

1 DRAFT FINAL
2 Site Inspection Report
3 Army Aviation Support Facility
4 Santa Fe, New Mexico

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7 Site Inspection for Perfluorooctanoic Acid (PFOA), Perfluorooctanesulfonic Acid (PFOS),
8 Perfluorohexanesulfonic Acid (PFHxS), Perfluorononanoic Acid (PFNA), Hexafluoropropylene
9 oxide dimer Acid (HFPO-DA), and Perfluorobutanesulfonic Acid (PFBS) at ARNG Installations
10 Nationwide

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12 **February 2023**

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24 Army National Guard Headquarters
25 111 S. George Mason Drive
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192

LIST OF ACRONYMS AND ABBREVIATIONS

193	°C	Degrees Celsius
194	°F	Degrees Fahrenheit
195	%	Percent
196	µg/kg	Microgram(s) per kilogram
197		
198	AASF	Army Aviation Support Facility
199	AECOM	AECOM Technical Services, Inc.
200	AFFF	Aqueous film-forming foam
201	amsl	Above mean sea level
202	AOI	Area of Interest
203	ARNG	Army National Guard
204	ASTM	ASTM International
205		
206	bgs	Below ground surface
207	btoc	Below top of casing
208		
209	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
210	City	City of Santa Fe
211	CSM	Conceptual site model
212		
213	DoD	Department of Defense
214	DPT	Direct-push technology
215	DQO	Data quality objective
216	DUA	Data Usability Assessment
217		
218	EA	EA Engineering, Science, and Technology, Inc., PBC
219	ELAP	Environmental Laboratory Accreditation Program
220	EM	Engineer Manual
221	EB	Equipment blank
222		
223	FB	Field blank
224	FD	Field duplicate
225	FedEx	Federal Express
226	ft	Foot (feet)
227		
228	GPS	Global Positioning System
229		
230	HDPE	High-density polyethylene
231	HFPO-DA	Hexafluoropropylene oxide dimer acid
232		
233	ID	Identification
234	IDW	Investigation-derived waste
235	ITRC	Interstate Technology Regulatory Council

236 **LIST OF ACRONYMS AND ABBREVIATIONS (continued)**

237

238	J	Estimated concentration
239	J+	Estimated concentration, biased high
240		
241	LC/MS/MS	Liquid chromatography with tandem mass spectrometry
242		
243	mg/kg	Milligram(s) per kilogram
244	MS	Matrix spike
245	MSD	Matrix spike duplicate
246		
247	NA	Not applicable
248	ng/L	Nanogram(s) per liter
249	NMARNG	New Mexico Army National Guard
250	NMED	New Mexico Environment Department
251	NMOSE	New Mexico Office of the Engineer
252	No.	Number
253		
254	OSD	Office of the Secretary of Defense
255		
256	P&A	Plugged and abandoned
257	PA	Preliminary Assessment
258	PFAS	Per- and polyfluoroalkyl substances
259	PFBS	Perfluorobutanesulfonic acid
260	PFHxS	Perfluorohexanesulfonic acid
261	PFNA	Perfluorononanoic acid
262	PFOA	Perfluorooctanoic acid
263	PFOS	Perfluorooctanesulfonic acid
264	PID	Photoionization detector
265	PVC	Polyvinyl chloride
266		
267	QAPP	Quality Assurance Project Plan
268	QSM	Quality Systems Manual
269		
270	RI	Remedial Investigation
271		
272	SAF	Santa Fe Airport
273	SI	Site Inspection
274	SL	Screening level
275		
276	TOC	Total organic carbon
277	TPP	Technical Project Planning
278		
279	UFP	Uniform Federal Policy
280	USACE	U.S. Army Corps of Engineers
281	USEPA	U.S. Environmental Protection Agency

282
283
284

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

WWTP Wastewater Treatment Plan

285

EXECUTIVE SUMMARY

286 The Army National Guard (ARNG) G-9 is the lead agency in performing Preliminary
287 Assessments (PAs) and Site Inspections (SIs) at ARNG facilities nationwide based on the current
288 or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on six
289 compounds presented in the memorandum from the Office of the Secretary of Defense (OSD)
290 dated 6 July 2022 (Assistant Secretary of Defense 2022). The six compounds listed in the OSD
291 memorandum include perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and
292 perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic
293 acid (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA).¹ These compounds are
294 collectively referred to as “relevant compounds” throughout the document. The applicable
295 screening levels (SLs) are provided below in **Table ES-1**.

296
297 The PA identified one Area of Interest (AOI) where PFAS-containing materials may have been
298 stored, disposed, or released historically (**Table ES-2** for AOI locations). The objective of the SI
299 is to determine whether there has been a release to the environment from the AOI identified in
300 the PA and determine whether further investigation is warranted, a removal action is required to
301 address immediate threats, or no further action is required based on a comparison of SI results to
302 SLs for the relevant compounds. This SI was completed at the Army Aviation Support Facility
303 (AASF) in Santa Fe, New Mexico, and determined further evaluation under the Comprehensive
304 Environmental Response, Compensation, and Liability Act (CERCLA) is warranted for AOI 1.
305 The Santa Fe AASF will be referred to as the “Facility” throughout this document.

306
307 The Facility, operated by the New Mexico ARNG (NMARNG), encompasses approximately
308 22 acres in Santa Fe, New Mexico, approximately 10 miles southwest of downtown. The original
309 Facility was constructed in 1979 in the northwest corner of the Santa Fe Regional Airport. The
310 Facility was renovated with a new, larger AASF building in 2012. The AASF and surrounding
311 area consists of piedmont slopes underlain by late Cenozoic basin-filling deposits, or the Santa
312 Fe marls. Basin-fill aquifers of the Santa Fe Group are the principal groundwater resource for the
313 cities of Santa Fe, Española, and six Pueblo nations (AECOM Technical Services, Inc. 2020).

314
315 The PA identified one AOI for investigation during the SI phase. SI sampling results from the
316 AOI were compared to OSD SLs. **Table ES-2** summarizes the SI results for the AOI. Based on
317 the results of this SI and following the CERCLA process, a remedial investigation (RI) is
318 warranted for AOI 1. Note that based on historical aerial photographs, application of biosolids
319 extended into the current Santa Fe AASF lease area; biosolid land application extended to the
320 north end of the current AASF building prior to the 2012 renovations of the facility. This area
321 was therefore designated for further evaluation during the SI planning phases.

¹ Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI, as screening values were established after SI planning and execution. However, ARNG will add HFPO-DA to the list of constituents sampled during the next phase of CERCLA, if warranted.

