertent access and is properly posted.
- RAM should be stored in a manner that reduces combustible loading. The use of cardboard containers for storage is discouraged.
- Flammable or combustible materials should not be stored adjacent to Radioactive Materials Areas.
- Fire protection measures, such as smoke detectors, water sprinklers and fire extinguishers, should be considered when establishing a Radioactive Materials Area.

The following sections address specific on-site controls that's should be in place to confirm that materials will be managed properly without creating unnecessary exposures or spreading contamination.

4.27.1 Material Controls

RAM should only be stored in areas that are clearly designated as Radioactive Materials Areas. Each RAM package stored in a radioactive materials area must be clearly labelled with a "Radioactive" warning label on the outside of the package (10 CFR 20.1904 [a]). Additionally, RAM should be stored such that:

- o Storage areas shall be cordoned off to prevent unauthorized access. If public access to the project site is not strictly controlled, RAM storage areas should be locked in a cage, room or building, or enclosed by a fence.
- o Storage areas having dose rates in excess of 5 mrem/hr at 1 foot from any surface are "radiation areas" and shall posted as such (10 CFR 20.1902 [a]).
- o Storage areas having dose rates in excess of 100 mrem/hr at 1 foot from any surface are "high radiation areas" and shall be posted as such and locked or guarded (10 CFR 20.1902 [b]).
- o Areas in which RAM is used or stored shall be posted as a Radioactive Materials Area (10 CFR 20.1902 [c]).
- o RAM should be stored to minimize exposure in accordance with the ALARA concept. Shielding may be necessary to reduce dose rates to acceptable levels. The Site RSO is responsible for maintaining exposures ALARA.
- o Storage areas shall, at a minimum, be surveyed quarterly for radiation and contamination unless otherwise authorized by the Corporate RSO. Unexpected changes in radiation or contamination levels should be reported to the Corporate RSO as soon as possible.

4.27.2 Contamination Control

- General contamination control methods should be described in RPPs. However, some specific practices may be implemented to help control the spread of contamination during the handling of RAM.
- Personnel should perform and document a survey on incoming used material that may come into contact with radiological contamination. This survey will include scanning measurements and removable contamination smears or large-area maslin wipes and should be conducted before the container enters a controlled area. Survey forms should include a unique container number and date of survey. Should contamination be identified, the container will not be used and the container provider must be notified immediately by the Project Manager or Site Supervisor.
- When practical, personnel should bag or wrap material coming from a Contamination, High Contamination, or Airborne Radioactivity Area if it is confirmed or suspected of having removable radioactive contamination above the site release criteria prior to placing the material in a storage or waste container. Thick or durable bags and plastic wrap should be used to reduce the possibility of punctures and tears. Material with sharp edges or projections should be taped or additionally protected to confirm package integrity. Wrapping or bagging contaminated materials will limit spreading contamination to the interior of the container. If the RAM has removable contamination levels that far exceed the release criteria (e.g., 100 times), additional packaging controls such as double-wrapping, or bagging should be used.
- Alternatively, a reusable waste container, such as an intermodal, may be lined with plastic. Often such containers may be placed at the edge of a contaminated area so that material can be placed into it directly, without prior wrapping. Measures must still be taken to protect the outside of the container and the surrounding area from contamination.
- Removable contamination surveys should be taken on the exterior of waste containers and nearby surfaces each day that waste is placed in the containers to confirm that waste loading activities are not contaminating the container or loading area.

4.27.3 Segregation of Materials

AECOM personnel should attempt to segregate RAM and LLRW by like materials to prevent the unwanted mixing of materials. The following measures should be taken at project sites:

- Solid material shall be stored and packaged separately from liquid materials.
- Liquid materials shall be stored in such a manner that a secondary containment will limit the spread of the material in the event a storage container leaks or ruptures.
- Materials contaminated only with radionuclides with short half-lives (< 120 days) should be placed in separate containers to allow for decay-in-storage.
- Radioactive syringe needles, broken glass, laboratory glassware, and other sharps shall be packaged in a thick-walled plastic bottle with a tight-fitting screw top, a sharps container, or plastic pail.
- Hazardous or potentially hazardous materials shall not be stored with or placed in a container with RAM or LLRW.
- All pathogenic (capable of spreading disease) waste must be deactivated.

