Final
Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Site Inspections of Aqueous Film Forming Foam Areas, Multiple Sites, United States Air Force Installations

Addendum 2
Field Sampling Plan for Volk Field Air Combat Readiness Training Center Juneau County, Wisconsin

August 2016

Submitted to:

Air Force Civil Engineer Center
3515 General McMullen Suite 155
San Antonio, Texas 78226-2018

Submitted by:

U.S. Army Corps of Engineers
Omaha District
1616 Capitol Avenue
Omaha, Nebraska 68102-4901

Prepared by:

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1006 Floyd Culler Court
Oak Ridge, Tennessee 37830-8022
under
Contract No. W9128F-15-D-0051
Delivery Order No. 0003

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Appendix A – Figures

Acronyms and Abbreviations

µg/L	micrograms per liter
µg/kg	micrograms per kilogram
±	plus/minus
≤	less than or equal to
AFCEC	Air Force Civil Engineer Center
AFFF	aqueous film forming foam
ANG	Air National Guard
ASL	Aerostar SES LLC
bgs	below ground surface
CE	civil engineering
Conc.	concentration
CRTC	Combat Readiness Training Center
CSM	conceptual site model
DD	day
DO	dissolved oxygen
DQO	data quality objective
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
ERPIMS	Environmental Restoration Program Information Management System
HDPE	high-density polyethylene
IRP	Installation Restoration Program
FTA	fire training area
IDW	investigation-derived waste
mg/kg	milligrams per kilogram
mL	milliliter
MM	month
MS	matrix spike
MSD	matrix spike duplicate
NL	not listed
No.	number
NTU	nephelometric turbidity units
OWS	oil water separator
PA	preliminary assessment
PFAS	per- and polyfluorinated alkyl substance
PFC	perfluorinated compound
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
pH	potential of hydrogen
PID	photoionization detector
PPE	personal protective equipment
PTFE	polytetrafluoroethylene
QAPP	quality assurance project plan
QC	quality control
SI	site inspection
SOP	standard operating procedure
TBD	to be determined
TCLP	toxicity characteristic leaching procedure
TSA	technical systems audit
UFP	Uniform Federal Policy

USAF	U.S. Air Force
USACE	U.S. Army Corps of Engineers
WWTP	wastewater treatment plant
YY	year

PROJECT OVERVIEW

Aerostar SES LLC (ASL), under contract to the U.S. Army Corps of Engineers (USACE) Omaha District (W9128F-15-D-0051, Delivery Order 0003), will conduct screening-level site inspections (SI) at multiple sites on U.S. Air Force (USAF) facilities. These SIs will be conducted to determine the presence or absence of per- and polyfluorinated alkyl substances (PFASs) (also known as perfluorinated compounds [PFCs]) in the environment at the sites.

PFASs are a class of synthetic fluorinated chemicals used in industrial and consumer products, including defense-related applications. In 1970, USAF began using aqueous film forming foam (AFFF), firefighting agents containing PFASs, to extinguish petroleum fires. AFFF may contain perfluorooctane sulfonate (PFOS), and some PFAS-based AFFF constituents may further degrade into perfluorooctanoic acid (PFOA). Releases of AFFF to the environment routinely occur during fire training, equipment maintenance, storage, and use. Although manufacturers have reformulated AFFF to eliminate PFOS, the United States Environmental Protection Agency (EPA) continues to permit the use of PFOS-based AFFF, and the USAF maintains a significant inventory of PFOS-based AFFF product. Types of potential AFFF release sites to be inspected during this project include

- Aircraft maintenance hangars (including associated oil water separators [OWSs]),
- AFFF lagoons/ponds,
- Fire stations,
- Fire training areas (FTAs),
- Identified AFFF spill sites, and
- Crash sites.

The objectives of this study are to

- determine if a confirmed release of PFASs has occurred at sites selected for inspection;
- determine if PFASs are present in groundwater, soil, or surface water/sediments at the site in concentrations exceeding the EPA lifetime HAs; and
- identify potential receptor pathways with immediate impacts to human health.

In accordance with *Interim AF Guidance on Sampling and Response Actions for Perfluorinated Compounds at Active and BRAC Installations* (USAF, August 2012) and EPA lifetime drinking water HAs for PFOS (EPA, May 2016b) and PFOA (EPA, May 2016a), a release will be considered confirmed if exceedances of the following concentrations are identified:

PFOS: [a]0.4 micrograms per liter (µg/L) in groundwater not used as a drinking water source (in the absence of promulgated screening values).
[a]0.4 µg/L in surface water not contributing to a drinking water source (in the absence of promulgated screening values).
[b]0.07 µg/L in groundwater/surface water that is used as or contributes to a drinking water source (combined with PFOA value).
[a]1.26 milligrams per kilogram (mg/kg) in soil (in the absence of promulgated screening values).
[a]1.26 mg/kg in sediment (in the absence of promulgated screening values).

PFOA: [a]0.4 µg/L in groundwater not used as a drinking water source (in the absence of promulgated screening values).
[a]0.4 µg/L in surface water not contributing to a drinking water source (in the absence of promulgated screening values).

[b]0.07 µg/L in groundwater/surface water that is used as or contributes to a drinking water source (combined with PFOS value).
[a]1.26 mg/kg in soil (in the absence of promulgated screening values).
[a]1.26 mg/kg in sediment (in the absence of promulgated screening values).

Notes:
[a]Screening levels calculated using the EPA Regional Screening Level calculator [https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search]
[b]For groundwater/surface water that does contribute to a drinking water source, the HA value of 0.07 µg/L for either PFOA or PFOS individually if only one is present, or 0.07 µg/L combined (the detected concentration of PFOA plus the detected concentration of PFOS) if both analytes are present.

Table 1 presents the screening values used for comparing the analytical results for each of the PFAS compounds.

Table 1 Regulatory Screening Values

Parameter	Chemical Abstract Number	EPA Regional Screening Level Table (May 2016)[a]			Calculated RSL for Soils and Sediments[b] (µg/kg)	Calculated RSL for Non-Drinking Source Surface Water or Groundwater[b] (µg/L)	EPA Health Advisory for Drinking Water (Surface Water or Groundwater) (µg/L)[c]
		Residential Soil (µg/kg)	Industrial Soil (µg/kg)	Tap Water (µg/L)			
6:2 Fluorotelomer sulfonate (6:2 FTS)	27619-97-2	NL	NL	NL	NL	NL	NL
8:2 Fluorotelomer sulfonate (8:2 FTS)	39108-34-4	NL	NL	NL	NL	NL	NL
Perfluorooctanesulfonamide (FOSA)	754-91-6	NL	NL	NL	NL	NL	NL
Perfluorobutanoic acid (PFBA)	375-22-4	NL	NL	NL	NL	NL	NL
Perfluorobutanesulfonic acid (PFBS)	375-73-5	1,600,000	23,000,000	380	NL	NL	NL
Perfluorodecanoic acid (PFDA)	335-76-2	NL	NL	NL	NL	NL	NL
Perfluorododecanoic acid (PFDoA)	307-55-1	NL	NL	NL	NL	NL	NL
Perfluorodecanesulfonic acid (PFDS)	335-77-3	NL	NL	NL	NL	NL	NL
Perfluoroheptanoic acid (PFHpA)	375-85-9	NL	NL	NL	NL	NL	NL
Perfluorohexanoic acid (PFHxA)	307-24-4	NL	NL	NL	NL	NL	NL
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	NL	NL	NL	NL	NL	NL
Perfluorononanoic acid (PFNA)	375-95-1	NL	NL	NL	NL	NL	NL
Perfluorooctanoic acid (PFOA)	335-67-1	NL	NL	NL	1,260.00	0.40	0.07*
Perfluorooctane sulfonate (PFOS)	1763-23-1	NL	NL	NL	1,260.00	0.40	
Perfluoropentanoic acid (PFPA)	2706-90-3	NL	NL	NL	NL	NL	NL
Perfluorotetradecanoic acid (PFTeA)	376-06-7	NL	NL	NL	NL	NL	NL
Perfluorotridecanoic acid (PFTriA)	72629-94-8	NL	NL	NL	NL	NL	NL
Perfluoroundecanoic acid (PFUnA)	2058-94-8	NL	NL	NL	NL	NL	NL

[a] EPA Regional Screening Levels (May 2016) [https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016]
[b] Screening levels calculated using the EPA Regional Screening Level calculator [https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search]
[c] EPA, May 2016a. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA) and
[c] EPA, May 2016b. Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS).
*Note: The EPA Health Advisory value for drinking water is the combined values of PFOS and PFOA compared to 0.07 µg/L.
µg/kg = micrograms per kilogram   µg/L = micrograms per liter
EPA = Environmental Protection Agency   NL = not listed

Sites were selected for further investigation through the SI process at each USAF installation during the preliminary assessment (PA) phase. Media to be evaluated at each site include surface soil, subsurface soil (vadose zone in the source area), groundwater (including samples from existing monitoring wells or newly installed monitoring wells), and surface water/sediment (if applicable). The methods of sample collection and laboratory analysis will meet a minimum level of quality and completeness to achieve comparability across the various sites and over time. To ensure an acceptable level of quality, a quality assurance project plan (QAPP) (ASL, April 2016) was prepared in accordance with EPA guidance (EPA, March 2012) and the Air Force Civil Engineer Center (AFCEC). This addendum to the QAPP identifies site-specific details for the SI at Volk Field Combat Readiness Training Center (CRTC). The standard operating procedures (SOPs) and protocols referred to in this addendum are derived from and/or are in accordance with EPA guidance documents. Copies of the applicable SOPs are in the QAPP. The Volk Field CRTC is approximately one mile north of the village of Camp Douglas, Wisconsin. Figure 1 (Appendix A) shows the location of Volk Field CRTC. Six sites were selected for SI at Volk Field CRTC. The final sampling approach for Volk Field CRTC has been detailed in QAPP Worksheets #9, #10, #13, #14/16, #17, #18, and #20 that are included in this installation-specific QAPP addendum. The QAPP consists of 37 prescriptive worksheets documenting aspects of the environmental investigation process of the SI and to guide the fieldwork. Table 2 presents the required elements of the QAPP, the worksheet where these elements can be found, and the document containing the worksheet.

Table 2 Crosswalk of Required Elements to Optimized UFP-QAPP Worksheets

Required Element	Optimized UFP-QAPP Worksheet Number	Contents of Worksheet(s)	Presented in QAPP	Presented in QAPP Addendum
Title and Approval Page	1 and 2	Identifies the principal points of contact for all organizations having decision-making authority in the project and documents their commitment to implement the QAPP.	X	
Project Organization and QAPP Distribution	3 and 5	Identifies key project personnel and lines of authority and lines of communication among the lead agency, prime contractor, subcontractors, and regulatory agencies.	X	
Personnel Qualifications and Sign-off Sheet	4, 7, and 8	Identifies key project personnel for each organization performing tasks defined in the QAPP and documents their commitment to implementing the QAPP.	X	
Communication Pathways and Procedures	6	Documents specific issues (communication drivers) that will trigger the need to communicate with other project personnel or stakeholders.	X	
Project Planning Session Summary	9	Provides a record of the notes taken during the site scoping visit for Volk Field CRTC.		X
Conceptual Site Model	10	Presents the conceptual site model for each site on the facility using text to convey succinctly what is currently known about each site.		X
Project/Data Quality Objectives	11	Documents the data quality objectives (DQOs), the environmental decisions that need to be made, and the level of data quality needed to ensure that those decisions are based on sound scientific data using EPA's seven-step DQO process.	X	

Table 2 Crosswalk of Required Elements to Optimized UFP-QAPP Worksheets (continued)

Required Element	Optimized UFP-QAPP Worksheet Number	Contents of Worksheet(s)	Presented in QAPP	Presented in QAPP Addendum
Measurement Performance Criteria	12	Documents the quantitative measurement performance criteria in terms of precision, bias, and sensitivity for both field and laboratory measurements and is used to guide the selection of appropriate measurement techniques and analytical methods.	X	
Secondary Data Uses and Limitations	13	Identifies sources of secondary data and summarizes information relevant to their uses for the current project.		X
Project Tasks and Schedule	14 and 16	Presents the proposed facility-specific schedule for the site inspections at Volk Field CRTC, the specific tasks, the group responsible for their execution, and planned start/end dates.		X
Project Action Limits and Laboratory-Specific Detection/Quantitation Limits	15	This worksheet is completed for each matrix, analyte, and analytical method. The purpose is to make sure the selected analytical laboratory and method can provide accurate data at the project action limit.	X	
Sampling Design and Rationale	17	Describes the sampling design and the basis for its selection at each site on the facility.		X
Sampling Locations and Methods	18	Provides a completeness check for field personnel and auditors/ assessors for all samples anticipated for collection at Alpena CRTC. It will facilitate checks to ensure all planned samples have been collected and appropriate methods have been used. The worksheet lists each individual sample that is planned to be collected, including field quality control samples.		X
Sample Containers, Preservation, and Hold Times	19 and 30	Serves as a reference guide for field personnel. They are also an aid to completing the chain of custody forms and shipping documents.	X	
Field Quality Control	20	Provides a summary of the types of samples to be collected and analyzed for the project to show the relationship between the number of field samples and associated quality control samples.		X
Field Standard Operating Procedures	21	Documents the specific field procedures being implemented. The QAPP contains detailed descriptions of procedures for all field activities, including sample collection; sample preservation; equipment cleaning and decontamination; equipment testing, maintenance, and inspection; and sample handling and custody.	X	
Field Equipment Calibration, Maintenance, Testing and Inspection	22	Documents procedures for calibrating, maintaining, testing, and/or inspecting all field equipment.	X	
Analytical Standard Operating Procedures	23	Documents information about the specific sample preparation and analytical procedures to be used.	X	
Analytical Instrument Calibration	24	Documents the laboratory calibration procedures and is completed for all analytical instruments referencing the project laboratory quality manual.	X	

Table 2 Crosswalk of Required Elements to Optimized UFP-QAPP Worksheets (continued)

Required Element	Optimized UFP-QAPP Worksheet Number	Contents of Worksheet(s)	Presented in QAPP	Presented in QAPP Addendum
Analytical Instrument and Equipment Maintenance, Testing, and Inspection	25	Documents the procedures for maintaining, testing and inspecting laboratory analytical equipment and was completed referencing the project laboratory quality manual.	X	
Sample Handling, Custody, and Disposal	26 and 27	Documents responsibilities for maintaining custody of samples from sample collection through disposal.	X	
Analytical Quality Control and Corrective Action	28	Ensures that the selected analytical methods are capable of meeting the project-specific measure performance criteria.	X	
Project Documents and Records	29	Records information for all documents and records that will be generated for the project. It describes how information will be collected, verified, and stored. Its purpose is to support data completeness, data integrity, and ease of retrieval.	X	
Assessments and Corrective Action	31, 32, and 33	Documents responsibilities for conducting project assessments, responding to assessment findings and implementing corrective action.	X	
Data Verification and Validation Inputs	34	Lists the inputs that will be used during data verification and validation.	X	
Data Verification and Procedures	35	Documents procedures that will be used to verify project data.	X	
Data Validation Procedures	36	Documents procedures that will be used to validate project data.	X	
Data Usability Assessment	37	Documents procedures that will be used to perform the data usability assessment.	X	

CRTC = Combat Readiness Training Center
EPA = United States Environmental Protection Agency
UFP = Uniform Federal Policy
DQOs = Data Quality Objectives
QAPP = Quality Assurance Project Plan

REFERENCES

Aerostar SES LLC, April 2016. *Final Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Site Inspections of Fire Fighting Foam Usage at Various Air Force Bases in the United States.*

CH2M Hill, June 2015. *Final Preliminary Assessment Report for Perfluorinated Compounds at Volk Field Combat Readiness Training Center, Camp Douglas, Wisconsin.*

Environmental Protection Agency (EPA), January 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (OSWER No. 9200.1-85. EPA 540-R-08-005).