322

Table ES-1. Screening Levels (Soil and Groundwater)

Analyte ²	Residential (Soil) (µg/kg) ¹ 0 to 2 ft bgs	Industrial / Commercial Composite Worker (Soil) (µg/kg) ¹ 2 to 15 ft bgs	Tap Water (Groundwater) (ng/L) ¹
PFOA	19	250	6
PFOS	13	160	4
PFBS	1,900	25,000	601
PFHxS	130	1,600	39
PFNA	19	250	6

Notes:
 1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using U.S. Environmental Protection Agency’s Regional SL Calculator. Hazard Quotient = 0.1. May 2022.
 2. Screening values for HFPO-DA were established after SI planning and execution and thus not included as an analyte. Future CERCLA phases will include HFPO-DA if warranted.
 bgs = Below ground surface
 ft = Foot (feet)
 µg/kg = Microgram(s) per kilogram
 ng/L = Nanogram(s) per liter

323

324

Table ES-2. Summary of Site Inspection Findings and Recommendations

Area	Potential Release Area	Soil	Groundwater-On-site	Groundwater – Facility Boundary	Future Action
AOI 1	Former Firetruck Bay and Tri-Max™ Hand Truck Storage Area	●	●	○	Proceed to RI
Historical WWTP Biosolid Application Area	Historical WWTP Biosolid Application	●	◐	○	Further Evaluation

Notes:
 1. This area will be assessed during the RI to determine if the contamination present poses a detrimental impact on human health for personnel at the facility or the environment.
 WWTP = Wastewater Treatment Plan

325

326

1. INTRODUCTION

327 1.1 PROJECT AUTHORIZATION

328 The Army National Guard (ARNG) G-9 is the lead agency in performing Preliminary
329 Assessments (PAs) and Site Inspections (SIs) at ARNG facilities nationwide based on the current
330 or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on six
331 compounds presented in the memorandum from the Office of the Secretary of Defense (OSD)
332 dated 6 July 2022 (Assistant Secretary of Defense 2022). The six compounds listed in the OSD
333 memorandum will be referred to as “relevant compounds” throughout this document and include
334 perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic
335 acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and
336 hexafluoropropylene oxide-dimer acid (HFPO-DA)² at ARNG facilities nationwide. The ARNG
337 performed this SI at the Army Aviation Support Facility (AASF) in Santa Fe, New Mexico. The
338 Santa Fe AASF will be referred to as the “Facility” throughout this report.

339

340 The SI project elements were performed in accordance with the Comprehensive
341 Environmental Response, Compensation, and Liability Act (CERCLA) (U.S. Environmental
342 Protection Agency [USEPA] 1980), as amended, the National Oil and Hazardous Substances
343 Pollution Contingency Plan (40 Code of Federal Regulations Part 300) (USEPA 1994), and in
344 compliance with Army requirements and guidance for field investigations.

345

346 1.2 SITE INSPECTION PURPOSE

347 A PA was performed at the Facility (AECOM Technical Services, Inc. [AECOM] 2020) that
348 identified one Area of Interest (AOI) where PFAS-containing materials were used, stored, and/or
349 disposed, or areas where known or suspected releases to the environment occurred. The objective
350 of the SI is to identify whether there has been a release to the environment from the AOI
351 identified in the PA and determine whether further investigation is warranted, a removal action is
352 required to address immediate threats, or no further action is required based on screening levels
353 (SLs) for the relevant compounds. During the SI planning phase and review of the historical
354 aerial photographs, it was noted that application of biosolids extended on to the current Santa Fe
355 AASF lease area to the north end of the current AASF building prior to the 2012 renovations of
356 the Facility. This area was therefore designated for further evaluation under this SI.

² Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI, as screening values were established after SI planning and execution. However, ARNG will add HFPO-DA to the list of constituents sampled during the next phase of CERCLA, if warranted.

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358

2. SITE BACKGROUND

359 2.1 SITE LOCATION AND DESCRIPTION

360 The Santa Fe AASF is located within the incorporated limits of and approximately 10 miles
361 southwest of downtown Santa Fe, New Mexico. The 22-acre Facility is located on the northwest
362 corner of the Santa Fe Regional Airport (SAF) and is leased to the New Mexico Army National
363 Guard (NMARNG) by the City of Santa Fe (City). The land was acquired in 1976, and the
364 original Facility was constructed in 1979. The original facility consisted of an AASF building
365 and hangar and a small parking apron for helicopters. In 2012, the Facility was completely
366 renovated with a new, larger AASF building constructed adjacent to the former AASF building,
367 and the former AASF building converted to the Santa Fe Readiness Center (AECOM 2020).

368

369 The properties immediately surrounding the AASF are also owned by the City, with the Santa Fe
370 Wastewater Treatment Plant (WWTP) to the north, and the Santa Fe Regional Airport
371 immediately to the west, south, and east (**Figure 2-1**) (AECOM 2020).

372

373 2.2 FACILITY ENVIRONMENTAL SETTING

374 The AASF is at an elevation of approximately 6,330 feet (ft) above mean sea level (amsl). The
375 Facility is covered by the U.S. Geological Survey Turquoise Hill 7.5-minute quadrangle
376 topographic map. The geographic coordinates for the center of the Facility are 106°18'31.454"W;
377 35°37'27.146"N. The Facility is developed with two large buildings, three small structures,
378 and a helicopter parking apron. One building, built in 1979 and renovated in 2012, is the former
379 AASF and the current administration headquarters for the Santa Fe Readiness Center. The
380 second building is the current AASF, which is comprised of a 75,000-square-foot (ft²) hangar/
381 administration building. A 16,400- ft² storage building; a guard house; fuel storage area; and
382 455,000 ft² of concrete airfield paving also exist on the property (AECOM 2020). Topography of
383 the area is displayed in **Figure 2-2**. The regional geology and groundwater features are shown on
384 **Figure 2-3**. The regional surface water features and drainage basins are shown on **Figure 2-4**.
385 Groundwater elevations and contours, if applicable, are presented on **Figures 2-5** and **2-6**.

386

387 2.2.1 Geology

388 The City of Santa Fe, New Mexico, is located on the east border of the Rio Grande trough, in the
389 Española Basin, within the Rio Grande Rift. The basin formed during 25 million years of plate
390 tectonic stress pulling the land apart and causing a vast expanse of land to subside. When these
391 basins formed, large amounts of sediment filled the basin from the ancient flow of the Rio
392 Grande and from volcanic eruptions. These sediments, which fill the basin, make up an aquifer
393 system that contains the primary source of water for most residents who live in the basin
394 (AECOM 2020).

395

396 The Española basin in north-central New Mexico comprises the central portion of the Rio
397 Grande rift, which formed in response to rifting as early as Oligocene epoch. There are four main
398 physiographic units associated with the Santa Fe area: a complex of metamorphic and igneous
399 rocks from the Pre-Cambrian encompassing the Sangre de Cristo mountains in the eastern area;
400 sedimentary and volcanic rocks Neogene to Quaternary in age in the southwest; basalt flows of

401 Quaternary in the western Mesa; and basin fill sediments of the Santa Fe group in the intervening
402 piedmont (AECOM 2020).

403
404 Most of the area consists of piedmont slopes underlain by late Cenozoic basin-filling deposits
405 called the Santa Fe marls. These marls are composed of silty sandstones, sand, and gravel
406 approximately 300 ft thick. This layer lies overtop of a bedrock floor that is made up of
407 sedimentary and igneous rocks (AECOM 2020).

408
409 Soils encountered during the SI were dominated by well-graded sand with interbedded gravel,
410 silt, and clay. Samples for grain size analyses were collected at two locations, AOI101-01 and
411 AOI01-02, and analyzed via ASTM International (ASTM) Method D-422. The results indicate
412 that the soil samples are comprised primarily of sand (30.5 to 50.3 percent [%]) and silt (57.3 to
413 41.3%). These results and field observations are consistent with the reported depositional
414 environment of the region. pH in soil samples ranged from 8.7 to 8.9. Total organic carbon
415 (TOC) concentrations ranged from 2,400 to 4,600 milligrams per kilogram (mg/kg).