4.27.4 LLRW Minimization

AECOM shall institute waste minimization practices at project sites to reduce the generation of radioactive waste and spread of contamination. The following practices should be instituted to support waste minimization:

- Restrict material entering controlled areas to those needed for performance of work. Specifically, packaging materials should remain outside of radiological areas.

- Reuse equipment when practical.
- On larger projects, reserve an assortment of tools primarily for use in controlled areas. Tools should be maintained in a designated storage or distribution area or a contaminated tool crib within the controlled area.
- Emphasize training in waste reduction philosophies and waste minimization techniques.

4.27.5 Naturally Occurring Radioactive Materials

- NORM and TENORM consist of radioactive elements found in the environment, such as uranium, thorium and potassium and any of their decay products, such as radium and radon. They are present in very low concentrations in the earth's crust and are brought to the surface through many activities such as oil and gas exploration or mining and through natural processes like leakage of radon gas to the atmosphere or through dissolving in ground water. They cause problems in many industries and transportation.
- Project Managers on sites suspected of containing NORM should contact the Business Group RSO or designee for information on NORM-related issues such as safety, instrument selection, transportation and disposal, etc. Many states and provinces deal with NORM regulations differently.
- It is recommended the Project Manager or Site Supervisor be familiar with the correct rules and regulations specific to the project site, and determine if employees using radiological instruments need to be trained as NORM Surveyors.
- MicroRoentgen or MicroRem instrumentation is the type of detector most recommended to observe low levels of NORM.

4.27.6 Gauge Sources

- Only Authorized Users trained in the use and handling of portable gauges are authorized to handle the gauges.
- The Business Group RSO is responsible for overall administration, management, coordination, effectiveness, and control of the radiation safety program for AECOM. The Site RSOs are authorized to supervise and administer the radiation safety program at the AECOM locations where gauge sources are stored. Specific requirements for the safe management of gauge sources is provided in AECOM procedure *S3AM-122-PR1 Gauge Source Radiation*.

4.27.7 Transportation

In general, AECOM does not ship radioactive waste from a project site to a disposal facility.

- Project Managers should use certified radioactive waste brokers to support shipments of radioactive waste.
- However, AECOM may be involved in the transportation of radiologically contaminated environmental samples, exempt radioactive check sources, and regulated radioactive gauge sources. Shipping procedures should be provided in by project- or program-specific documents. In the event that a project does not have appropriate procedures to ship radioactive materials, the Project Manager should contact the Site RSO or the Business Group RSO.
- DOT and the CNSC have very specific rules and regulations that govern the transportation of radioactive materials. The DOT's Hazardous Material Regulations are found in 49 CFR 172 and 49 CFR 173. AECOM Employees involved in shipping radioactive materials shall meet the training requirements provided in the appropriate regulations.

4.28 Emergency Procedures

4.28.1 Emergency procedure for a project or program shall be provided in or referenced in the applicable RPP.

4.28.2 Medical Emergencies

- A medical emergency is a situation that presents a significant threat to the health of Employees on site. Chemical exposure, heat stress, injuries, and poisonous insect bites can cause medical emergencies. Proper care must be initiated immediately. Proper care may be in the form of first aid treatment or emergency hospitalization.
- Emergency medical care always has priority over health physics/radioactive contamination concerns and will not be delayed because of such concerns. If possible, health physics personnel should accompany or follow contaminated or potentially contaminated victims to the medical care facility with survey instruments to help medical care providers address this issue.

4.29 Unexpected Levels of Radiation or Airborne Radioactivity

4.29.1 AECOM performs surveys and calculations to demonstrate that exposure rates and airborne radioactivity mandate the use of dosimetry and respiratory protection.

4.29.2 Should these surveys and calculations indicate ambient dose rates greater than 50 mR/hr or airborne radioactive could be greater than 5 percent of an applicable DAC (or if the unity rule applied to airborne radioactivity exceeds 0.05), the Business Group RSO shall be notified and they will then determine the requirements, if any, for additional health physics measure, such as self-reading dosimeters and respiratory protection.