EPA, January 2010. *National Functional Guidelines for Inorganic Superfund Data Review. Final. USEPA Contract Laboratory Program* (OSWER 9240.1-51. USEPA-540-R-10-011). (http://www.epa.gov/superfund/programs/clp/download/ism/ism1nfg.pdf).

EPA, June 2008. *National Functional Guidelines for Superfund Organic Methods Data Review. Final. USEPA Contract Laboratory Program* (OSWER 9240.1-48. USEPA-540-R-08-01). (http://www.epa.gov/superfund/programs/clp/download/somnfg.pdf)

EPA, March 2001. *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5. EPA/240/B-01/003).

EPA, March 2012. *Uniform Federal Policy for Quality Assurance Project Plans Workbook.*

EPA, May 2016a. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).*

EPA, May 2016b. *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS).*

Leidos, June 2015. *Final PA/SI Report, Volk Field Combat Readiness Training Center (CRTC), Camp Douglas, WI.*

Montgomery Watson, February 1998. *Installation Restoration Program, Final Technical Memorandum (Volumes I and II), Volk Field Combat Readiness Training Center, Wisconsin Air National Guard, Camp Douglas, Wisconsin.*

U.S. Army Corps of Engineers (USACE), February 2001. *Requirements for the Preparation of Sampling and Analysis Plans.* (CEMP-RA Engineer Manual 200-1-3).

USACE Omaha District, July 2015. *Performance Work Statement for Site Inspection of Aqueous Film Forming Areas, Multiple Sites, United States Air Force Installations.*

QAPP WORKSHEET #9. PROJECT PLANNING SESSION SUMMARY

Personnel on the site walk
Dan Gonnering (Volk Field CRTC, Civil Engineering, Environmental)
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Brian Odom (ASL)
Greg Carlson (ASL)
Jeremy Klein (ASL)

Volk Field CRTC Site Visit Notes from 03/03/2016

ASL personnel visited Volk Field CRTC on March 3, 2016, to conduct on-site visits to the potential AFFF release sites identified in the PA (CH2M Hill, June 2015). The following notes were recorded during the visit.

Photos at Volk Field during work activities do not require special permission in most areas. Some controlled areas do have photographic restrictions but are independently fenced. In that case, field personnel can inquire with the site representative about photographic permissions.

Dig permits should be submitted electronically, approximately 1 month before fieldwork begins, using the form provided by Volk Field personnel. A work order will need to be generated and sent to Meredith Conn, who will provide the work order to the locater. Once the permits are approved, ASL will be notified but will not receive the permits until field personnel are on site. If ASL is not informed that they have been completed prior to fieldwork, ASL will contact Dan Gonnering and he will check status of the permits.

Investigation-derived waste (IDW) will be managed through soil farming and the onsite wastewater treatment plant (WWTP). Locations for the soil farm and WWTP dumping point were provided by Volk Field personnel. The wastewater dumping point is located in the vehicle maintenance facility while the soil farm is located to the north of the runway. *Note: After further discussion, it was decided that since land-farming would be ineffective in treating PFAS contamination, waste soil will be drummed, characterized, and disposed off-site.*

Former FTA (IRP Site 1) (Site 1)

The former FTA does not have any wells installed in the area as it is a recently closed Environmental Restoration Program (ERP) site. The burn pit was located adjacent to the road and is currently in a stand of trees. Its location was marked on a map provided by Volk Field personnel. Three wells will need to be installed to determine local groundwater flow, which historically has been to the northeast. Surface and subsurface soil samples will also need to be collected in the areas around the former burn pit.

Spray Nozzle Test Area (Primary) (Site 2)

The primary spray nozzle test area was likely utilized from the road or parking lot adjacent to the area. Fire trucks would pull up and conduct their testing into the open field area. The surface is a “sugar sand,” very fine grained and loose so the fire trucks couldn’t have driven on it. There are no existing wells in the area and three wells will need to be installed to determine local groundwater flow direction. Historically, groundwater flow in the area is to the southeast. There is no surface water of concern in the area used for testing. Surface water does exist year-round in the area to the south of the road, but there was no path for surface water from the spray nozzle test area to cross the raised road.

Spray Nozzle Test Area (Alternate) (Site 3)

There is no surface water present in the alternate spray nozzle testing area, and as with the primary spray nozzle test area, there is surface water on the southern side of the road. There is an excavated low point in the middle of the test area. There are no existing wells in the area and three wells will need to be installed to determine local groundwater flow. Historically, groundwater flow direction in the area is to the southeast.

Former Primary Settling Ponds (Site 4)

The former primary settling ponds will require three wells to determine local groundwater flow direction which has historically been to the northeast. The former primary settling pond is located within the boundary of the airfield but according to Dan Gonnering (Volk Civil Engineering Environmental) flightline permissions are not required here. An airfield safety flag may need to be attached to the top of the drill rig mast and a notice to airmen (NOTAM) filed. Flightline drivers will not be required. There is a low spot that usually contains standing water in the southeast corner of the former primary wastewater settling pond.

KC-97 Crash Site (IRP Site 5) (Site 5)

The KC-97 crash site will need to be accessed from the flightline, and work at this site will need to be flexible based on flight operations and flightline driver availability. Dan Gonnering suggested that the Fire Department may be able to provide an escort. The airfield manager is Angie Kaberle. Two new wells will be installed at the KC-97 site. Water level data from the nearby secondary wastewater settling pond will be used to develop potentiometric surface levels. Surface and subsurface soil sampling will be also be conducted in the crash area. There is no surface water of concern in this area. Ms. Kaberle informed ASL that there are no wingtip clearance requirements as long as ASL installs flush mounted wells.

Secondary Settling Pond and Treated Wastewater Outfalls (Site 6)

The treated wastewater outfall described in the PA is located approximately 3 miles off site. The former outfalls, which were abandoned around 1995, are located on the southeast and northeast corners of the secondary settling pond. The locations for these two outfalls (primary and secondary) were marked on a map provided by Volk Field personnel. The areas around the outfalls will need to be sampled for sediment and surface water. The alternate outfall still has a concrete structure associated with it and the former primary outfall is located just north of the bend in the road that follows the perimeter of the former secondary wastewater settling pond. The former secondary settling pond will require three wells to determine local groundwater flow direction which has historically been to the northeast.

QAPP WORKSHEET #10. CONCEPTUAL SITE MODEL

10.1 FACILITY HISTORY

Volk Field CRTC is approximately 90 miles north and west of Madison, Wisconsin, one mile north of the village of Camp Douglas in Juneau County. Property in the Volk Field area was originally purchased for use as a rifle range in 1888. By 1903, the property had been expanded to encompass over 800 acres and was used by the Wisconsin National Guard as a training facility. The property was named Camp Williams in 1927 and the first hard surface runway was constructed in 1935-1936 (Leidos, June 2015).

The airfield was leased by the Federal Government in 1954 from the State of Wisconsin for use as a permanent field training site, and in 1957, the site was renamed Volk Field in memory of the first Wisconsin Air National Guard (ANG) pilot killed in combat in the Korean conflict. The alert hangars (Buildings 951 through 958) were constructed in the 1960s and 1970s while Volk Field was being used as a Dispersed Operating Base for the Active Duty Air Defense Mission from Duluth, Minnesota. In 1989, Volk Field was redesignated as a CRTC.

Volk Field currently has approximately 143 buildings and an asphalt and concrete paved 9,000-foot-long runway. Volk Field is one of four ANG CRTCs and the only one not co-located with a civilian airport. The current mission of Volk Field CRTC is “to provide a year-round integrated training environment (airspace, facilities, and equipment) for units to enhance their combat capabilities and readiness.” Volk Field CRTC operates no aircraft of its own; aircraft are brought in by visiting units (Leidos, June 2015).

10.2 PRELIMINARY ASSESSMENT

The PA for PFCs at Volk Field CRTC was conducted by CH2M Hill on March 2 and 3, 2015, and documented in *Final Preliminary Assessment Report for Perfluorinated Compounds at Volk Field Combat Readiness Training Center*, *Camp Douglas*, *Wisconsin* (CH2M Hill, June 2015). The PA identified six sites at Volk Field CRTC that warranted the initiation of an SI to determine the presence or absence of PFASs (Figure 2, Appendix A). The six sites selected for SI are listed in Table 3.

Table 3 Sites and Selection Rationale for Site Inspection at Volk Field Combat Readiness Training Center

Site	List of Site Inspection Sites	Site Selection Rationale
1	Former FTA (IRP Site 1) (Site 1)	Activities were conducted at the site beginning in the 1940s until 1980. The site was routinely used for fire training exercises and for refueling vehicles and routinely servicing equipment. It is not known whether AFFF was used during the training exercises.
2	Spray Nozzle Test Area (Primary) (Site 2)	Five fire engines currently perform annual testing to ensure proper equipment operation. Testing is typically conducted in the sand pit at the primary spray nozzle test area. Each fire engine holds between 30 and 500 gallons of AFFF. During each annual test, no more than 4 to 5 gallons of AFFF are released from each engine directly into the sand pit. This practice has been standard for at least the past two decades at Volk Field CRTC.
3	Spray Nozzle Test Area (Alternate) (Site 3)	When the primary spray nozzle test area is not accessible, the annual spray nozzle testing is performed at an alternate sand pit just east of the primary location. The frequency of use for the alternate spray nozzle test area was not documented.
4	Former Primary Settling Pond (Site 4)	The former primary wastewater settling pond was in operation prior to 1970 until 1995. The former wastewater settling pond is unlined and collected liquid wastes from across the facility. The sanitary sewer utility lines were connected to the primary and secondary wastewater settling ponds. It is therefore likely that any AFFF released into the sewer system would have been transmitted to the settling ponds.
5	KC-97 Crash Site (IRP Site 5) (Site 5)	In 1978, a KC97 refueling aircraft crashed approximately 400 feet north of Taxiway 3 and parallel to the main runway. The Volk Field CRTC Fire Department responded to the aircraft crash. It is unknown what type or amount of firefighting foam was used at the crash location. However, the fact that it occurred in 1978 and was a fuel fire suggests that AFFF containing PFASs was likely used to extinguish the fire.
6	Secondary Settling Pond and Treated Wastewater Outfalls (Site 6)	The former secondary wastewater settling pond was in operation prior to 1970 until 1995. The former wastewater settling pond was unlined and collected liquid wastes from across the facility. The former treated wastewater outfalls are located on the north and east sides of the secondary settling pond. Treated wastewater was released from these outfalls during the active life of the settling pond until operations ceased in 1995. The sanitary sewer utility lines were connected to the primary and secondary wastewater settling ponds. It is therefore likely that any AFFF released into the sewer system would have been transmitted to the settling pond and passed through the outfalls.

AFFF = aqueous film forming foam
CRTC = Combat Readiness Training Center
FTA = fire training area
IRP = Installation Restoration Program
PFASs = per- and polyfluorinated alkyl substances

The following information was taken from previously published reports for Volk Field CRTC and reference materials for the State of Wisconsin. Figure 2 (Appendix A) presents the relative position of the six sites selected for SIs within Volk Field CRTC.

10.3 CLIMATE

The climate in the area of Volk Field CRTC is characterized as humid continental. Humid continental conditions are defined by variable weather patterns and a large seasonal temperature variance. Winter temperatures can fall well below freezing, with moderate to occasionally heavy snowfall and temperatures reaching 0 degrees Fahrenheit. High temperatures in summer average in the lower 80s (degrees Fahrenheit), often accompanied by high humidity levels. Significant precipitation occurs in both summer and winter. The mean annual precipitation from 1981 through 2010 was 34 inches (Leidos, June 2015).

10.4 HYDROGEOLOGIC SETTING

10.4.1 Regional Hydrogeology

Volk Field CRTC is within the Wisconsin Central Plain physiographic province, a subsection of the Central Lowlands physiographic province of the continental United States. This portion of the Central Plains is characterized by flat or gently undulating topography. Relief is generally low except for the sandstone buttes near the facility that rise 100 to 300 feet above the surrounding lowlands. This area is characterized by maturely dissected plateaus and lowlands filled with glacial outwash. The geomorphic features of the area are the result of Pleistocene glaciation. During glacial retreat, large inland lakes formed near the perimeters of the receding glaciers. Sand, silt, and clay were deposited from streams and rivers into these lakes. Volk Field CRTC is within one of the ancient lake beds, now referred to as Glacial Lake Wisconsin. The thickness of the unconsolidated glacial sediments in the area of the facility are estimated to range between 100 and 150 feet. Beneath these sediments are the Cambrian-aged Wonewoc Sandstone, consisting of a well-sorted quartz sandstone with interbedded thin shales. The thickness of the Wonewoc Sandstone in the area of Volk Field ranges from 100 to 400 feet.

Groundwater in the area of Volk Field CRTC is in the shallow Pleistocene glacial aquifer and the deeper Cambrian Age sandstone aquifer. The shallow Pleistocene glacial aquifer, is typically encountered at approximately 10 feet below ground surface (bgs) and fluctuates seasonally. The aquifer consists of unconsolidated sand and gravel deposits with interbedded silt and clay layers. The deeper Cambrian sandstone aquifer consists of relatively thin, well-sorted quartz sandstone and fine- to coarse-grained sandstone with interbedded shale. Previous investigations did not identify a defined confining layer between the two aquifers indicating that they are most likely hydraulically connected. Groundwater generally flows toward the east-northeast at velocities ranging from 0.05 to 2.9 feet/day. Groundwater is often encountered in borings at depths ranging from 5.5 to 19.5 feet bgs. The shallowest groundwater observed in previous investigation was in the eastern portion of the facility near a marshy area. In the southwestern portion of the facility, groundwater was not encountered before reaching the sandstone bedrock, indicating that the top of the bedrock surface may locally affect the distribution of groundwater in the unconsolidated shallow aquifer (Leidos, June 2015). Figure 3 (Appendix A) presents a generalized hydrogeologic column of Juneau County, Wisconsin.