416 417 **2.2.2 Hydrogeology**

418 Primary aquifers in the Española Basin are contained within the Tertiary-Quaternary Santa Fe
419 Group. Basin-fill aquifers of the Santa Fe Group are the principal groundwater resource for the
420 cities of Santa Fe, Española, and six Pueblo nations. The Santa Fe Group thickens to the west
421 and north, ranging from approximately 250 ft thick south of the City to greater than 10,000 ft
422 beneath the Pajarito Plateau west of Española. The Ancha Formation is a locally important
423 shallow aquifer that is present in the vicinity of the Facility (Johnson et al 2016). The Ancha
424 Formation is comprised of alluvial deposits associated with the ancestral Santa Fe River and the
425 alluvial slope deposits originating from the southwestern Sangre de Cristo Mountains. The
426 Tesuque Formation lies beneath the Ancha Formation and is in hydraulic communication with
427 aquifers within the overlying Ancha and Puye Formations. The highly heterogeneous and
428 complex nature of the Tesuque aquifer reflects its depositional environment of coalescing
429 alluvial fans, a heterogeneity that is compounded by discontinuities created by faulting. The
430 Santa Fe Group aquifers are in hydraulic communication with Precambrian rocks along the
431 eastern margin of the basin where most of the recharge occurs. Paleozoic limestones underlying
432 the basin-fill aquifers, fractured Tertiary intrusive rocks, and Tertiary volcanics of the Jemez
433 volcanic field also locally produce water. Recharge within the basin is assumed to occur
434 primarily from the higher elevations with little or no recharge from the lower elevations because
435 of high evapotranspiration and low precipitation (AECOM 2020).

436
437 Regional groundwater studies indicate that the Facility is near a groundwater divide and
438 that groundwater may travel southwest toward the Santa Fe River or south toward Arroyo
439 Hondo/Cienega Creek (Johnson et al 2016). Based on the SI, regional groundwater flows
440 south-southwest at the Facility. Numerous wells are located south and southwest of the Facility.
441 The nearest domestic well is located approximately 1 mile southwest of the Facility. A municipal
442 well located at the Santa Fe Airport is located a 0.5 mile southeast of the Facility (New Mexico
443 Office of the Engineer [NMOSE] 2022). These and other wells identified during the PA are
444 displayed on **Figure 2-3**.

445

446 The City's drinking water comes from a nearly even split between groundwater from the
447 Buckman and City Well Fields, and surface water from the Santa Fe and Rio Grande rivers. The
448 City well fields are located within or northeast of Santa Fe (AECOM 2020), which are
449 hydrologically upgradient of the Facility.

450
451 During the SI, perched groundwater was observed on the west side of the Facility at depths of
452 110–111 ft below ground surface (bgs). Groundwater flow direction of the perched groundwater
453 could not be calculated since it was encountered in only two drilling locations (**Figure 2-5**).
454 Depth to regional groundwater was observed at 176–185 ft bgs, which is consistent with
455 observations made at Santa Fe WWTP monitoring wells located east of the Facility (New
456 Mexico Environment Department [NMED] Ground Water Quality Bureau 2011). Measurements
457 made during the SI indicate that regional groundwater flows south-southwest with a gradient of
458 0.001 ft/ft (**Figure 2-6**).

459 460 **2.2.3 Hydrology**

461 The Facility's topography is relatively flat. It straddles two watersheds with the northern portion
462 within the Headwaters Santa Fe River Watershed and the southern portion within the Outlet
463 Santa Fe River Watershed. The surface water flow direction is generally to the southwest on both
464 sides of the watershed divide. The Santa Fe River cuts through undeveloped land approximately
465 0.5 miles north of the Facility (AECOM 2020). Water features near the Facility are shown in
466 **Figure 2-4**.

467
468 Consistent with regional surface water flow directions, historical imagery indicates that
469 stormwater flowed to the southwest from the historical helicopter parking apron and other paved
470 areas. Stormwater also appears to have accumulated on either side of the taxiway historically.
471 There are two stormwater retention basins that currently receive water from the tarmac. A
472 stormwater detention pond north of the Readiness Center currently receives runoff and has an
473 outflow that is directed north. Historical imagery suggests that those areas were constructed
474 during the 2012 facility renovations and did not previously receive runoff. Current and historical
475 areas that receive or appear to have received stormwater runoff are displayed in **Figure 2-4**.

476
477 The City of Santa Fe's surface water comes from the Santa Fe River and San Juan-Chama
478 Project water via the Rio Grande, both of which are treated through conventional and advanced
479 treatment processes to meet current permit regulations. The City of Santa Fe has a license to
480 store up to 3,985-acre ft (combined) of Santa Fe River water in McClure and Nichols Reservoirs.
481 Both municipal drinking water supply reservoirs are located east of Santa Fe (AECOM 2020).

482 483 **2.2.4 Climate**

484 Santa Fe is located in north central New Mexico at an elevation of approximately 7,000 ft amsl.
485 January is the coldest month, with an average temperature of 30.5 degrees Fahrenheit (°F), while
486 July is the hottest month, with an average temperature of 70.1°F. Santa Fe receives an average of
487 14.2 inches of precipitation annually, with 5.85 inches falling during summer months. The City
488 receives an annual snowfall amount of 23 inches per year (AECOM 2020).

489 **2.2.5 Current and Future Land Use**

490 Presently, Santa Fe AASF resides on SAF property. The Facility is comprised of one hangar,
491 multiple administrative buildings, a paved parking area, a fueling station, and a small, paved
492 parking area. The current land use is listed as I-1 Light Industrial. Future land use is not
493 anticipated to change (AECOM 2020). The Facility is fenced and has restricted access. Land
494 directly to the north and east of the Facility is currently a WWTP biosolid application area
495 owned by the City of Santa Fe.

496
497 **2.2.6 Critical Habitat and Threatened/Endangered Species**

498 A wildlife survey has not occurred at the Facility, and the Facility does not have any significant
499 areas of habitat. The following species have not been identified at the Facility but may be present
500 in the surrounding area.

501
502 The following species are listed as federally endangered, threatened, proposed, and/or candidate
503 species in Santa Fe County, New Mexico (U.S. Fish and Wildlife Service 2022):

- 504
- 505 • Birds: Mexican Spotted Owl, *Strix occidentalis lucida* (Threatened); Southwestern
506 Willow Flycatcher, *Empidonax traillii extimus* (Endangered); and Yellow-billed Cuckoo,
507 *Coccyzus americanus* (Threatened)
 - 508
 - 509 • Fishes: Rio Grande Cutthroat Trout, *Oncorhynchus clarkii virginalis* (Candidate); and
510 Rio Grande Silvery Minnow, *Hybognathus amarus* (Endangered)
 - 511
 - 512 • Insects: Monarch Butterfly, *Danaus plexippus* (Candidate)
 - 513
 - 514 • Amphibians: Jemez Mountains Salamander, *Plethodon neomexicanus* (Endangered)
 - 515
 - 516 • Mammal: New Mexico Meadow Jumping Mouse, *Zapus hudsonius luteus* (Endangered).
 - 517

518 **2.3 HISTORY OF PFAS USE**

519 Two potential PFAS release areas were identified at the Facility during the PA (AECOM 2020).
520 The areas include the former AASF building and former Tri-Max™ 70/30 hand-truck storage
521 area, which consists of the flight line and paved parking apron. These two potential source areas
522 are in close proximity to one another and have co-mingling stormwater runoff. As a result, these
523 areas were combined and together comprise AOI 1.