4.30 Excessive Personnel Contamination

4.30.1 Generally, in application of the ALARA principle, no personnel contamination is tolerable.

4.30.2 Any detected personnel contamination shall be reported to the Site RSO immediately. The Site RSO will investigate the cause of and determine the extent of any personnel contamination. The Site RSO will document the incident in case dose evaluations are required later. The Site RSO will report the incident to the Site Supervisor and Project Manager at the earliest opportunity.

4.30.3 Contaminated personnel shall be decontaminated, with assistance from support personnel, prior to exiting the Controlled Area (RCA) or the general area where the contamination occurred. Contaminated personnel shall be decontaminated using materials such as soap and water, waterless hand cleaner, and paper towels or rags whenever possible. All contaminated areas on the body, including hair, should be thoroughly decontaminated. If clothing is contaminated, it should be removed in a way to minimize further contact with the substance.

4.30.4 The Business Group RSO will be consulted for additional guidance if these basic decontamination measures are not completely effective.

4.31 Suspected Inhalation or Ingestion

4.31.1 The Site Supervisor and Business Group RSO will be notified immediately of suspected inhalation or ingestion of radioactive material. The Business Group RSO shall provide appropriate instructions for a suitable response, which may include bioassay.

4.32 Internal Program Assessment

4.32.1 AECOM shall conduct internal assessments of the Radiation Safety Program at least annually to identify its strengths and weaknesses, areas of vulnerability, and noncompliance. The assessment shall include a review of the annual summary reports provided to the Business Group RSO by Site RSO's, examination of the radiological protection program content, and implementation.

5.0 Records

5.1 The Site RSO shall maintain records of ALARA evaluations for a period of 5 years.

5.2 ALARA evaluations shall also be transmitted to the Employee's Area Safety Manager and placed in the Employee's safety training file.

5.3 The Program and Site RSOs shall maintain records of periodic ALARA trending, annual ALARA summary reports, and ALARA evaluations for a period of 5 years.

5.4 General Record-Keeping Requirements

5.4.1 The following records presented in Table 4 shall be maintained by AECOM personnel. These records shall be maintained in a readily retrievable manner that will be subject to internal AECOM inspection and/or regulatory audit.

5.4.2 Surveys, instrument control records, and waste generation/transportation/disposal records generated during work performed for a client at a temporary job location shall become part of the project file and retained or transfer to the client along with other project documents. If work is being performed under an AECOM license, however, all records are also retained by the Site RSO. All records that describe or support assigning occupational dose to AECOM personnel, regardless of whose license the dose was acquired under, shall be maintained by AECOM.

Table 4 – Record Keeping Requirements

Record to Retain	Retention Period	Retained By (Copies To)
Provisions of the Radiation Protection Program for an AECOM License	Until License is Terminated by Agency	Site RSO
Audits of License's Program	3 years	Site RSO
Radiation, Contamination, and Airborne Surveys	3 years	Site RSO or Project File
Instrument Calibrations	3 years	Site RSO or Project File
Training Records	3 years	Site RSO and Project File
Surveys used to perform dose estimates when no instrument data are present	For the life of the company	Site RSO and Human Resources)
Measurements and calculations to determine intake of radionuclides	Forever	Site RSO
Results of air samples, surveys, and bioassays used to determine intake of radionuclides	Forever	Site RSO
Measurements of calculations and measurements used to evaluate the release of radioactive effluents to the environment	Forever	Site RSO
Records of internal and external dose	Forever	Site RSO
Records for Planned Special Exposures	Forever	Site RSO
Records of Individual Monitoring results	Forever	Site RSO
Records of doses to individual members of the public	Forever	Site RSO
Records of Waste Disposal	Until License is terminated by Agency	Site RSO or Project File

6.0 Attachments

6.1 S3AM-120-ATT1 Bioassays Procedure

6.2 S3AM-120-FM1 ALARA Evaluation

6.3 S3AM-120-FM2 Radiation Work Permit

6.4 S3AM-120-FM3 Hazardous Work Permit

6.5 S3AM-120-FM4 Declaration of Pregnancy Form

6.6 S3AM-120-FM5 Embryo/Fetus Initial Dose Calculation

6.7 S3AM-120-FM6 Withdrawal of Declaration of Pregnancy