10.4.2 Surface Water

Volk Field CRTC contains three ponds Beck's Pond, Green Pond, and Ice Pond. Beck's Pond is to the north of the airfield near the facility boundary, Green Pond is along the eastern facility boundary, and Ice Pond is along the southern boundary of the facility. Surface water primarily flows into a series of drainage ditches leading northeast to the Lemonweir River. Surface water in the eastern third of Volk Field CRTC drains through ditches, southeast to the Little Lemonweir River. There are approximately 908 acres of designated wetlands on Volk Field CRTC property. Wetland communities at Volk Field consist of southern wet to wet-mesic lowland hardwood forest; shrub-carr; fresh (wet) meadow with small stands of shallow marsh; and artificial and natural ponds, drainage ditches, and associated vegetation. The lowland hardwood forest and shrub-carr communities best represent the original native wetland vegetation, while the fresh (wet) meadow, primarily disturbed, represents the majority of wetland acreage. In general, the marshy areas are located to the north of the airfield and along its southeastern boundary. The facility does not fall within a 100-year flood plain (Leidos, June 2015).

10.5 FORMER FIRE TRAINING AREA (IRP SITE 1) (SITE 1)

The former FTA was designated as "Site 1" in the Installation Restoration Program (IRP) documents at Volk Field CRTC and this designation will continue for the current project (Montgomery Watson, February 1998). The former FTA is a relatively flat, grass- and tree-covered lot, approximately 600 feet southeast of the intersection of Madison Boulevard and Bluff Road in the central portion of Volk Field CRTC (latitude/longitude coordinates: 43°55'58.49"N/90°15'15.87"W). The site is bordered to the north, east, and south by grassy areas and to the west by a building and associated parking lots. Beginning in the 1940s until 1980, the site was used for fire training exercises, refueling vehicles, and routine servicing of equipment. The activities conducted at the site impacted the area with fuel-related contaminants. However, the concrete burn pits and other associated building materials associated with the FTA have been removed and the site was investigated and remediated through the IRP process. The site currently has a "site closed, no further action at this time" status. There are no records indicating what types or quantities of AFFF (if any) were used during the training exercises. However, based on the operational history of the site and the historical usage of AFFF within the USAF and ANG during the operational years of the former FTA, it is very probable that PFASs were released to the environment at this site.

The media of concern at the former FTA are surface soil, subsurface soil, and shallow groundwater. Surface and subsurface soil samples will be collected from soil borings installed at four locations within the area of the former FTA burn pit. New groundwater monitoring wells will be installed in three of the borings and groundwater samples will be collected from the three newly installed wells. There are no surface water bodies near the area, so no surface water or sediment samples will be collected for this site.

10.6 SPRAY NOZZLE TEST AREA (PRIMARY) (SITE 2)

For at least the past 20 years, annual nozzle spray testing for the fire engines at Volk Field CRTC has been performed in the sand pit in the southeast portion of Volk Field CRTC (latitude/longitude coordinates: 43°55'24.19"N/90°15'12.74"W). The sand pit is bordered to the north by a sandstone bluff, to the south by South Perimeter Road, and the entire site is surrounded by wooded land. The five fire engines currently on the facility perform annual testing to ensure proper equipment operation. During each annual test, no more than 4 to 5 gallons of AFFF is released from each engine directly into the sand pit, for a total of 20 to 25 gallons per event. The majority of the AFFF fluids infiltrate into the sandy soils with little to no surface runoff (CH2M Hill, June 2015).

The media of concern at the Primary Spray Nozzle Test Area are surface soil, subsurface soil, shallow groundwater, surface water, and sediments. Surface and subsurface soil samples will be collected from three soil borings in the spray area. Three new groundwater monitoring wells will be installed in the borings and groundwater samples collected from the three new wells. One set of surface water and sediment samples will be collected from the creek south of the site.

10.7 SPRAY NOZZLE TEST AREA (ALTERNATE) (SITE 3)

If the primary Spray Nozzle Test Area (Site 2) is not accessible when the annual spray nozzle test is due, the spray test for the fire engines is performed at the Alternate Spray Nozzle Test Area approximately 1,000 feet east of the primary test area. The alternate test area is also a sand pit bordered to the north by the sandstone bluff, to the south by South Perimeter Road, and surrounded by wooded land (latitude/ longitude coordinates: 43°55'27.56"N/90°14'53.89"W). There are no records of how often the alternate spray test area has been used over the last 20 years, but the testing process is the same as for the primary spray test area. The five fire engines currently on the facility perform annual testing to ensure proper equipment operation. During each annual test, no more than 4 to 5 gallons of AFFF is released from each engine directly into the sand pit, for a total of 20 to 25 gallons per event. The majority of the AFFF fluids infiltrate into the sandy soils with little to no surface runoff (CH2M Hill, June 2015). However, the sand pit is contoured so that surface drainage collects in a depression at the center of the spray area. During the March 2016 site visit, ASL personnel observed water standing in the depression.

The media of concern at the Alternate Spray Nozzle Test Area are surface soil, subsurface soil, shallow groundwater, surface water, and sediments. Surface and subsurface soil samples will be collected from three soil borings around the depression in the center of the spray area. Three additional borings will be drilled around the outer perimeter of the spray area and three new groundwater monitoring wells will be installed in these borings. Groundwater samples will be collected from the three new wells. One set of surface water and sediment samples will be collected from the depression at the center of the spray area if standing water is present. However, if there is no standing water at the time of sampling, a surface soil sample will be collected at this location instead.

10.8 FORMER PRIMARY SETTLING POND (SITE 4)

The former Primary Settling Pond was in operation prior to 1970 until 1995. The primary wastewater settling pond is adjacent to, and north of the current WWTP (Building 650) (latitude/longitude coordinates: 43°56'12.55"N/90°16'32.61"W). During the active life of the ponds, the sanitary sewer lines at Volk Field CRTC were connected to the unlined wastewater settling ponds and collected fluid wastes from across the facility. The ponds discharged treated water into the unnamed tributary north of the facility (CH2M Hill, June 2015).

The media of concern at Site 4 are surface soil, subsurface soil, shallow groundwater, surface water, and sediments. Surface and subsurface soil samples will be collected from soil borings at three locations within the perimeter of the former primary wastewater settling pond. Three new groundwater monitoring wells will be installed in the borings and groundwater samples will be collected from the three newly installed wells. A surface water and sediment sample will also be collected from the depression at the southeast corner of the site where surface water collects. However, if there is no standing water at the time of sampling, a surface soil sample will be collected at this location instead.

10.9 KC-97 CRASH SITE (IRP SITE 5) (SITE 5)

The KC-97 Crash Site was designated as “Site 5” in IRP documents at Volk Field CRTC and this designation will continue for the current project. In 1978, a KC-97 refueling aircraft crashed approximately 400 feet north of Taxiway 3, parallel to and near the center of the main runway (latitude/ longitude coordinates: 43°56'23.47"N/90°15'13.16"W). The site is a relatively flat, open area vegetated with tall grasses. Following the crash the site was investigated through the IRP process and currently has a “site closed, no further action required” status. There are no records of the type or volume of AFFF used during the incident. However, the fact that the crash occurred in 1978 and involved a fuel fire suggests that AFFF containing PFASs was likely used to extinguish the fire (CH2M Hill, June 2015).

The media of concern at Site 5 are surface soil, subsurface soil, and shallow groundwater. Surface and subsurface soil samples will be collected from four soil borings within the area of the crash. An additional surface soil sample will be collected in the depression on the north side of the crash site where surface runoff collects. New groundwater monitoring wells will be installed in two of the soil borings. Groundwater samples will be collected from the two new wells. There are no surface water bodies nearby, so no surface water or sediment samples will be collected for this site.

10.10 SECONDARY SETTLING POND AND TREATED WASTEWATER OUTFALLS (SITE 6)

The former Secondary Settling Pond was in operation prior to 1970 until 1995. The pond was located north of the KC-97 Crash Site (Site 5), approximately 750 feet north of the main runway (latitude/ longitude coordinates: 43°56'32.29"N/90°15'9.69"W). During the active life of the pond, the sanitary sewer lines at Volk Field CRTC collected fluid wastes from across the facility and transported to the pond for treatment (CH2M Hill, June 2015). The pond discharged treated water through two outfalls. One at the northeast corner of the pond and one at the southeast corner of the pond.

The media of concern at Site 6 are surface soil, subsurface soil, shallow groundwater, surface water, and sediments. Surface and subsurface soil samples will be collected from two soil borings within the perimeter of the former secondary wastewater settling pond. Two new groundwater monitoring wells will be installed in the borings and groundwater samples will be collected from the two newly installed wells. An additional surface soil sample will be collected from the center of the former pond area. Surface water and sediment samples will be collected from the surface water feature where each of the two former outfalls discharged.

QAPP WORKSHEET #13. SECONDARY DATA USES AND LIMITATIONS

The following worksheet identifies data used to generate the installation-specific work plan addenda (such as previous environmental sampling reports, published scientific literature, etc.).

Data Type	Source	Data Uses Relative to Current Project	Factors Affecting the Reliability of Data and Limitations on Data Use
Regional geology and hydrogeology	*Installation Restoration Program, Final Technical Memorandum (Volumes I and II), Volk Field Combat Readiness Training Center, Wisconsin Air National Guard, Camp Douglas, Wisconsin.* (Montgomery Watson, February 1998)	Provided geologic and hydrogeologic setting.	None known.
Meteorology, regional geology, and hydrogeology.	*Final PA/SI Report, Volk Field Combat Readiness Training Center (CRTC), Camp Douglas, Wisconsin.* (Leidos, June 2015)	Provided information on geographic setting and climate.	None known.
Operational history of sites	*Final Preliminary Assessment Report for Perfluorinated Compounds at Volk Field Combat Readiness Training Center, Camp Douglas, Wisconsin.* (CH2M Hill, June 2015.)	Provided operational and contaminant release history for the selected sites. Also provided information on nearby human/ecological receptors.	None known.

PA = preliminary assessment
SI = site inspection

QAPP WORKSHEET #14/16. SUMMARY OF PROJECT TASKS & SCHEDULE

The procedures and schedule for collecting environmental samples are presented in this section to ensure that the data generated represent the media from which the samples were taken.

14.1 DATA COLLECTION AND INSTALLATION SITE VISITS

A site visit was conducted on March 3, 2016, to review available data; interview Volk Field CRTC personnel; and determine additional information needs for the six sites selected for the SI process. Site types included AFFF lagoons/ponds, fire stations, FTAs, and any other sites where AFFF releases may have occurred. ASL proposed the location and method of collecting samples from various media at each location, including groundwater, surface soil, subsurface soil, surface water, and sediment samples.

14.2 BASE/INSTALLATION-SPECIFIC WORK PLAN ADDENDA

This addendum to the QAPP identifies site-specific details for the inspection of sites at Volk Field CRTC, Juneau County, Wisconsin. The SOPs and protocols referred to in this addendum are derived from or are in accordance with EPA guidance documents. Copies of the applicable SOPs are in the QAPP. This addendum lists the six sites selected for SI. The addendum includes detailed descriptions of the analytes to be sampled (PFAS), the numbers and locations of samples to be collected, the matrices to be sampled, and the methods that will be used to collect the samples (hand auger, Roto-Sonic drilling, sampling of existing and newly installed monitoring wells, surface water sampling, etc.). This addendum will be reviewed and approved prior to mobilization to the site and beginning the field activities.

14.3 BASE/INSTALLATION SITE INSPECTIONS

SIs will be performed at six sites on Volk Field CRTC. This proposed plan for the SI was developed based upon information obtained during the data collection and the site visit phase of the project. ASL will mobilize to Volk Field CRTC and perform sampling activities for all six sites during one mobilization. Field activities for this SI are installing groundwater monitoring wells, collecting groundwater samples from newly installed monitoring wells, collecting surface and subsurface soil samples from soil borings, and collecting surface water and sediment samples.

14.3.1 Site Preparation

Site preparation activities may include clearing vegetation/debris if necessary, establishing a decontamination station for portable sampling equipment, and finalizing IDW storage areas and procedures. Efforts will be made to minimize impacts to the worksites and not damage equipment and structures or impede current activities or missions at the sites.

Base Access

Prior to mobilizing to the site, ASL will notify the base POC of all field personnel (including subcontractors) conducting or overseeing field operations for this project to be added to the “Authorized Entry” list. The list of vehicles (including license plate numbers) to be brought on base will be provided to the security force at least five business days prior to the date of access to allow time for processing the request. As this is a short-term duration project; temporary badges will not be required. All personnel will present picture identification when entering the facility. Valid vehicle registration, insurance, and/or rental contract will also be required.

Readiness Review

ASL will perform a readiness review prior to mobilization to ensure that the necessary equipment, supplies, and personnel are present and prepared to execute required sampling tasks.

Utility Clearance

Utility clearances will be conducted by the base civil engineering (CE) department. The CE department will coordinate as necessary with the state utility authority of Wisconsin. ASL personnel will submit a dig permit request to Volk Field CRTC personnel. The dig permit request will include site maps for each planned site showing all proposed sampling locations. ASL will be notified once the dig permits are approved and the ASL field team will be provided a copy of the permits when they arrive on the facility. All utilities will be marked prior to any intrusive activities. If any utilities are found during intrusive work, operations will stop immediately. If the utility is damaged, ruptured, or compromised, the responsible parties will be notified immediately, the site secured, and emergency personnel and the IRP project manager will be contacted if applicable.

Flightline Training

Volk Field CRTC staff will familiarize ASL personnel with the hazards and procedures to be followed to ensure safe work conditions along the flightline prior to conducting operations in these areas. All drilling in flightline areas will be scheduled to avoid conflicting with flight operations.

14.3.2 Sample Matrices

Matrices to be sampled at the sites will consist of surface soil, subsurface soil, sediment, groundwater, and surface water. Quantities of samples proposed for collection from each matrix have been revised as necessary to properly fill data gaps for each site.

14.3.3 Sample Collection Methods for Soil and Sediment

All surface and subsurface soil sampling will be collected in accordance with ASL SOP-013 “Soil Sampling,” and all sediment sampling will be conducted in accordance with ASL SOP-012 “Sediment Sampling,” as listed in Worksheet #21 of the QAPP.

Surface Soil and Subsurface Soil Samples

Hand augers or stainless steel spoons will be used to collect the surface soil samples. The sampling devices will be decontaminated per ASL-SOP-015 before use and between each use and given a final rinse with PFC-free water just prior to use. EPA, and most state regulatory agencies, define surface soil to be from 0 to 1 foot bgs. For this project, surface soil samples will be collect from 0 to 0.5 feet (6 inches) in depth as PFAS compounds tend to either stay on top of the ground surface (when dried) or dissolve into and migrate with water. Subsurface soil samples will be collected from just above the first zone of saturated soil using a Roto-Sonic drilling system. The soil samples will be field-screened with a photoionization detector (PID) during sample collection and readings recorded in the field logbook. Soil samples will be collected directly from the sampling device into a 250 milliliter (mL) high-density polyethylene (HDPE) sample container using precleaned stainless steel spoons or spatulas. Teflon® (polytetrafluoroethylene [PTFE] components) will not be allowed to come into contact with the samples because they can be a potential source of PFAS contamination. Sampling personnel will not be allowed to don Gore-Tex® clothing, Tyvek® suits, or clothes treated with stain- or rain-resistant coatings or come into contact with plastic wrappers, Post-It® notes, or Styrofoam® cups because these are also potential sources of PFAS contamination. The soil sampling procedure is

1. Confirm that all sampling and field scanning equipment is ready and properly calibrated.
2. Don appropriate personal protective equipment (PPE) as outlined in the project safety and health plan. At a minimum, a fresh pair of disposable gloves will be donned for each sampling interval.
3. Advance sampling device to desired depth. Retrieve and open sampler.
4. Scan the soil core with a PID, and record areas and magnitude of PID detections in the field logbook.
5. Collect required sample using a decontaminated stainless steel spoon to transfer soil from sampler to sample container(s). Record sample number, date/time, and other pertinent information in the field logbook.
6. Place the sample container(s) into a plastic resealable bag and place the bag into a cooler with ice for temporary storage.
7. Record physical description of soil core in the field logbook.
8. Dispose of excess sample in the appropriate waste pile and decontaminate the sampling device.
9. Prepare the samples for shipping, complete the chain of custody forms, pack the samples with fresh ice packs, and ship via overnight courier to the project laboratory. Record shipping waybill number and courier information in the field logbook.