524
525 Personnel interviews confirmed that a firetruck parked within the former AASF building stored
526 aqueous film-forming foam (AFFF). Personnel indicate that it was never used because no one at
527 the Facility was qualified to use it; however, there is a possibility that the firetruck stored inside
528 the former AASF Facility may have leaked AFFF or may have had its AFFF tank flushed out
529 during maintenance. There are no records or recollection of the AFFF stored on this firetruck
530 being used or spilled.

531

532 Prior to the 2012 facility renovation, Tri-Max™ 70/30 hand trucks were stored in various places
533 around the flight line and paved parking apron and constitute a potential PFAS source within
534 AOI 1. The hand trucks were regularly serviced. Service for Tri-Max™ 70/30 hand trucks may
535 include nozzle checks that can result in an AFFF discharge. According to personnel, the Tri-
536 Max™ hand trucks were only used for 4 to 5 years in the mid-2000s and were turned in because
537 they were too expensive to maintain. There is no recollection or record of any training conducted
538 with these units or nozzle testing performed. A description of AOI 1 and its potential release
539 areas are presented in **Section 3**.

540

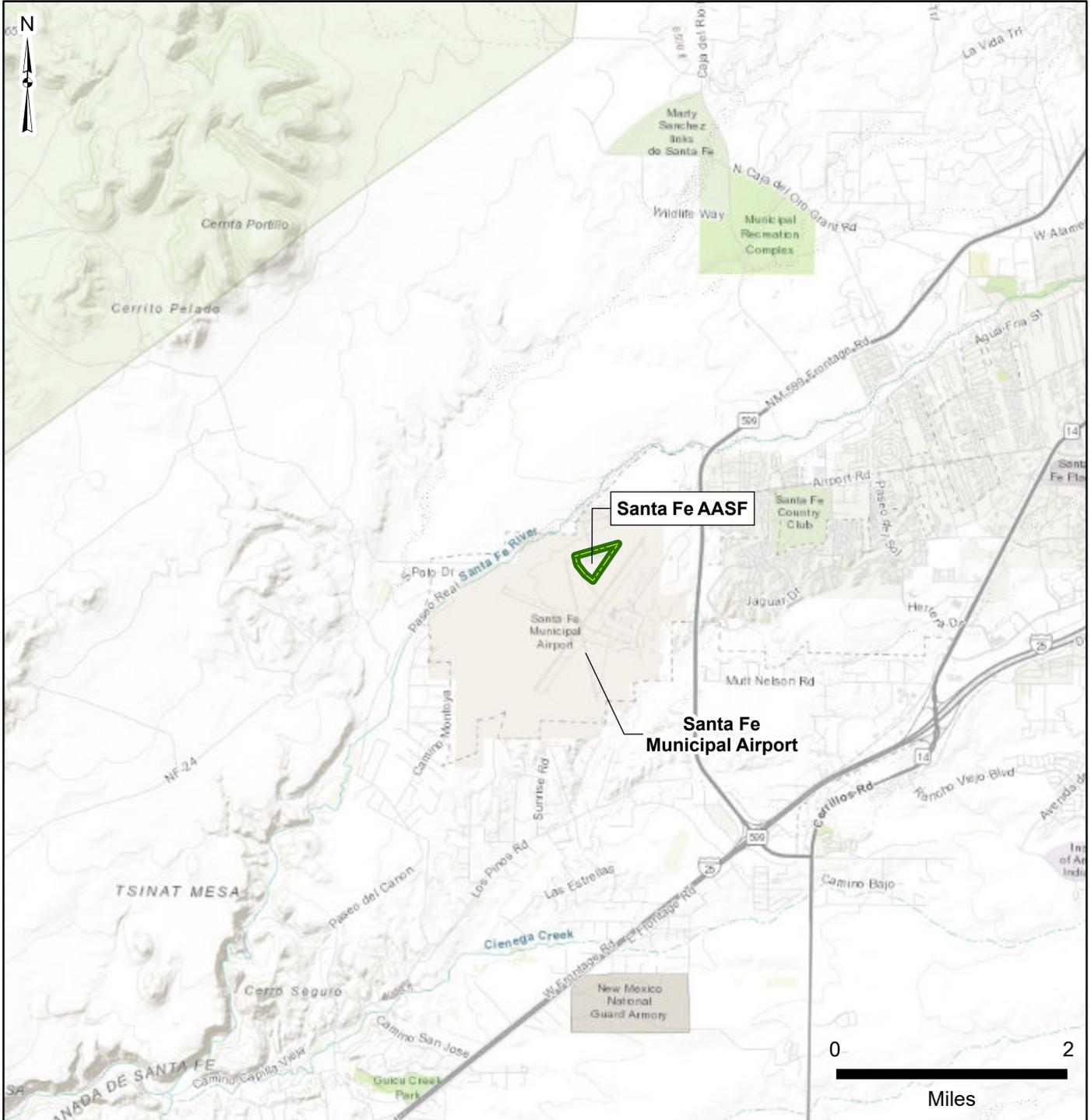
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 Santa Fe AASF, New Mexico



Figure 2-1
 Facility Location



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Facility Data

 Facility Boundary

Data Sources:
 ESRI 2020
 AECOM 2020

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

544

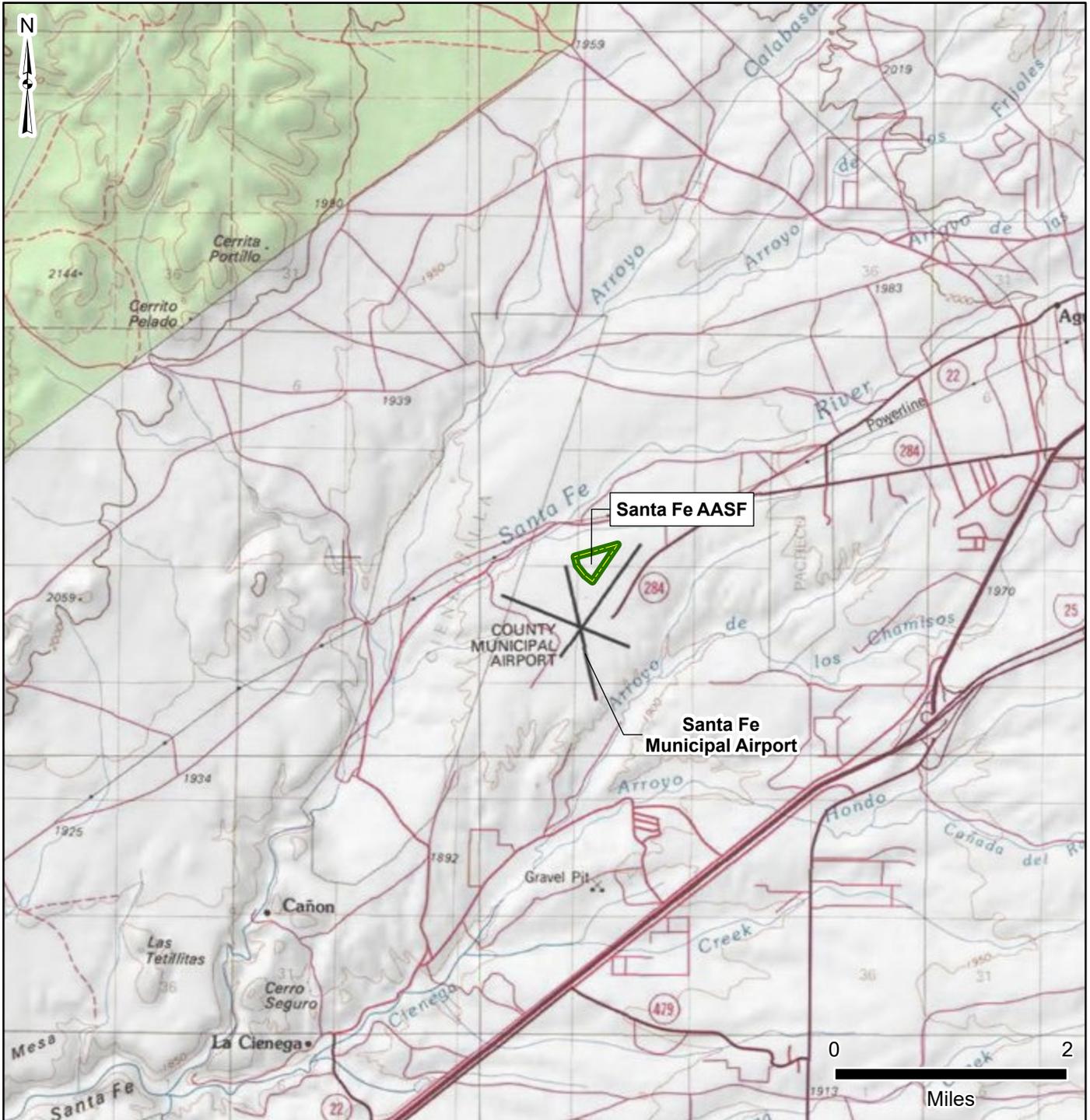
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Army National Guard Site Inspections
 Site Inspection Report
 Santa Fe AASF, New Mexico