Boreholes that encounter the water saturated/unsaturated soil interface (and are not to be used for new well installation) will be covered and allowed to remain open overnight. The water level in the open borehole will then be measured and recorded the following morning and the borehole abandoned. Boreholes that will not be used for new well installation will be abandoned by backfilling with cement/bentonite grout to within 1 foot of the ground surface. The last foot of the borehole will be backfilled with native soil or concrete to match the surrounding area and the location marked with a properly labeled stake for future surveying.

Sediment Samples

Sediment samples will be collected from creeks and drainage features. Surface water samples will be co-located with and collected before sediment samples. The procedure for collecting sediment samples will be similar to soil sampling procedures. The sediment sampling process is

1. Don appropriate PPE and wading equipment (if needed).
2. Clear the area to be sampled of any surface debris.

3. Insert sampling device into the sediment at an angle (0 to 20 degrees from vertical) to minimize washout and spillage upon retrieval. Slowly retrieve the core/sample from the bottom of the stream and carefully decant the water, taking care to retain the fine sediment fraction. Two-person crews are important with one person retrieving the sediment (dirty hands) and one person transferring the sample to the containers (clean hands).
4. Place sample into appropriate containers and release excess sample back into the stream.

A properly labeled stake will be placed on the bank of the surface water body as close to the sampling location as possible for future surveying of coordinates.

14.3.4 Groundwater Monitoring Well Installation and Development Methods

All groundwater monitoring well installation will be conducted in accordance with ASL SOP-019 “Monitoring Well Installation” and USACE *Geology Supplement to the Scope of Services* (USACE, June 2013). The groundwater monitoring wells proposed for Volk Field CRTC will be installed in the surficial aquifer, the first groundwater encountered bgs.

Sonic Drilling

Sonic drilling uses alternately advanced concentric hollow drill stems with rotation in conjunction with axial vibration of the drill stem to advance the borehole. After each stage of drill stem advancement, the inner string is removed with a core of drill cuttings while the outer 'override' string remains to hold the borehole open. The cuttings are removed nearly intact from the inner casing for examination of the stratigraphy prior to sampling or disposal. This drilling method is particularly useful in the glacial till and sand material anticipated at Volk Field CRTC.

Well Installation

A total of 16 new groundwater monitoring wells are proposed for installation at Volk Field CRTC during this project. All of the wells will be constructed of 2-inch diameter, Schedule 40 polyvinyl chloride (PVC) screens and risers with flush mount threads. No lubricating oils or grease will be used on casing threads, nor will any glue of any type be used to secure casing joints. Using Teflon® "O" rings or Teflon® tape to ensure a tight fit and minimize leakage on the joints is also not acceptable due to their being a potential source of PFASs. However, "O" rings made of other materials, such as Viton® rubber, are acceptable.

All well screens will be 10 feet long, composed of continuous slot, wire-wrap design with 0.010-inch slots. Based on previous wells installed at the facility (Montgomery Watson, February 1998), ASL proposes installing filter packs composed of clean, rounded to well-rounded, hard, insoluble particles of silica sand in 20/30 size (#2 sand) around the well screens. The filter pack material will be tremied into place to avoid bridging and ensure a continuous filter pack throughout the screened interval of the well. The filter pack will extend from approximately 1 foot below to 3–5 feet above the well screen.

A 3- to 5-foot-thick bentonite seal will be placed in the annular space above the well screen and filter pack sand. The seal shall be composed of commercially manufactured, solvent-free, sodium bentonite pellets in ¼-inch size. Wells will be installed so that the bentonite seal section is below the depth of the soil water saturated/unsaturated interface. The bentonite seal will be placed immediately after installing the filter pack and allowed to hydrate a minimum of two hours before grouting the remaining annulus.

Cement grout will be placed from the top of the bentonite seal to the ground surface. The cement grout shall consist of a mixture of Portland cement (ASTM C 150) and water in the proportion of not more than 7 gallons of water per bag of cement (94 pounds) with an additional 3 percent by weight of sodium bentonite powder. The grout will be placed by pumping through a side discharging tremie pipe with the lower end of the tremie pipe within 3 feet of the top of the bentonite seal. Pumping will continue until undiluted grout flows from the boring at the ground surface. The grout will be placed within 48 hours, but no sooner than two hours after placement of the bentonite seal. The grout will be allowed to set a minimum of 24 hours before completing the well head.

At Volk Field CRTC, all of the wells not on the airfield will be completed with a stick-up well completion, as follows. The well casing, when installed and grouted, will extend a minimum of 2.5 feet above the ground surface and a vent hole will be drilled into the top of the well casing cap to permit pressure equalization. An outer protective casing will be installed into the borehole after the annular grout has cured for at least 24 hours. The outer, protective casing will be 4 inches square by 5 feet long of steel construction with a hinged, locking cap. The protective casing will have sufficient clearance around the inner well casings so that the outer protective casings will not come into contact with the inner well casings after installation. The protective casing will have a weep hole to allow drainage of accumulated rain or spilled purge water. The weep hole will be approximately ¼-inch in diameter and drilled into the protective casings just above the top of the concrete surface pad to prevent water from standing inside of the protective casings. The protective casing will then be installed by pressing it into the top surface of the bentonite grout seal and concrete poured around the protective casing. A granular material such as sand or gravel will then be used to fill the space between the riser and protective casing. The protective casing will extend above the ground surface to a height so that the top of the inner well casing is exposed when the protective casing is opened. A small notch will be cut on the north side of the well casing to mark the measuring point for water level measurements and the well secured with an expanding cap.

A concrete surface pad will be installed around each well at the same time as the outer protective casing is being installed. Concrete will be placed into the pad forms in one operation making a contiguous unit. The pad will be 2 feet x 2 feet x 4 inches thick. The finished pad will be slightly sloped so that drainage will flow away from the protective casing and off of the pad. A minimum of one inch of the finished pad will be below grade to prevent washing and undermining by soil erosion. Four bumper guards consisting of steel pipes 3 to 4 inches in diameter and a minimum 5-foot length will be installed adjacent to, but not in or connected to, the concrete pad. These bumper guards will be installed to a minimum depth of 2 feet bgs in a concrete footing and extend a minimum of 3 feet above ground surface. Concrete will also be placed into the steel pipe to provide additional strength. After the wells have been installed, the outer protective casing will be painted with a highly visible paint. The paint color will be selected per the requirements of the facility with the default color being blaze orange. The wells will be permanently marked with a well tag containing the well number, date installed, site name, elevation, etc. At each site, the wells will be secured with keyed-alike locks on the outer protective casings.

Monitoring wells installed near the airfield will be completed with a water-tight flush mounted cover. The flush mounted traffic covers will extend from the ground surface down into the concrete plug around the well casing. The flush mounted cover will have a seal that makes the unit water-tight when closed and secured. The flush mounted covers will be installed slightly above grade to minimize standing water and promote runoff. Permanent identification markings will be on a tag affixed to the inside of the protective cover. Expansive sealing plugs will be used to cap the well riser to prevent infiltration of any water that might enter the flush cover.

Well Development

Newly completed monitoring wells will not be developed for at least 24 hours after the surface pad and outer protective casing are installed. This will allow sufficient time for the well materials to cure before development procedures are initiated. Monitoring wells may also be developed before the annular space is filled as long as the borehole remains open or is held open with drill rods. The primary purpose of developing new monitoring wells is to remove the residual materials remaining in the wells after installation has been completed and to reestablish the natural hydraulic flow conditions of the formations which may have been disturbed by well construction around the immediate vicinity of each well. Each new monitoring well will be developed until the column of water in the well is free of visible sediment, and the potential of hydrogen (pH), temperature, turbidity, and specific conductivity have stabilized. In most cases, the above requirements can be satisfied; however, in some cases the pH, temperature, and specific conductivity may stabilize but the water remains turbid. If the well is pumped to dryness or near dryness, the water table should be allowed to sufficiently recover (to the static water level) before the next development period is initiated. All field decisions will be documented in the field log book. ASL anticipates using pumping to accomplish well development. Care will be exercised to prevent undue forces on the formation or well materials during development. ASL anticipates beginning groundwater sampling as soon as the groundwater has reequilibrated, is free of visible sediment, and the water quality parameters have stabilized. Since site conditions vary, even between wells, ASL will wait 24 hours after development before sampling a new monitoring well.

14.3.5 Sample Collection Methods for Groundwater and Surface Water

All groundwater and surface water sampling will be conducted in accordance with SOPs reviewed prior to implementation of field activities consisting of ASL SOP-001 “Logbooks,” ASL SOP-002 “Groundwater Sampling,” ASL SOP-003 “Pump Operation,” ASL SOP-004 “Surface Water Sampling,” ASL SOP-005 “Water Level and Well Depth Measurements,” ASL SOP-006 “Field Measurement of Dissolved Oxygen,” ASL SOP- 007 “Field Measurement of pH,” ASL SOP-008 “Field Measurement of Oxidation Reduction Potential,” ASL SOP-009 “Field Measurement of Specific Conductance,” ASL SOP-010 “Field Measurement of Temperature,” ASL SOP-011 “Field Measurement of Turbidity,” ASL SOP-012 “Sediment Sampling,” ASL SOP-013 “Soil Sampling,” ASL SOP-015 “Field Equipment Cleaning and Decontamination,” ASL SOP-016 “Shipping Samples,” ASL SOP-017 “Sample and Evidence Management,” ASL SOP-018 “Field Sampling Quality Control,” ASL SOP-019 “Monitoring Well Installation/Abandonment,” ASL SOP-020 “Management of Investigation Derived Waste,” ASL SOP-026 “Global Positioning Systems,” ASL SOP-028 “Field Sampling Protocols to Avoid Cross-Contamination at Perfluorinated Compounds Sites,” and ASL SOP-029 “Providing Contaminant-Free Source Water at Perfluorinated Compounds Sites.”

Groundwater

Well purging and groundwater sample collection methods using peristaltic pumps for existing and newly installed wells are anticipated for this project.

Well Head Preparation – The following sequence will be conducted at each well prior to well purging.

1. Put plastic sheeting around wellhead to prevent sampling equipment from coming in contact with the ground surface and don PPE as required by the project site safety and health plan. At a minimum, persons handling sample containers or sampling equipment will don a fresh pair of disposable gloves.

2. Inspect the protective casing, or well vault, and the well cap. Note the condition of the wellhead, casing diameter, and any other pertinent observations in the field logbook.
3. Unseal the well, scan the well casing opening with a PID, and record readings in the field logbook.
4. Using a decontaminated water probe, measure the depth to water in the well. Measure the water level from a reference mark on the well casing and record the reading in the field logbook. If no reference mark exists on the well casing at the initial measurement, mark a point on the lip of the well casing on the north side of the well. All future measurements will be taken at this mark.
5. Calculate the standing volume of water in the well (well volume). Record the well volume in the field logbook. Note: For a 2-inch diameter well, the formula for calculating the well volume is 1 well volume equals 0.16 gallons of water per foot times the height of the standing water column in feet.
6. If there is no dedicated pump or tubing in the well, cut an appropriate length of ¼-inch diameter poly tubing and install in the well. The tubing length should be sufficient to place the intake of the tubing at the center of the saturated portion of the screened interval. A sufficient length of tubing must be cut to meet the installation parameters and to secure the tubing at the wellhead to prevent movement during purging and sampling.

Well Purging – After the tubing has been installed in the well to the appropriate depth, set up the pump and prepare to purge the well. The exhausts of all fuel-powered equipment and vehicles must be positioned downwind of the well being purged and at least 10 feet from the wellhead.

Water quality parameters will be recorded during purging with a YSI multi-parameter water quality meter in an in-line flow-through container. A separate turbidity meter will be used to check turbidity readings. The water quality meter will be calibrated at the start of each day of use in accordance with the instrument instruction manual. The initial and daily calibration will be documented in the field logbook. Each calibration will be compared with the acceptance criteria (potential of hydrogen [pH] ± 0.02 standard units, conductivity ± 5 percent, temperature ± 0.05 degree Centigrade, dissolved oxygen [DO] ± 0.3 mg/L). If the results fail to meet the criteria, the probe will be rinsed with analyte-free water or fresh standard, and the measurement and/or calibration will be repeated. If results continue to fall outside the acceptance range, fresh calibration standards will be used and the calibration reattempted. If the problem persists, the meter will be replaced. The label information on the standards, the identifying numbers on the meter/probe, and any maintenance or repair of the electrodes will be documented in the field logbook. Standards will be selected to bracket the expected sample ranges. If samples are encountered outside the range of the initial calibration, the calibration will be verified with additional standards that bracket the new range of sample values. If the calibration verification fails, the instrument will be recalibrated to the new range of standards. The calibration, documentation, and use of field measurement meters will be in accordance with the QAPP.

The following sequence will be used for well purging using a peristaltic pump.

1. Install a new section of silicone tubing (less than 1 foot long) in the rotary compartment of the peristaltic pump for each well. Connect the poly tubing to the silicone tubing on the suction (intake) side of the pump. Cut a piece of poly tubing, and use it to connect the pressure (output) side of the pump to the bottom port of the flow-through cell. Install the YSI meter probe in the flow-through cell. Cut another length of poly tubing and connect it to the top port of the flow-through cell. Put the end of the poly tubing connected to the top port into a 5-gallon bucket, marked in 1-gallon increments.
2. Calculate the combined volume of the tubing, pump, and flow-through cell. Record the calculation in the field logbook.

3. Begin pumping and note the time in the field logbook. Continuously monitor the water level in the well. The objective is to pump at the rate closest to the recharge rate of the well. Establish the pumping rate that matches the recovery rate of the well (water level stabilizes). If the water level will not stabilize even at the lowest achievable pumping rate (less than 100 mL per minute), the well should be pumped dry and allowed to recover before sampling.
4. Purging will be considered complete when one of the following occurs:
    a. If DO is ≤ 20 percent of saturation for the measured temperature and turbidity is ≤ 20 nephelometric turbidity units (NTUs), then purging is complete when in three consecutive readings: temperature ± 0.2 degrees Centigrade, pH ± 0.2 standard units, and specific conductivity ± 5.0 percent of reading.
    b. If DO is greater than 20 percent of saturation for the measured temperature and/or turbidity is greater than 20 NTUs after every attempt has been made to reduce the DO and turbidity, then purging is complete when in three consecutive readings: temperature ± 0.2 degrees Centigrade, pH ± 0.2 standard units, specific conductivity ±5 percent of reading, DO ± 0.2 mg/L or readings are within 10 percent (whichever is greater), and turbidity ± 5 NTUs or readings are within 10 percent (whichever is greater).
    c. The well purges dry at the lowest achievable pumping rate (100 mL per minute or less). Note: At least one measurement for pH, temperature, specific conductivity, DO, and turbidity must be collected for the well either while purging the well dry or after well recovery.

If water quality parameters do not stabilize after five well volumes have been removed, purging may be discontinued and the sample collected at the discretion of the sample team leader.

Groundwater Sampling – After purging and immediately before collecting the groundwater samples, disconnect the flow-through cell. Samples for PFAS will be collected directly from the outflow tubing of the peristaltic pump (Note: The silicone tubing in the peristaltic pump must be less than 1 foot long). Teflon® (or PTFE) bailers, tubing, or tape will not be allowed to come into contact with the samples because they can be a potential source of PFAS contamination. Glass containers/sampling equipment will not be used because PFASs are known to adhere to glass, which would lower the analytical results. As with the soil samples, sampling personnel will not be allowed to don Gore-Tex® clothing, Tyvek® suits, or clothes treated with stain- or rain-resistant coatings or come into contact with plastic wrappers, Post-It® notes, or Styrofoam® cups because these are also potential sources of PFAS contamination.

Surface Water

Surface water samples will be collected from creeks and drainage features and co-located with sediment samples. The surface water sample will be collected before the sediment sample to avoid the turbidity from coring of a sediment sample. Surface water collection equipment will consist of collecting the grab sample directly into the laboratory container or using bailers to retrieve a sample. The surface water sampling process is

1. Don appropriate PPE and wading equipment (if needed).
2. Clear the area to be sampled of any surface debris.
3. Insert sample container into water surface. Allow the container to slowly fill without overfilling. Two-person crews are important, with one person retrieving the sample (dirty hands) and one person transferring the sample to the containers (clean hands).

Depending upon the depth of the water, wading may be used in shallow water to access the site. Enter downstream and wade upstream to avoid the turbidity caused by the disturbance of bottom sediments during wading from impacting the surface water sample. Wading is acceptable only if the stream has a current that will move the turbid water away from the surface water sample. If wading, the sampler should always face upstream.

14.3.6 Decontamination

Adherence to the equipment decontamination procedure will ensure that all equipment that contacts a sample during sample acquisition is free from the analytes of interest. Equipment rinseate blanks will be collected to test the effectiveness of the cleaning procedure. In general, the cleaning procedure consists of washing with a phosphate-free detergent (such as Luminox®) and consecutive rinses using organic-free water. Stainless steel equipment will be used when appropriate to reduce the decontamination effort. If possible, single-use disposable sampling equipment will be used to reduce the possibility of cross-contamination. PPE will be worn during the decontamination process, and any waste materials must be disposed of properly.

Gross contamination may be removed by physically scrubbing or pressure-cleaning methods. Soil boring equipment that does not come in direct contact with the sample (such as drill rig sampling rods) will be cleaned by pressure washing. Field instruments, such as water-level probes, will be wiped down with nonphosphate detergent solution and triple-rinsed with tap water and analyte-free water. Clean water-level instruments will be stored in untreated plastic bags to eliminate potential contamination during storage and transport.

Distilled/deionized water may be used to decontaminate sampling equipment if the laboratory has verified the water is analyte-free for the contaminants of concern. In general, the equipment decontamination process is

1. Wash in soapy (Luminox®) water, brushing to remove gross contamination as needed.
2. Rinse with tap water.
3. Double rinse with analyte-free water.
4. Allow to air dry in a contaminant-free environment before sealing in an untreated plastic bag, and storing in a contaminant-free environment.

Each decontamination station will be separated by a minimum of 3 feet. All secondary containers (spray bottles) will be clearly marked with the contents.

14.3.7 Sample Handling

Disposable clean Nitrile gloves (Microflex® SuprenoSE® or equivalent) will be worn to conduct each sampling activity; new, unused gloves will be donned at each sampling point. Immediately after collection, samples will be placed in sample containers appropriate for the requested analyses. Samples will be placed in a cooler on ice to achieve and maintain a temperature of 4 degrees Centigrade ± 2 degrees Centigrade. “Blue Ice” or similar products will not be used as a substitute for ice because they are potential sources for PFAS contamination. See Worksheets #26 and #27 of the QAPP for more details on sample handling, preservation, transportation, and custody.

When samples are collected or a measurement is made, a detailed description of the location, method, custody, transport, and laboratory analysis will be recorded in field logbooks, field forms, and electronic files. After samples are collected, the field sampler and field team leader will be responsible for the care and custody of the samples until they are transferred to another individual or are properly dispatched to the project laboratory. As few people as possible will handle the samples from the time they are collected until shipped. Sample custody is defined as in your possession, in your view after being in your possession, in your possession and locked in a secure location, or in a designated secure area. Sample coolers will be sealed with custody seals across the opening for the lid prior to shipment. A minimum of two custody seals will be placed on each cooler (one on the front and one across the hinges on the back of the cooler). A properly completed chain of custody form will be sealed in a zip lock bag and taped to the lid on the interior of the cooler. When transferring the possession of samples, the individual relinquishing and receiving the cooler will sign, date, and record the time on the chain of custody in the proper location. This record will document the transfer of custody for the samples from the sampler to the analytical laboratory.

The original chain of custody will accompany the shipment, and copies will be retained by the field team leader for the project files. Sample coolers will be shipped via overnight courier and will have a bill of lading completed for the containers when they are shipped. All shipments will comply with applicable Department of Transportation (DOT) regulations for environmental samples. Shipping samples on Fridays is discouraged unless the project laboratory has given assurances that personnel will be present on Saturday to receive and process the shipment within the analytical holding times.

14.3.8 Sample Containers, Volumes, and Preservation

The subcontracted laboratory will supply new, precleaned sample containers. Containers will be stored in clean areas to prevent exposure to ambient contaminants. Sample volumes, container types, and preservation requirements for the analytical methods are provided in Worksheet #19 of the QAPP. No Teflon® (PTFE components) will be allowed to come into contact with the samples because they can be a potential source of PFOA and PFAS contamination. Glass containers should also be avoided because PFAS may adhere to the glass surfaces. HDPE containers are recommended for liquid and solid PFAS samples.

14.3.9 Waste Handling

All IDW will be managed in accordance with the guidance provided by Volk Field CRTC ERP manager. IDW will consist mainly of soil and wastewater potentially impacted with PFAS; used PPE, such as disposable gloves; and construction waste, such as paper, rags, plastic sheeting, etc. To the extent practicable, ASL will segregate contaminated waste from noncontaminated waste to reduce the volume of contaminated waste generated. Samples will be collected from the soil IDW and submitted to the project laboratory for analyses. Waste samples will be analyzed for the full toxicity characteristic leaching procedure (TCLP) list (volatile organic compounds, semi-volatile organic compounds, pesticides, herbicides, and metals), polychlorinated biphenyls, total petroleum hydrocarbons, flashpoint, reactivity, ignitability, corrosivity, pH, sulfide, and cyanide. Disposal options for the fluid and soil waste will be based on the analytical results from the waste samples.

Waste Soil – Waste soil will be generated during the installation of soil borings. The minimal volume of soil remaining after collecting the sample from each boring will be placed in a DOT-approved steel drum and staged to a secure location for waste sampling and proper disposal.

Wastewater – Potential sources of wastewater during the SI activities include groundwater generated during monitoring well development, purging prior to sampling, and waste fluids generated during decontamination activities. Wastewaters will be transported to the Volk Field CRTC vehicle maintenance facility and discharged into the liquid waste disposal point for treatment at the WWTP.

Construction Waste – Construction waste–such as paper, plastic, trash, and PPE–may be generated during this project. The waste will be placed in plastic garbage bags and placed in an on-site dumpster for disposal at an off-site Resource Conservation and Recovery Act Subtitle D industrial landfill.

14.3.10 Analysis Tasks

Samples will be analyzed for constituents identified in Worksheet #15 of the QAPP. Sampling design and rationale, media type, and the analytical suite are described in Worksheets #17 and #18 of this addendum.

14.3.11 Quality Control Tasks

Sample collection and QC tasks are outlined in Worksheets #12, #19, #21, #22, #26, and #28 of the QAPP and Worksheets #18 and #20 of this addendum. Laboratory analysis QC tasks are outlined in Worksheets #12, #23, and #28 of the QAPP. Field and laboratory data verification, validation, and documentation are identified in Worksheets #29-37 of the QAPP. Project assessments and audits are detailed in Worksheets #31 and #33 of the QAPP. Environmental Restoration Program Information Management System (ERPIMS) is the USAF system for storing and managing data from environmental projects. These data contain analytical chemistry samples, tests, and results as well as hydrogeological information, site/location descriptions, and monitoring well characteristics. An ERPIMS data deliverable will be submitted to AFCEC with the laboratory data package. Quality assurance/QC measures will be implemented to ensure that samples are tracked and handled properly and that cross-contamination does not occur during sample collection activities. To ensure that samples are accurately tracked from collection through shipping and laboratory analyses, a unique sample number will be assigned to each sample. Equipment rinseate blanks will be collected from the soil and groundwater sampling devices at a frequency of one sample for each device per day of sampling. Field duplicate samples will be collected at a rate of one duplicate for every 10 samples for each sample matrix. Samples will be submitted via overnight courier to Maxxam Analytics International Corporation of Mississaugua, Ontario, Canada, under chain of custody procedures and analyzed for PFASs by modified EPA Method 537.

14.3.12 Data Management Tasks

Data management tasks are discussed in Worksheet #17 of this addendum and Worksheets #26 and #27 of the QAPP.

14.3.13 Documentation and Records

Documentation and records tasks are detailed in Worksheets #29, #31, and #37 of the QAPP. Field personnel will maintain logbooks throughout the field activities. Field personnel maintaining the logbook will sign and date it at the end of each day's activities. The information will be recorded with indelible ink in a bound notebook with sequentially numbered pages. All lines must be completed or a line drawn through a partially completed or blank page/section with the field personnel's initials. Field forms will be completed in the same manner.

14.3.14 Data Review Tasks

Data reviews are detailed in Worksheets #34 and #37 of the QAPP.

14.4 REPORTING

The report for Volk Field CRTC will be submitted following the completion of field activities and upon receiving sampling results. The report will include at a minimum a site description/history, geology/ hydrology of the site, a site map, a conceptual site model, potentiometric surface, sampling points, sampling depths, sampling results, validation of sampling results, and recommendations for the sites.

Table 4 provides the schedule of activities for the SI at Volk Field CRTC.

Table 4 Proposed Site Inspection Schedule for Volk Field Combat Readiness Training Center

Activities	Organization	Dates (MM/DD/YY) Anticipated Date of Initiation	Dates (MM/DD/YY) Anticipated Date of Completion	Deliverable	Deliverable Due Date
Installation site visits – A site visit was made to the facility to gather information on up to five sites.	ASL	3/03/16	3/04/16	Site visit notes on activities planned for each of five site	3/15/16
Generate Base-specific work plan addenda to the UFP QAPP – This facility-specific QAPP addendum was generated using information gathered from the site visit, including information provided by AFCEC and the Volk Field CRTC ERP office.	ASL	3/05/16	4/18/16	Base-specific addendum to the QAPP	8/26/16
Readiness review- A readiness review will be conducted prior to mobilization to the Base to ensure that the field crew has the proper sampling equipment, sample containers, PPE, site clearances, sample locations, and any miscellaneous materials necessary to conduct the SI.	ASL	8/27/16	8/27/16	Results of the readiness reviews will be included in the Base-specific project report	5/26/17
Installation SI field activities – Field activities will be conducted at six sites, collecting environmental samples for PFAS analysis.	ASL	8/29/16	9/9/16	Information to be included in the Base-specific reports	5/26/17
Field sampling TSA – A field sampling TSA will be performed at least once during the mobilization/ sampling event to ensure that approved SOPs are followed, to note deficiencies in sampling activities, and to develop and implement corrective actions.	ASL	9/1/16	9/1/16	Field sampling TSA e-mail	9/10/16
Data Review – A review of the field sampling analytical data will be conducted for each sample data group.	DataChek	9/9/16	12/9/16	Information to be included in the Base-specific report	5/26/17

Table 4 Proposed Site Inspection Schedule for Volk Field Combat Readiness Training Center (continued)

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date of Initiation	Anticipated Date of Completion		
Base-specific reports – A report based upon the data generated during the installation SIs will be developed. This report will include at a minimum a site description, geology/hydrogeology of the site, site map, a conceptual site model, potentiometric surface, sampling points, sampling depths, sampling results, validation of sampling results, and recommendations for the site.	ASL	9/9/16	5/26/17	Base-specific report	5/26/17

AFCEC = Air Force Civil Engineer Center
CRTC = Combat Readiness Training Center
ERP = Environmental Restoration Program
PFAS = per- and polyfluorinated alkyl substances
QAPP = quality assurance project plan
SOP = standard operating procedure
UFP = Uniform Federal Policy
ASL = Aerostar SES LLC
DD = day
MM = month
PPE = personal protective equipment
SI = Site Inspection
TSA = technical systems audit
YY = year

QAPP WORKSHEET #17. SAMPLING AND DESIGN RATIONALE

17.1 PROPOSED SCOPE OF WORK

A total of 144 sites have been identified at 19 installations for sampling to determine the presence or absence of PFAS in the environment, as detailed in the performance work statement (PWS). A cumulative total of 1,745 samples will be collected at these 19 installations for an estimated average of 11 samples per site. Sample media can include soil, groundwater (from existing monitoring wells, or newly installed wells), surface water, or sediment (USACE, July 2015).

ASL will use a judgmental sampling design to collect samples in locations most likely to have PFASs as a result of an AFFF release. ASL anticipates collecting surface soil samples with a hand auger or stainless steel spoon, subsurface soil samples using a drill rig, groundwater samples from existing or newly installed groundwater monitoring wells, surface water samples, and sediment samples. All samples will be analyzed for the following parameters.

Analyte	*CAS Number
• Perfluorooctane sulfonate (PFOS)	1763-23-1
• Perfluorohexanesulfonic acid (PFHxS)	355-46-4
• Perfluorooctanoic acid (PFOA)	335-67-1
• Perfluoroheptanoic acid (PFHpA)	375-85-9
• Perfluorononanoic acid (PFNA)	375-95-1
• Perfluorobutanesulfonic acid (PFBS)	375-73-5
• Perfluorobutanoic acid (PFBA)	375-22-4
• Perfluoropentanoic acid (PFPA)	2706-90-3
• Perfluorohexanoic acid (PFHxA)	307-24-4
• Perfluorooctanesulfonamide (FOSA)	754-91-6
• Perfluorodecanoic acid (PFDA)	335-76-2
• Perfluorodecanesulfonic acid (PFDS)	335-77-3
• Perfluoroundecanoic acid (PFUnA)	2058-94-8
• Perfluorododecanoic acid (PFDoA)	307-55-1
• Perfluorotridecanoic acid (PFTriA)	72629-94-8
• Perfluorotetradecanoic acid (PFTeA)	376-06-7
• 6:2 Fluorotelomer sulfonate (6:2 FTS)	27619-97-2
• 8:2 Fluorotelomer sulfonate (8:2 FTS)	39108-34-4

*CAS = Chemical Abstract Service

17.2 SAMPLES PROPOSED FOR EACH SITE

The following sections detail the locations and types of samples to be collected at each of the five sites proposed for SIs. Table 5 presents the number of samples per media proposed for each site. Each sample collected during the field effort will receive a unique sample number. The number for each sample will be in the pattern XXXXXXX-ZZZ-YY-###

Where

- VLKFDXX = five digit ERPIMS facility identification code and site number (for example: VLKFD01 = Volk Field CRTC Site 1).