Figure 2-2
 Facility Topography



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Facility Data

Facility Boundary

Data Sources:
 ESRI 2020
 AECOM 2020

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

548

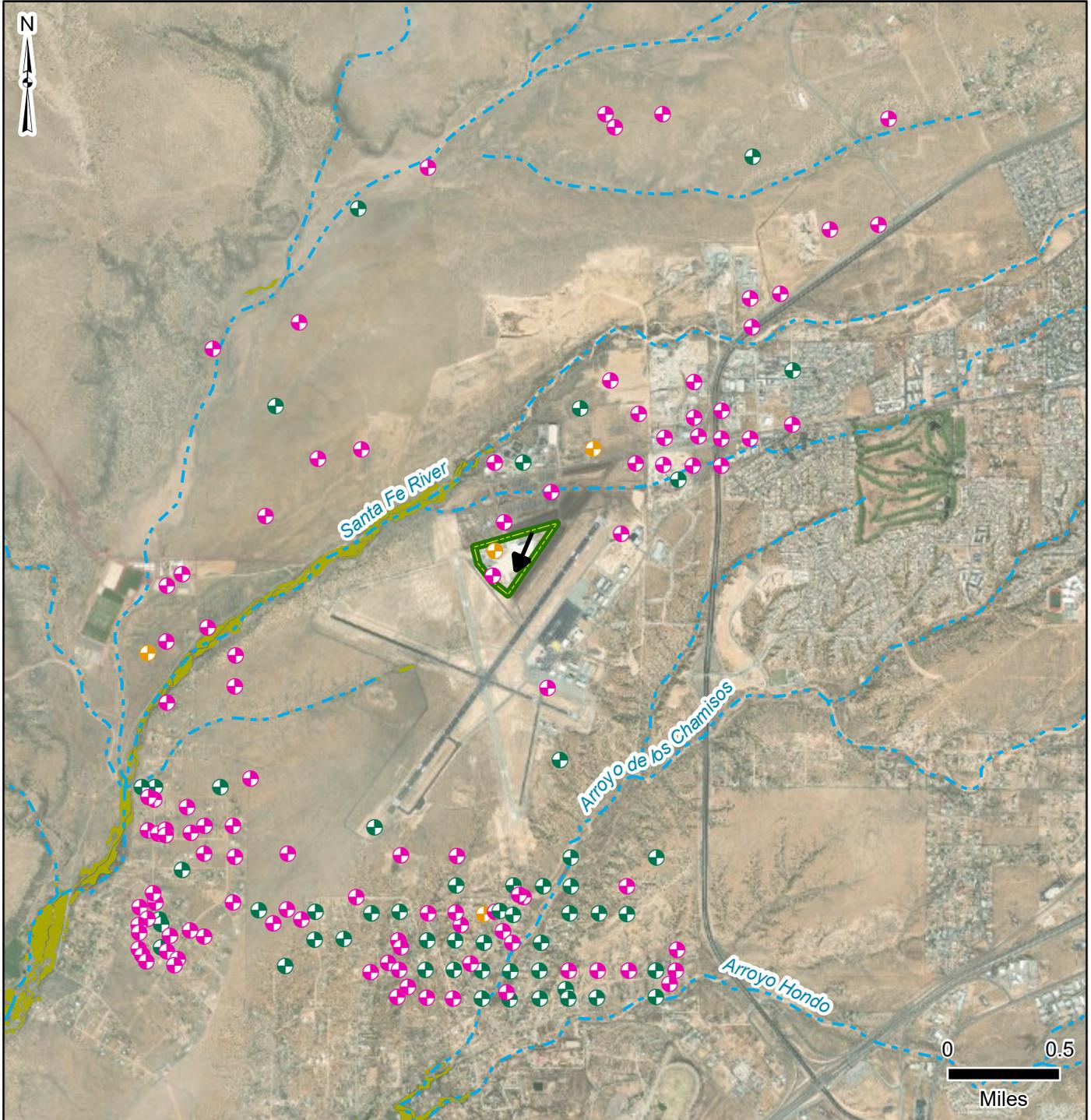
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 Santa Fe AASF, New Mexico



Figure 2-3
 Groundwater Features



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Facility Data

Facility Boundary

Well Type

- Domestic Well
- Irrigation Well
- Unknown/Other Well

Hydrology/Hydrogeology

- Groundwater Flow Direction (Deep Water-Bearing Zone)
- Perennial Creek/Stream
- Intermittent Creek/Stream
- Wetlands

Data Sources:
 ESRI 2020
 AECOM 2020

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

552

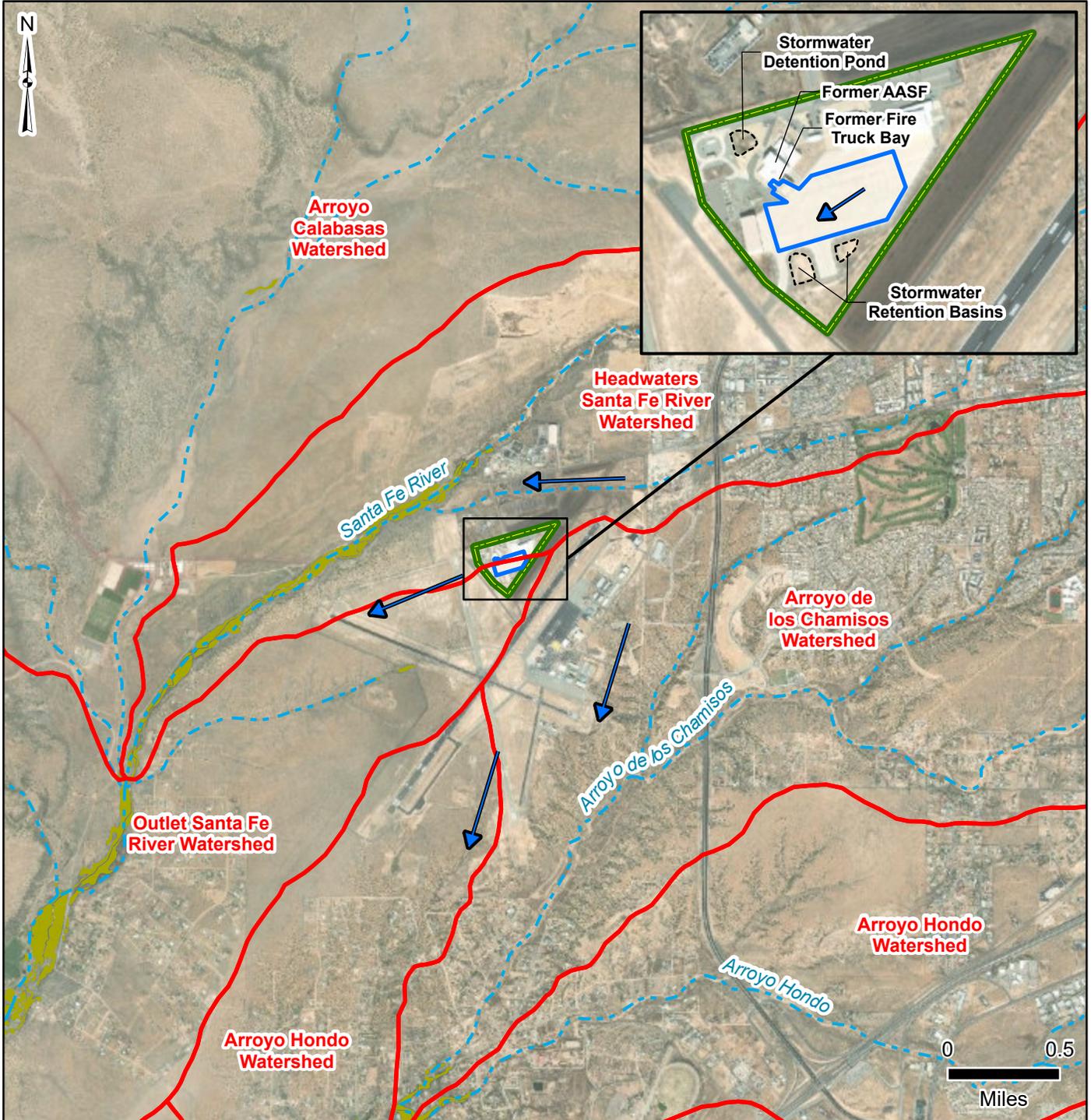
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Army National Guard Site Inspections
 Site Inspection Report
 Santa Fe AASF, New Mexico



Figure 2-4
 Surface Water Features



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Facility Data

- Facility Boundary
- Area of Interest

Hydrology

- Surface Water Flow Direction
- Perennial Creek/Stream
- Intermittent Creek/Stream
- Wetlands

Watershed Boundary

Data Sources:
 ESRI 2020
 AECOM 2020

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

556

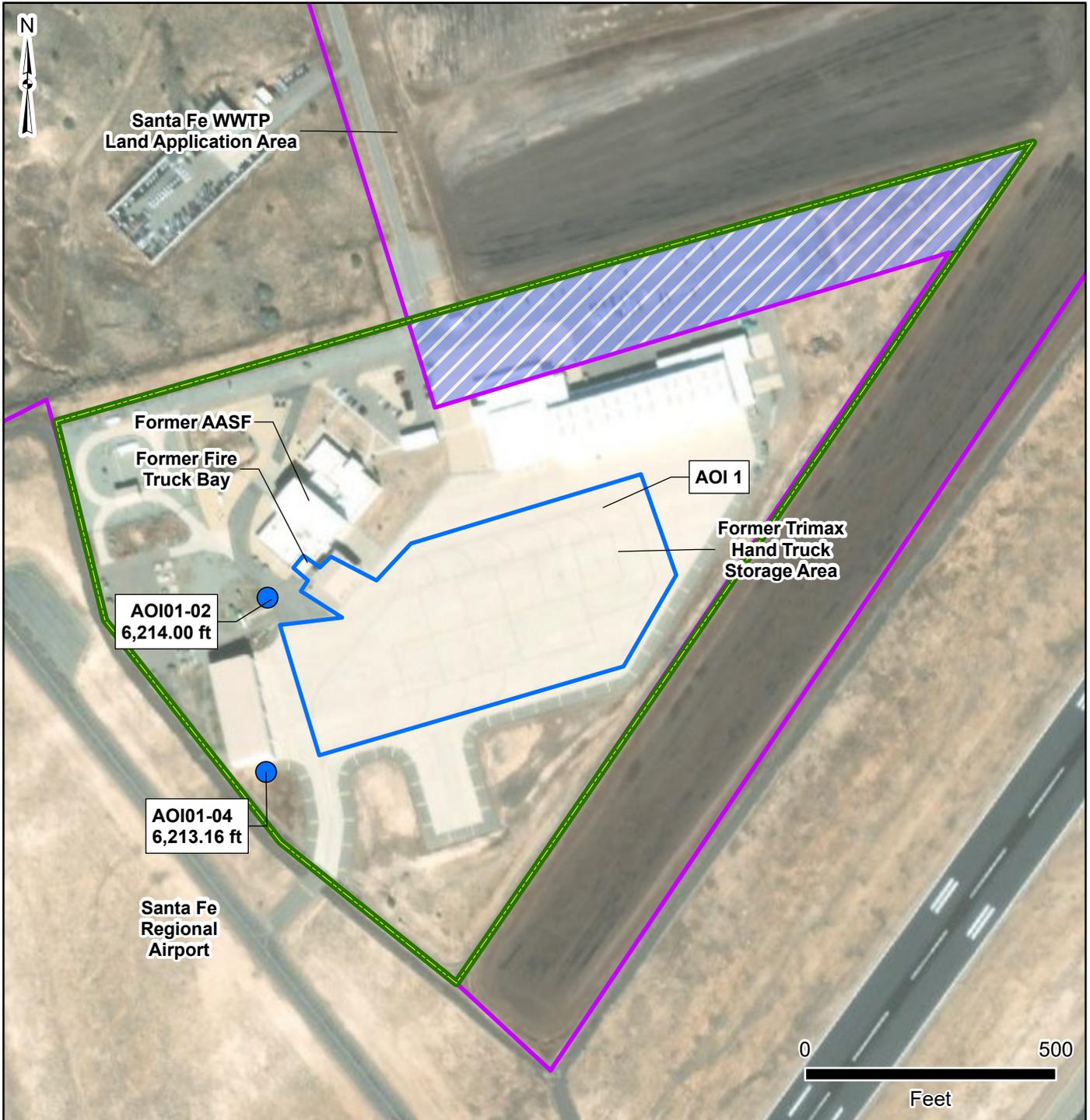
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Army National Guard Site Inspections
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Santa Fe AASF, New Mexico



Figure 2-5
Groundwater Elevations,
Perched (June 2022)



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Facility Data

- Facility Boundary
- Area of Interest
- Adjacent Potential Source Areas
- Historical WWTP Biosolid Area

Sample Locations

- Sonic Soil Boring/Monitoring Well

Note:
Groundwater elevation is provided
in feet above mean sea level.