- ZZZ = the sample location number for a site (for example: 001 would be the first sample location at a site).
- YY = sample matrix type
  - SS = surface soil sample (less than 3 inches bgs),
  - SO = soil boring sample (greater than 3 inches bgs),
  - SD = sediment sample,
  - GW = groundwater sample,
  - SW = surface water sample,
  - WW = wastewater (IDW), and
  - WS = waste soil (IDW).
- ### = would be the sequence number for the sample at a location. For soil borings, this would be the depth of the sample. (For example: 001 would be the 0 to 1 foot depth interval in a soil boring, or a sediment/surface water sample. A soil boring sample with a 004, or other last number, would indicate the 3-4 foot, or other depth, sample.) A "9" in the first number position would indicate a duplicate sample (for example 901 would indicate a duplicate sample of the 0 to 1 foot sample in a boring, or a duplicate of a surface water or sediment sample at a site).

Groundwater samples from existing wells will be in the pattern
XXXXXXX-ZZZZZZZ-###

Where
- XXXXXX = five digit ERPIMS facility identification code and site number.
- ZZZZZ = the well identification number.
- ### = the depth of the existing well. A "9" in the first number position would indicate a duplicate sample (for example "061" would indicate a well with a total depth of 61 feet while "961" would indicate a duplicate sample of that well).

Note: ASL does not anticipate sampling any existing wells at Volk Field CRTC.

Identification numbers for newly installed monitoring wells will be in the pattern
VLKFDXX-ZZZ-GW-###

Where
- XX = the Volk Field CRTC site number.
- ZZZ = the sequential well number at that site.
- ### = the depth of the well. A "9" in the first number position would indicate a duplicate sample (for example "061" would indicate a well with a total depth of 61 feet while "961" would indicate a duplicate sample of that well).

For each site where borings are installed, a representative composite soil sample will also be collected for the entire area evaluated for each depth sampled. The composite sample will be submitted to CT Laboratories of Baraboo, Wisconsin, for geotechnical analyses of soil physiochemical properties. The analyses to be conducted are soil pH (EPA Method 9045D), particle size analysis (ASTM D422), and total organic carbon content is soil (EPA Lloyd Kahn Method).

Table 5 Proposed Samples per Media at Each Site

Site	Site Description	Surface Soil Sample	Subsurface Soil Samples	Groundwater Samples	Surface Water Samples	Sediment Samples
Former FTA (IRP Site 1) (Site 1)	Suspected release of AFFF to ground surface.	4	4	3	0	0
Primary Spray Nozzle Test Area (Site 2)	Known release of AFFF to ground surface.	3	3	3	1	1
Alternate Spray Nozzle Test Area (Site 3)	Known release of AFFF to ground surface.	3	3	3	1	1
Former Primary Settling Pond (Site 4)	Suspected release of AFFF to ground surface.	3	3	3	1	1
KC-97 Crash Site (IRP Site 5) (Site 5)	Known release of AFFF to ground surface.	5	4	2	0	0
Secondary Settling Pond and Treated Wastewater Outfalls (Site 6)	Suspected release of AFFF to ground surface.	3	2	2	2	2
Totals:		**21**	**19**	**16**	**5**	**5**
Field Duplicates:		**3**	**2**	**2**	**1**	**1**
Matrix Spike/Matrix Spike Duplicates:		**2**	**1**	**1**	**1**	**1**
Field Blanks:		**0**	**0**	**1**	**0**	**0**
Equipment Rinseate Blanks		**2**	**2**	**0**	**0**	**1**
Total Samples:		**28**	**24**	**20**	**7**	**8**

AFFF = aqueous film forming foam
FTA = fire training area

17.2.1 Former Fire Training Area (IRP Site 1) (Site 1)

Surface soil, subsurface soil, and shallow groundwater will be investigated in the crash site area. Surface and subsurface soil samples will be collected from four boring locations around the area of the burn pit of the former FTA. New monitoring wells will be installed in three of the borings and groundwater samples will be collected from the wells. These well locations provide coverage of the majority of the former FTA burn pit and are positioned in a triangular arrangement to allow for plotting of the potentiometric surface. There are no surface water bodies near the site so surface water and sediment samples will not be collected. The proposed sample locations for the former FTA are shown on Figure 4 (Appendix A).

17.2.2 Spray Nozzle Test Area (Primary) (Site 2)

Surface soil, subsurface soil, shallow groundwater, surface water, and sediments will be sampled in and around the sand pit that is used as the primary spray nozzle test area. Surface and subsurface soil samples will be collected from three borings drilled within the spray fan area on the north, northeast, and west side of the paved area where the fire trucks park to conduct the spray tests. Groundwater monitoring wells will be installed in the three borings. These well locations provide coverage of the majority of the spray test area and are positioned in a triangular arrangement to allow for plotting of the potentiometric surface. Groundwater samples will be collected from the three newly installed wells. One set of co-located surface water and sediment samples will be collected from the creek on the south side of the access adjacent to the sand pit. Although there is reportedly very little runoff from the spray tests, this creek is in the direction of surface water flow from the site. The location of the proposed samples for Primary Spray Nozzle Test Area are shown on Figure 5 (Appendix A).

17.2.3 Spray Nozzle Test Area (Alternate) (Site 3)

Surface soil, subsurface soil, shallow groundwater, surface water, and sediment will be sampled in and around the sand pit that is used as the alternate spray nozzle test area. Surface and subsurface soil samples will be collected from three soil borings drilled within the spray fan area of the tests. Three additional borings will be drilled for installing three new groundwater monitoring wells. The monitoring well borings will be drilled on the south, east, and north sides of the spray fan area. These well locations provide coverage of the majority of the spray test area and are positioned in a triangular arrangement to allow for plotting of the potentiometric surface. Groundwater samples will be collected from each of the three newly installed wells. One set of co-located surface water and sediment samples will be collected from the depression at the center of the spray fan area within the sand pit. ASL personnel observed surface water standing in this depression during the March 2016 site visit. If there is no surface water standing in the depression at the time of the field effort, a surface soil sample will be collected near the center of the depression in lieu of a surface water/sediment sample. The proposed sample locations for the Alternate Spray Nozzle Test Area are shown on Figure 6 (Appendix A).

17.2.4 Former Primary Settling Pond (Site 4)

Surface soil, subsurface soil, shallow groundwater, surface water, and sediment will be investigated at the Former Primary Settling Pond. Surface and subsurface soil samples will be collected from three soil borings drilled within the perimeter of the former settling pond. Groundwater monitoring wells will be installed within each of the borings and groundwater samples collected from the three newly installed wells. These well locations provide coverage of the majority of the former settling pond and are positioned in a triangular arrangement to allow for plotting of the potentiometric surface. One set of co-located surface water and sediment samples will be collected from the low area at the southeast corner of the site where standing surface water is often observed. The proposed locations of the samples for the Former Primary Settling Pond are shown on Figure 7 (Appendix A).

17.2.5 KC-97 Crash Site (IRP Site 5) (Site 5)

Surface soil, subsurface soil and shallow groundwater in the area of the KC-97 Crash Site will be investigated. Surface and subsurface soil samples will be collected from four soil borings installed within the perimeter of the identified crash site. An additional surface soil sample will be collected from a fifth location on the north side of the site where surface water runoff collects. Groundwater monitoring wells will be installed in two of the borings, one at the northeast corner of the site and one on the south side of the site. Groundwater samples will be collected from the two newly installed wells. There are no surface water bodies close to the site, so no surface water or sediment samples will be collected. The proposed locations of the samples for KC-97 Crash Site are shown on Figure 8 (Appendix A).

17.2.6 Secondary Settling Pond and Treated Wastewater Outfalls (Site 6)

Surface soil, subsurface soil, shallow groundwater, surface water, and sediment will be sampled within and around the area of the Former Secondary Settling Pond and Wastewater Outfalls. Surface and subsurface soil samples will be collected from two soil borings. Groundwater monitoring wells will be installed in the two borings, one at the northeast corner and one at the southwest corner of the former settling pond. Groundwater samples will be collected from the two newly installed wells. An additional surface soil sample will be collected from a third location near the center of the former settling pond. One set of co-located surface water and sediment samples will be collected from the former wastewater outfall at the northeast corner of the pond area and one set of co-located surface water and sediment samples will be collected from the former wastewater outfall at the southeast corner of the pond area. The proposed locations of the samples for the Former Secondary Settling Pond and Wastewater Outfalls are shown on Figure 9 (Appendix A).

QAPP WORKSHEET #18. VOLK FIELD CRTC SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE

Sampling Location/ ID Number	Matrix	Depth (units)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference[1]	Rationale for Sampling Location
SITE 1 – Former FTA VLKFD01-001-SS-001 VLKFD01-001-SS-001 MS/MSD VLKFD01-001-SS-901 (duplicate)	Surface soil	0 to 0.5 feet	PFAS	Low to high	1 primary 1 MS/MSD 1 duplicate	ASL-SOP-013 ASL-SOP-013 ASL-SOP-013	Samples collected within area of former FTA burn pit where AFFF was released
VLKFD01-001-SO-00# VLKFD01-001-SO-00# MS/MSD VLKFD01-001-SO-90# (duplicate) (depth to be determined)	Subsurface soil	TBD			1 primary 1 MS/MSD 1 duplicate	ASL-SOP-013 ASL-SOP-013 ASL-SOP-013	
VLKFD01-001-GW-00# VLKFD01-001-GW-00# MS/MSD VLKFD01-001-GW-90#	Groundwater	TBD			1 primary 1 MS/MSD 1 duplicate	ASL-SOP-002 ASL-SOP-002 ASL-SOP-002	
VLKFD01-002-SS-001 VLKFD01-002-SO-00# VLKFD01-002-GW-00#	Surface soil Subsurface soil Groundwater	0 to 0.5 feet TBD TBD			1 primary 1 primary 1 primary	ASL-SOP-013 ASL-SOP-013 ASL-SOP-002	
VLKFD01-003-SS-001 VLKFD01-003-SO-00# VLKFD01-003-GW-00#	Surface soil Subsurface soil Groundwater	0 to 0.5 TBD TBD			1 primary 1 primary 1 primary	ASL-SOP-013 ASL-SOP-013 ASL-SOP-002	
VLKFD01-004-SS-001 VLKFD01-004-SO-00#	Surface soil Subsurface soil	0 to 0.5 feet TBD			1 primary 1 primary	ASL-SOP-013 ASL-SOP-013	
VLKFD01-005-SS-001 VLKFD01-005-SO-00#	Surface soil Subsurface soil	Composite samples from all borings	Geotechnical		Composite sample from each depth	ASL-SOP-013 ASL-SOP-013	Representative matrix samples for site

Sampling Location/ ID Number	Matrix	Depth (units)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference[1]	Rationale for Sampling Location
SITE 2 – Primary Spray <u>Nozzle Test Area</u> VLKFD02-001-SS-001 VLKFD02-001-SO-00# VLKFD02-001-GW-00#	 Surface soil Subsurface soil Groundwater	 0 to 0.5 feet TBD TBD	 PFAS	 Low to high	 1 primary 1 primary 1 primary	 ASL-SOP-013 ASL-SOP-013 ASL-SOP-002	Samples collected from borings installed in the spray fan where AFFF is released and from the creek south of the site where surface runoff collects.
VLKFD02-002-SS-001 VLKFD02-002-SO-00# VLKFD02-002-GW-00#	Surface soil Subsurface soil Groundwater	0 to 0.5 feet TBD TBD			1 primary 1 primary 1 primary	ASL-SOP-013 ASL-SOP-013 ASL-SOP-002	
VLKFD02-003-SS-001 VLKFD02-003-SO-00# VLKFD02-003-GW-00#	Surface soil Subsurface soil Groundwater	0 to 0.5 feet TBD TBD			1 primary 1 primary 1 primary	ASL-SOP-013 ASL-SOP-013 ASL-SOP-002	
VLKFD02-004-SW-001 VLKFD02-004-SW-001 MS/MSD VLKFD02-004-SW-901 (duplicate)	Surface water	0 to 0.5 feet			1 primary 1 MS/MSD 1 duplicate	ASL-SOP-002 ASL-SOP-002 ASL-SOP-002	
VLKFD02-004-SD-001 VLKFD02-004-SD-001 MS/MSD VLKFD02-004-SD-901 (duplicate)	Sediment	0 to 0.5 feet			1 primary 1 MS/MSD 1 duplicate	ASL-SOP-012 ASL-SOP-012 ASL-SOP-012	
VLKFD02-005-SS-001 VLKFD02-005-SO-00#	Surface soil Subsurface soil	Composite samples from all borings	Geotechnical		Composite sample from each depth	ASL-SOP-013 ASL-SOP-013	Representative matrix samples for site

Sampling Location/ ID Number	**Matrix**	**Depth** (units)	**Analytical Group**	**Concentration Level**	**Number of Samples** (identify field duplicates)	**Sampling SOP Reference**[1]	**Rationale for Sampling Location**
SITE 3 – Alternate Spray **Nozzle Test Area** VLKFD03-001-GW-00#	Groundwater	TBD	PFAS	Low to high	1 primary	ASL-SOP-002	Samples collected from borings installed within spray fan of test area where AFFF is released.
VLKFD03-002-GW-00#	Groundwater	TBD			1 primary	ASL-SOP-002	
VLKFD03-003-GW-00#	Groundwater	TBD			1 primary	ASL-SOP-002	
VLKFD03-004-SS-001 VLKFD03-004-SO-00#	Surface soil Subsurface soil	0 to 0.5 feet TBD			1 primary 1 primary	ASL-SOP-013 ASL-SOP-013	
VLKFD03-005-SS-001 VLKFD03-005-SO-00#	Surface soil Subsurface soil	0 to 0.5 feet TBD			1 primary 1 primary	ASL-SOP-013 ASL-SOP-013	
VLKFD03-006-SS-001 VLKFD03-006-SO-00#	Surface soil Subsurface soil	0 to 0.5 feet TBD			1 primary 1 primary	ASL-SOP-013 ASL-SOP-013	
VLKFD03-007-SS-001 VLKFD03-007-SS-901 (duplicate) VLKFD03-007-SO-00# VLKFD03-007-SO-90# (duplicate)	Surface soil Subsurface	0 to 0.5 feet 0 to 0.5 feet TBD TBD			1 primary 1 duplicate 1 primary 1 duplicate	ASL-SOP-013 ASL-SOP-013 ASL-SOP-013 ASL-SOP-013	
VLKFD03-008-SS-001 VLKFD03-008-SO-00#	Surface soil Subsurface soil	Composite samples from all borings	Geotechnical		Composite sample from each depth	ASL-SOP-013 ASL-SOP-013	Representative matrix samples for site