Data Sources:
ESRI 2022
AECOM 2020

Date:.....December 2022
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 13N

560

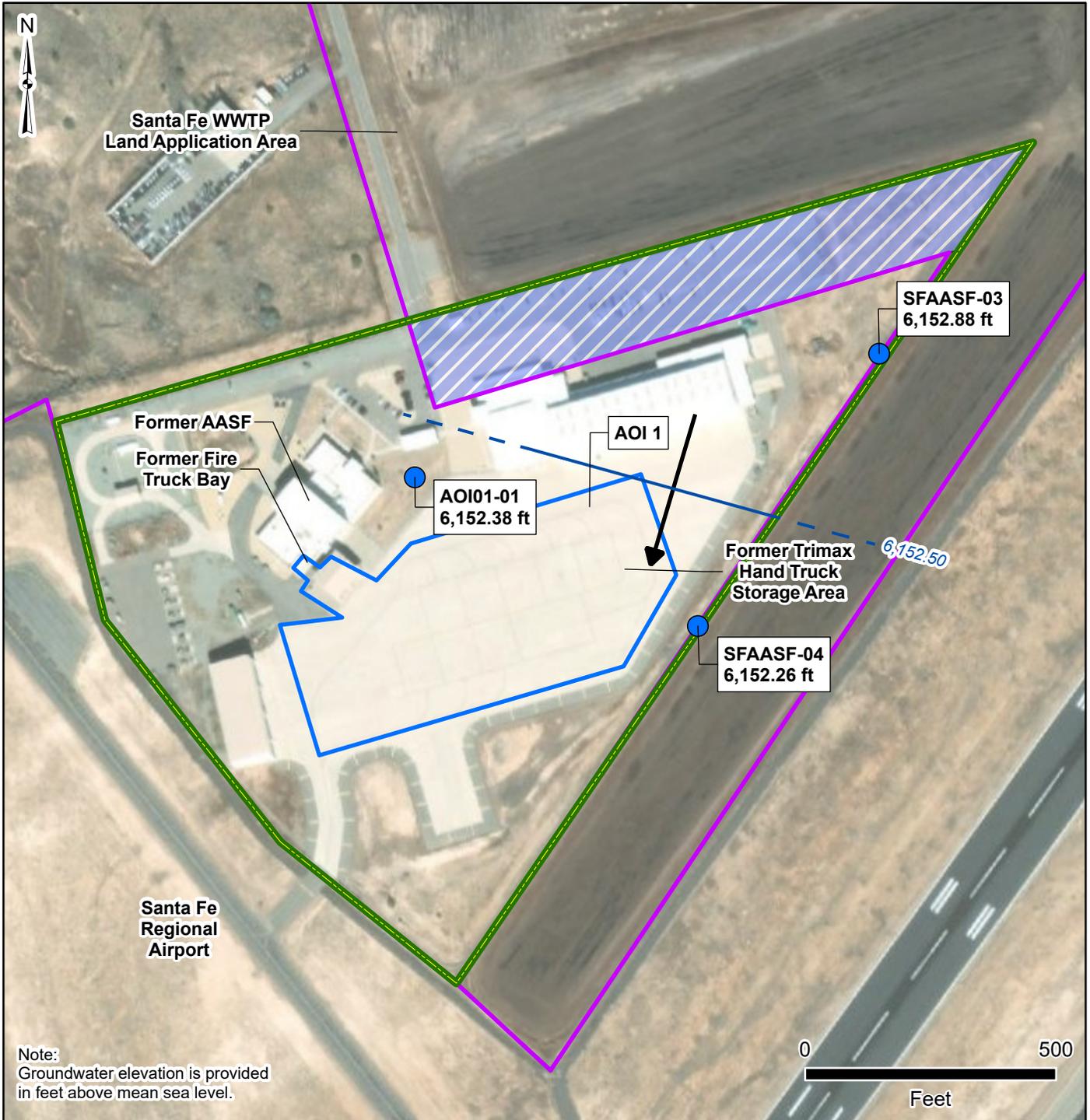
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Army National Guard Site Inspections
 Site Inspection Report
 Santa Fe AASF, New Mexico



Figure 2-6
 Groundwater Elevations,
 Regional (June 2022)



Note:
 Groundwater elevation is provided
 in feet above mean sea level.

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Facility Data

- Facility Boundary
- Area of Interest
- Adjacent Potential Source Areas
- Historical WWTP Biosolid Area

Sample Locations

- Sonic Soil Boring/Monitoring Well

Hydrology/Hydrogeology

- Groundwater Flow Direction
- Groundwater Elevation Deep Water Contour Interval
- Dashed where Inferred

Data Sources:
 ESRI 2022
 AECOM 2020

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

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565

3. SUMMARY OF AREAS OF INTEREST

566 The PA evaluated areas where PFAS-containing materials may have been used, stored, disposed,
567 or released historically. Based on the PA findings, one potential release area was identified at the
568 Santa Fe AASF: AOI 1 Former Firetruck Bay and Tri-Max™ Hand Truck Storage Area.

569 Additionally, there are off-facility potential source areas as detailed in **Section 3.2**. The potential
570 source areas are shown on **Figure 3-1** and described in subsequent sections.

571

572 **3.1 AOI 1 – FORMER FIRETRUCK BAY AND TRI-MAX™ HAND TRUCK** 573 **STORAGE AREA**

574 AOI 1 consists of the Santa Fe AASF Former Firetruck Bay and Tri-Max™ Hand Truck Storage
575 Area. Each of these areas is described below and shown on **Figure 3-1**.

576

577 **3.1.1 Former Firetruck Bay**

578 The former AASF building, which is now the current Santa Fe Readiness Center, is located on
579 the western portion of the Facility and historically housed a single firetruck within a bay. The
580 firetruck was stored in this bay for an unknown length of time, but it was sold in 2005 to the
581 Santa Fe Fire Department. Personnel interviews confirmed that the firetruck stored AFFF foam,
582 but it was never used because no personnel at the Facility were qualified to use it. There are no
583 records or recollection of the use or release of the AFFF stored on the firetruck; however, there is
584 a possibility that the firetruck stored may have leaked AFFF or had its AFFF tank flushed out
585 during maintenance.

586

587 The building was renovated in 2012 and received a new roof, exterior wall openings and
588 finishes, interior walls, floor finishes, ceilings, and lighting. Mechanical, electrical, plumbing,
589 fire protection, telecommunication, and security systems were replaced as well. There is no floor
590 drain in the remodeled bay and no evidence one was previously present. The current Santa Fe
591 Readiness Center building does not currently house any materials containing AFFF (AECOM
592 2020).