Sampling Location/ ID Number	**Matrix**	**Depth** (units)	**Analytical Group**	**Concentration Level**	**Number of Samples** (identify field duplicates)	**Sampling SOP Reference[1]**	**Rationale for Sampling Location**
SITE 4 – Former Primary Wastewater Settling Pond							
VLKFD04-001-SS-001 VLKFD04-001-SO-00# VLKFD04-001-GW-00#	Surface soil Subsurface soil Groundwater	0 to 0.5 feet TBD TBD	PFAS	Low to high	1 primary 1 primary 1 primary	ASL-SOP-013 ASL-SOP-013 ASL-SOP-002	Samples collected from borings within area of former wastewater settling pond.
VLKFD04-002-SS-001 VLKFD04-002-SO-00# VLKFD04-002-GW-00# VLKFD04-002-GW-90# (duplicate)	Surface soil Subsurface soil Groundwater	0 to 0.5 feet TBD TBD TBD			1 primary 1 primary 1 primary 1 duplicate	ASL-SOP-013 ASL-SOP-013 ASL-SOP-002 ASL-SOP-002	
VLKFD04-003-SS-001 VLKFD04-003-SO-00# VLKFD04-003-GW-00#	Surface soil Subsurface soil Groundwater	0 to 0.5 feet TBD TBD			1 primary 1 primary 1 primary	ASL-SOP-013 ASL-SOP-013 ASL-SOP-002	
VLKFD04-004-SW-001 VLKFD04-004-SD-001	Surface water Sediment	0 to 0.5 feet 0 to 0.5 feet			1 primary 1 primary	ASL-SOP-002 ASL-SOP-012	Samples collected where surface drainage collects
VLKFD04-005-SS-001 VLKFD04-005-SO-00#	Surface soil Subsurface soil	Composite samples from all borings	Geotechnical		Composite samples from each depth	ASL-SOP-013 ASL-SOP-013	Representative matrix samples for site

Sampling Location/ ID Number	**Matrix**	**Depth** (units)	**Analytical Group**	**Concentration Level**	**Number of Samples** (identify field duplicates)	**Sampling SOP Reference**[1]	**Rationale for Sampling Location**
SITE 5 – KC-97 Crash Site							
VLKFD05-001-SS-001 VLKFD05-001-SO-00# VLKFD05-001-GW-00#	Surface soil Subsurface soil Groundwater	0 to 0.5 feet TBD TBD	PFAS		1 primary 1 primary 1 primary	ASL-SOP-013 ASL-SOP-013 ASL-SOP-002	Samples collected from borings within area of crash site where AFFF was released.
VLKFD05-002-SS-001 VLKFD05-002-SO-00# VLKFD05-002-GW-00#	Surface soil Subsurface soil Groundwater	0 to 0.5 feet TBD TBD			1 primary 1 primary 1 primary	ASL-SOP-013	
VLKFD05-003-SS-001 VLKFD05-003-SO-00#	Surface soil Subsurface soil	0 to 0.5 feet TBD			1 primary 1 primary	ASL-SOP-013 ASL-SOP-013	
VLKFD05-004-SS-001 VLFFD05-004-SO-00#	Surface soil Subsurface soil	0 to 0.5 feet TBD			1 primary 1 primary	ASL-SOP-013 ASL-SOP-013	
VLKFD05-005-SS-001	Surface soil	0 to 0.5 feet			1 primary	ASL-SOP-013	Sample collected on north side of site where surface water collects.
VLKFD05-006-SS-001 VLKFD05-006-SO-00#	Surface soil Subsurface soil	Composite samples from all borings	Geotechnical		Composite sample from each depth	ASL-SOP-013 ASL-SOP-013	Representative matrix samples for site

Sampling Location/ ID Number	Matrix	Depth (units)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference[1]	Rationale for Sampling Location
SITE 6 –Secondary Settling Pond and Treated Wastewater Outfalls							
VLKFD06-001-SS-001 VLKFD06-001-SO-00# VLKFD06-001-GW-00#	Surface soil Subsurface soil Groundwater	0 to 0.5 feet TBD TBD	PFAS	Low to high	1 primary 1 primary 1 primary	ASL-SOP-013 ASL-SOP-013 ASL-SOP-002	Samples collected from borings within area of former wastewater settling pond.
VLKFD06-002-SS-001 VLKFD06-002-SS-001 MS/MSD VLKFD06-002-SS-901 (duplicate) VLKFD06-002-SO-00# VLKFD06-002-GW-00#	Surface soil Subsurface soil Groundwater	0 to 0.5 feet 0 to 0.5 feet 0 to 0.5 feet TBD TBD			1 primary 1 MS/MSD 1 duplicate 1 primary 1 primary	ASL-SOP-013 ASL-SOP-013 ASL-SOP-013 ASL-SOP-013 ASL-SOP-002	
VLKFD06-003-SW-001 VLKFD06-003-SD-001	Surface water Sediment	0 to 0.5 feet 0 to 0.5 feet			1 primary 1 primary	ASL-SOP-002 ASL-SOP-012	Samples collected from former outfalls where treated water was released.
VLKFD06-004-SW-001 VLKFD06-004-SD-001	Surface water Sediment	0 to 0.5 feet 0 to 0.5 feet			1 primary 1 primary	ASL-SOP-002 ASL-SOP-012	
VLKFD06-005-SS-001	Surface soil	0 to 0.5 feet			1 primary	ASL-SOP-013	Sample collected at center of former settling pond.
VLKFD06-006-SS-001 VLKFD06-006-SO-00#	Surface soil Subsurface soil	Composite samples from all borings	Geotechnical		Composite sample from each depth	ASL-SOP-013 ASL-SOP-013	Representative matrix samples for site

[1]Specify the appropriate letter or number from the Project Sampling SOP References table (Worksheet #21).
# denotes bottom depth of sample interval
AFFF = aqueous film forming foam
FTA = fire training area
MS = matrix spike
MSD = matrix spike duplicate
PFASs = per- and polyfluorinated alkyl substances
SOP = standard operating procedure
TBD = to be determined

QAPP WORKSHEET #20. VOLK FIELD CRTC FIELD QUALITY CONTROL SAMPLE SUMMARY TABLE

Matrix	Analytical Group	Conc. Level	Analytical and Preparation SOP Reference[1]	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of MS/MSD	No. of Field Blanks	No. of Equip. Blanks[2]	Total No. of Samples to Lab
Soil (surface, subsurface, and sediment)	PFAS	Low to high	CAM SOP-00894	45	6	4	0	5	60
Water (surface water and groundwater)	PFAS	Low to high	EPA 537 (modified)/ CAM SOP-00894	21	3	2	1	0	27

[1] Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23). Note: Maxxam SOPs will be provided to the government upon request.
[2] If sampling equipment that contacts sampling media is decontaminated and then reused, then 1 equipment blank should be taken per each day of sampling operations. If disposal-sampling equipment is used, then no equipment blanks are required.

Conc. = concentration
EPA = Environmental Protection Agency
MS = matrix spike
MSD = matrix spike duplicate
No. = number
PFAS = per- and polyfluorinated alkyl substances
SOP = standard operating procedure

Appendix A

Site-Specific Figures

G:\M2027.0003 Omaha\Volk Field\MXD\QAAP\Figure 1 Location of Volk Field.mxd; Date: 4/29/2016

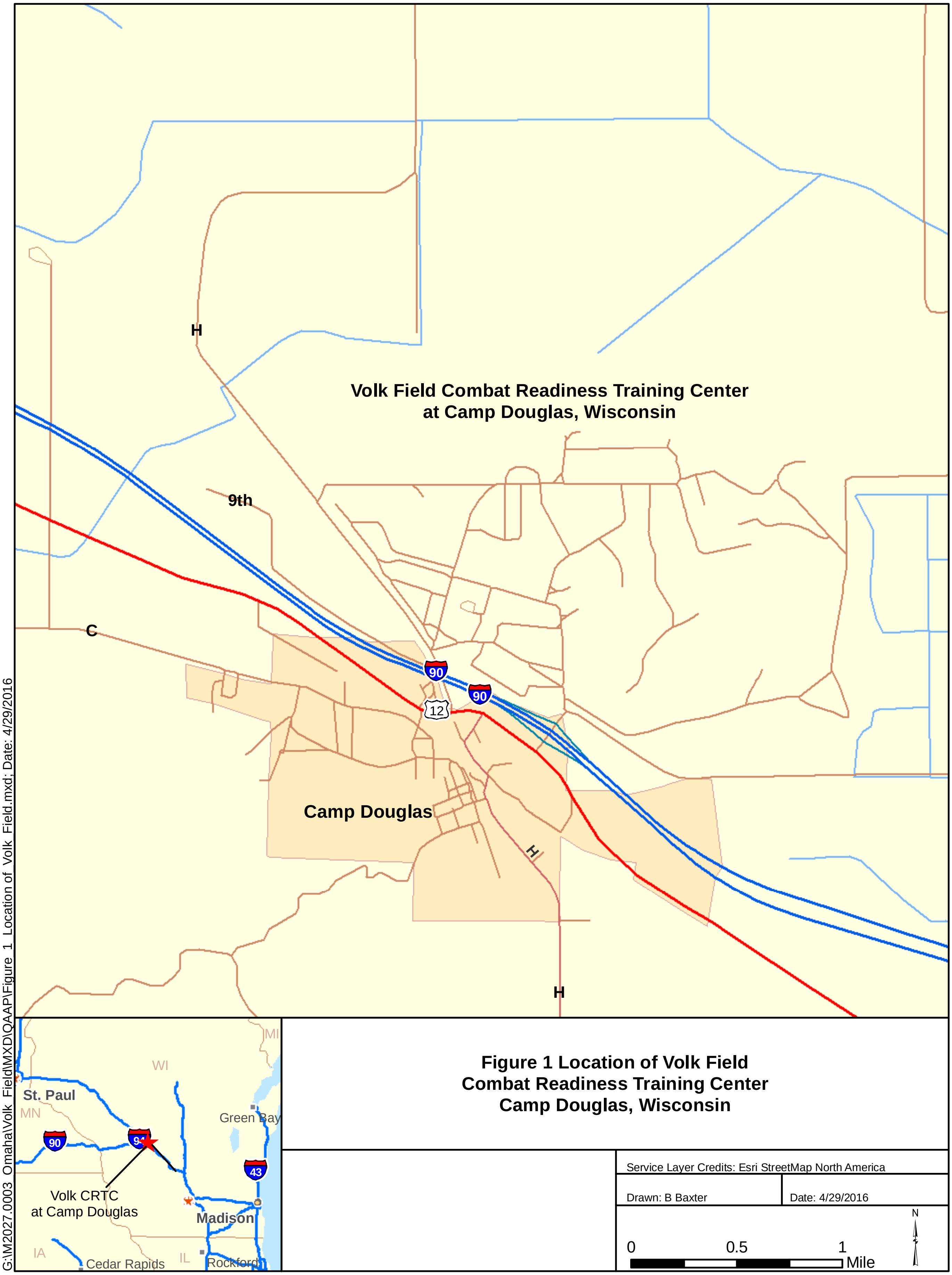
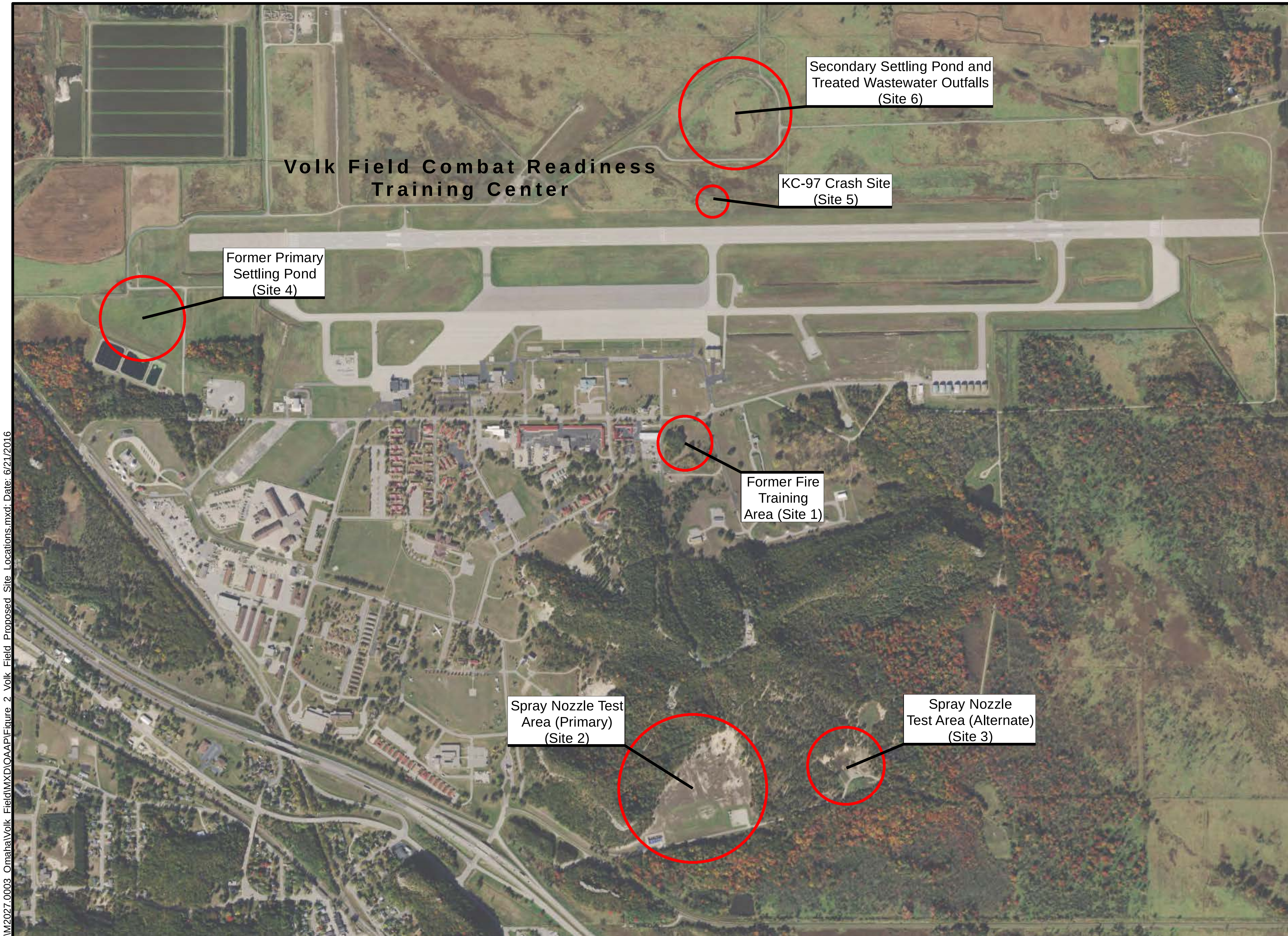


Figure 1 Location of Volk Field Combat Readiness Training Center Camp Douglas, Wisconsin

Service Layer Credits: Esri StreetMap North America

Drawn: B Baxter | Date: 4/29/2016



Legend

Proposed AFFF Inspection Sites

N

0 500 1,000 1,500

Feet

Volk Field Combat Readiness Training Center
Juneau County, Wisconsin

Figure 2
Proposed Site Locations for AFFF Inspections

Aerostar SES LLC

Drawn: B Baxter | Date: 6/21/2016

Service Layer Credits: Esri ArcGIS Online Aerial Photography

G:\M2027.0003 Omaha\Volk Field\MXD\OAAP\Figure 2 Volk Field Proposed Site Locations.mxd; Date: 6/21/2016

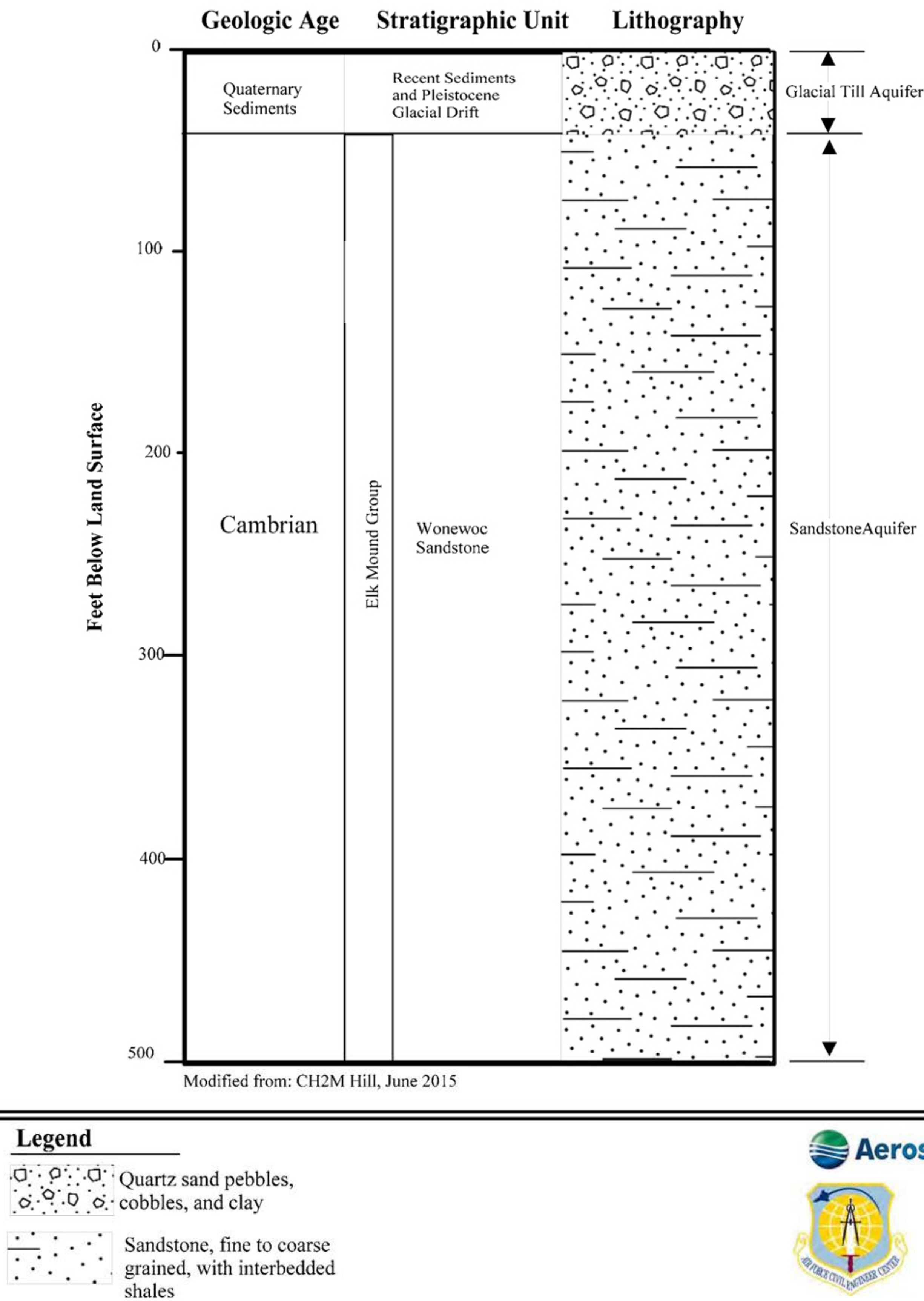
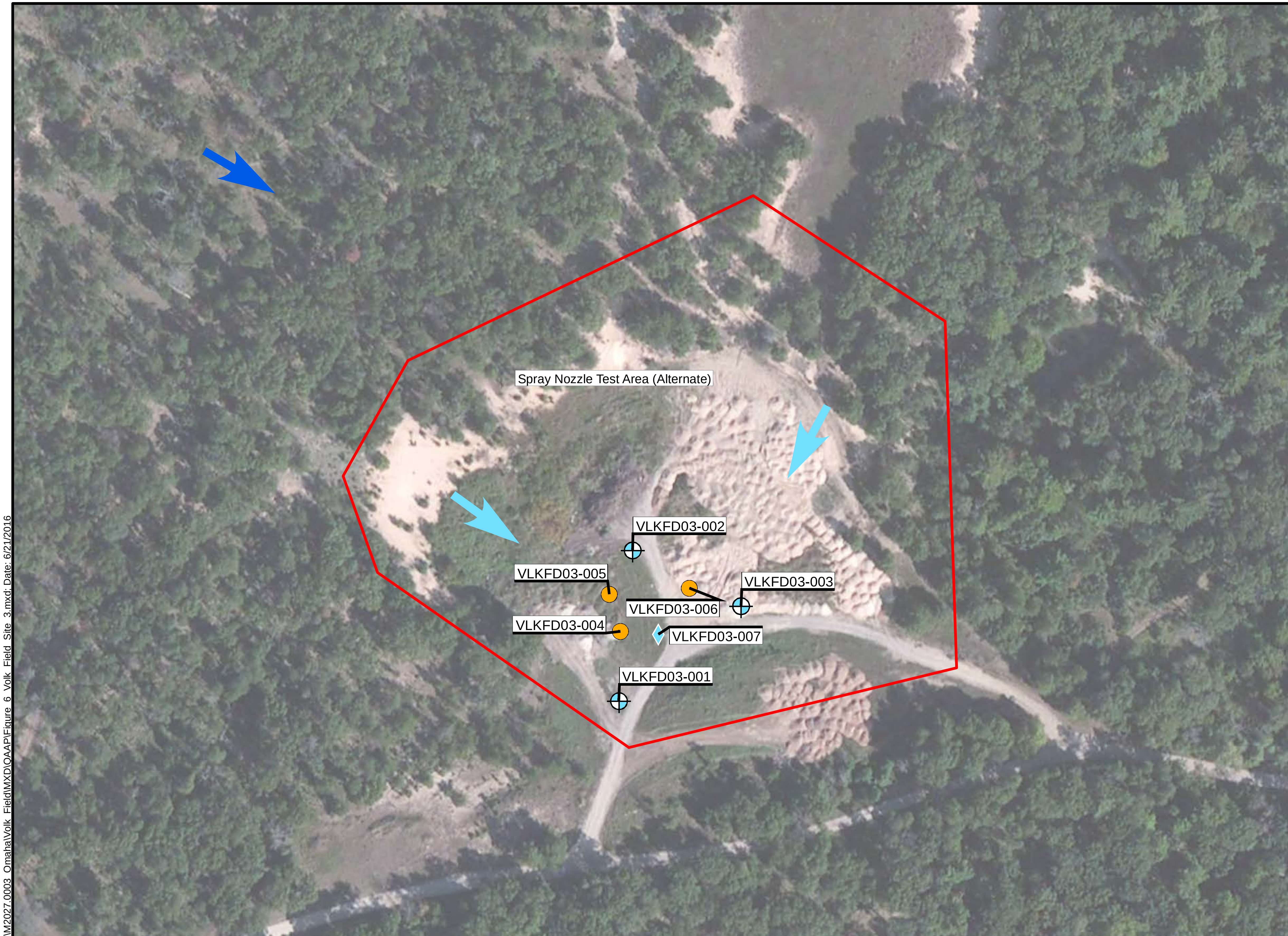


Figure 3 Generalized Hydrogeologic Column of Juneau County, Wisconsin

G:\M2027.0003_Omaha\Volk_Field\MXD\OAAP\Figure_4_Volk_Field_Site_1.mxd; Date: 6/21/2016

G:\M2027.0003_Omaha\Volk_Field\MXD\QAAP\Figure_5_Volk_Field_Site_2.mxd; Date: 6/21/2016



Legend

- Proposed Monitoring Well Location
- Proposed Soil Boring Location for Collecting Surface and Subsurface Soil Samples
- Proposed Location for Collecting Surface Water and Sediment Sample
- Presumed Groundwaterwater Flow Direction
- Surface Water Flow Direction

N

0 100 200

Feet

Volk Field Combat Readiness Training Center
Juneau County, Wisconsin

Figure 6
Proposed Sampling Locations
Spray Nozzle Test Area (Alternate)
(Site 3)

Aerostar SES LLC

Drawn: B Baxter | Date: 6/21/2016

Service Layer Credits: Esri ArcGIS Online Aerial Photography

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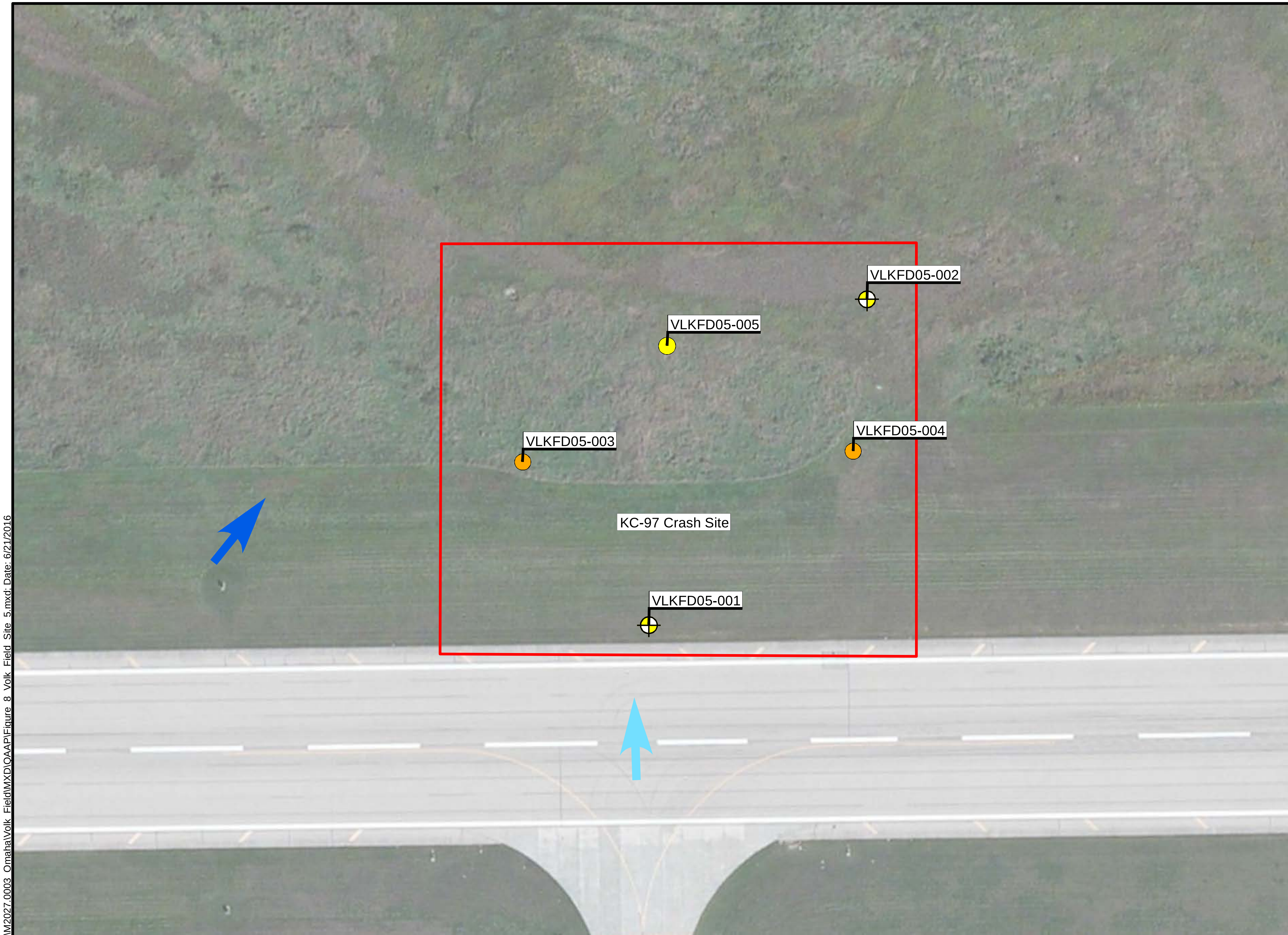
Site Location
Legend
Proposed Monitoring Well Location with Surface and Subsurface Soil Samples
Proposed Location for Collecting Surface Water and Sediment Sample
Presumed Groundwaterwater Flow Direction
Surface Water Flow Direction
VLKFD04-003
VLKFD04-002
Former Primary Settling Pond
VLKFD04-001
Surface Water Commonly Collects in this Area
VLKFD04-004
Current Wastewater Treatment Plant (Bldg 650)
N
0
100
200
Feet
Volk Field Combat Readiness Training Center
Juneau County, Wisconsin
Figure 7
Proposed Sampling Locations
Former Primary Settling Pond
(Site 4)
Aerostar SES LLC
Drawn: B Baxter
Date: 6/21/2016
Service Layer Credits: Esri ArcGIS Online Aerial Photography
G:\M2027.0003_Omaha\Volk_Field\MXD\OAAP\Figure_7_Volk_Field_Site_4.mxd; Date: 6/21/2016



Legend

- Proposed Location for Collecting Surface Soil Sample
- Proposed Monitoring Well Location with Surface and Subsurface Soil Samples
- Proposed Soil Boring Location for Collecting Surface and Subsurface Soil Samples
- Presumed Groundwaterwater Flow Direction
- Surface Water Flow Direction

N

0 50 100 150

Feet

Volk Field Combat Readiness Training Center
Juneau County, Wisconsin

Figure 8
Proposed Sampling Locations
KC-97 Crash Site (IRP Site 5)
(Site 5)

Aerostar SES LLC

Drawn: B Baxter | Date: 6/21/2016

Service Layer Credits: Esri ArcGIS Online Aerial Photography

G:\M2027.0003 Omaha\Volk Field\MXD\QAAP\Figure 8 Volk Field Site 5.mxd; Date: 6/21/2016

G:\M2027.0003_Omaha\Volk_Field\MXD\QAAP\Figure_9_Volk_Field_Site_6.mxd; Date: 6/21/2016