593

594 **3.1.2 Former Tri-Max™ Hand Truck Storage Area**

595 The flight line and paved parking apron currently stretch across the majority of the Facility and
596 are directly adjacent to both the current and former AASF buildings. The area was expanded
597 and repaved in 2012 during the construction and renovation of the Facility. Prior to the 2012
598 renovation, Tri-Max™ 70/30 hand trucks were stored in various places around the flight line and
599 parking apron and were regularly serviced. Service for Tri-Max™ 70/30 hand trucks may include
600 nozzle checks that can result in an AFFF discharge. According to personnel, the Tri-Max™ hand
601 trucks were only used for 4 to 5 years in the mid-2000s and their use was discontinued because
602 they were too expensive to maintain. There is no recollection or record of any training conducted
603 with these units or nozzle testing performed. Interviewees were unsure about when or where,
604 specifically, the Tri-Max™ units were turned in, but they no longer exist at the Facility and have
605 since been replaced with fire extinguishers that do not contain PFAS (AECOM 2020).

606 **3.2 ADJACENT AND HISTORICAL POTENTIAL SOURCES**

607 Two potential off-facility sources of PFAS are located adjacent to the Facility and are not under
608 the control of the NMARNG. A description of each potential off-facility source is presented
609 below and shown on **Figure 3-1**.

610
611 **3.2.1 Santa Fe Regional Airport**

612 The SAF is a public airport that opened in 1941 and covers 2,128 acres. The SAF has three
613 active asphalt runways. Interviews with NMARNG facility staff and a historical records search
614 provided little information regarding use of AFFF at SAF; however, the records search detailed
615 two emergency incidents that happened on or near the runway on 27 November 2018, and on
616 8 April 2019. According to a local news source, the first crash occurred when a single-engine
617 Mooney M20 crashed just short of the runway and burst into flames. The second crash happened
618 several months later, when a two-seater aircraft crashed and burst into flames at the airport on a
619 secondary runway just south of the AASF Facility (AECOM 2020). Fire Station 10 supports the
620 Santa Fe Airport with a crash rescue fire truck (City of Santa Fe 2022), which is presumably
621 AFFF-enabled. As a result, the entirety of the airport is considered a potential AFFF release area.
622 The Santa Fe Regional Airport is located upstream of surface water flow and cross-gradient to
623 groundwater flow at the time of gauging.

624
625 **3.2.2 Santa Fe WWTP, Associated Land Application Areas, and Solar Panel Farm**

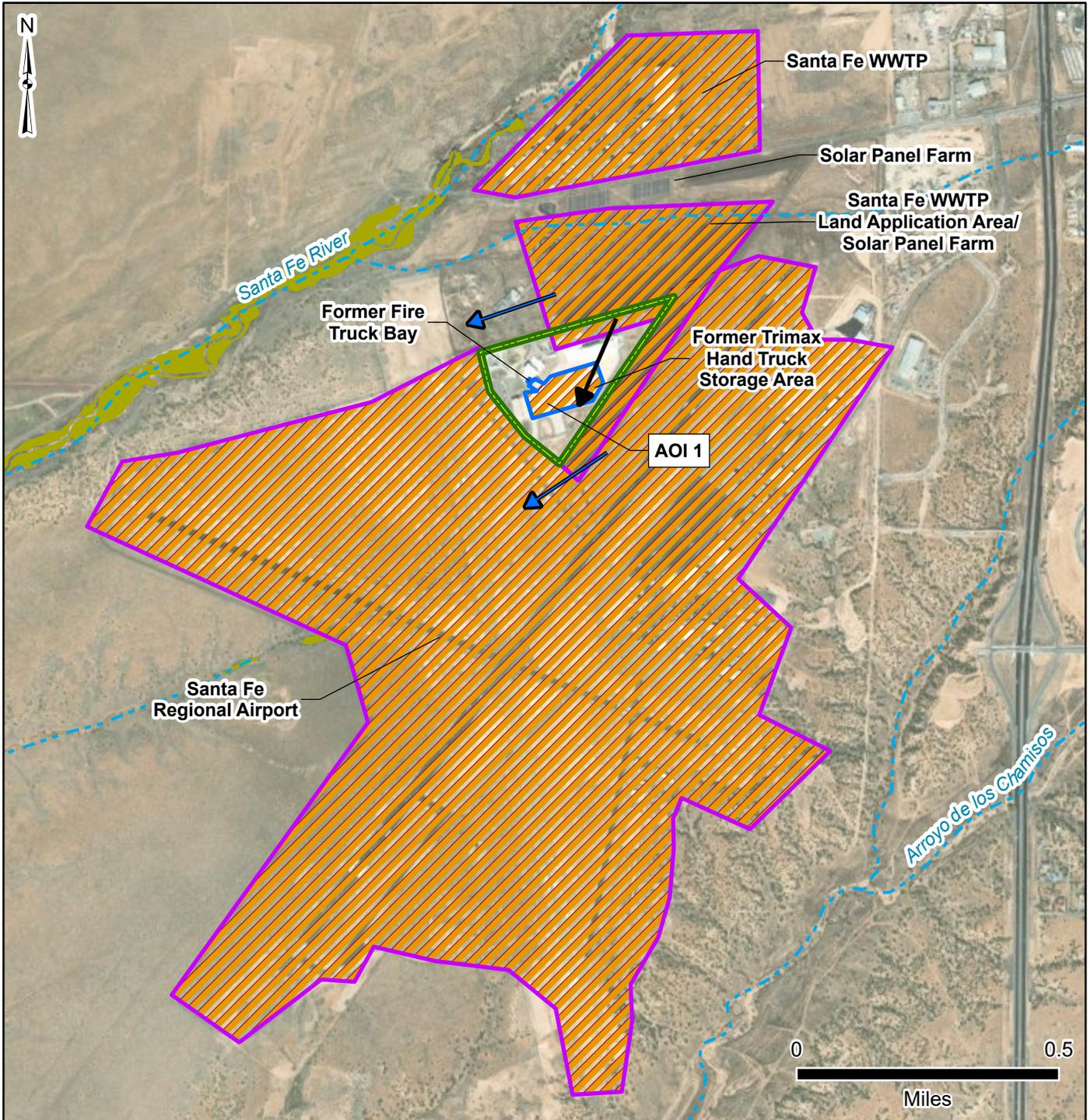
626 The Santa Fe WWTP is located north of the Santa Fe AASF. Areas to the north and east of the
627 Santa Fe AASF are currently used for land application of biosolids. Within the Santa Fe WWTP
628 Land Application area is a solar panel farm, which is also a potential source of PFAS due to the
629 use of fluoropolymers in the construction of solar panels. Based on historical aerial
630 photographs, application of biosolids extended into the current Santa Fe AASF lease area;
631 biosolid land application extended to the north end of the current AASF building prior to the
632 2012 renovations of the Facility (**Figure 3-1**). Although WWTPs are not usually primary
633 potential release areas of PFAS, sludges and liquids from areas of potential release that are
634 treated at WWTPs can create a secondary source of contamination.



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Figure 3-1
 Areas of Interest



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Facility Data

- Facility Boundary
- Area of Interest
- Adjacent Potential Source Areas
- Potential PFAS Release

Hydrology/Hydrogeology

- Surface Water Flow Direction
- Groundwater Flow Direction (Regional)
- Intermittent Creek/Stream

Wetlands

Data Sources:
 ESRI 2020
 AECOM 2020

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

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639

4. PROJECT DATA QUALITY OBJECTIVES

640 As identified during the data quality objective (DQO) process and outlined in the SI Uniform
641 Federal Policy- (UFP) Quality Assurance Project Plan (QAPP) Addendum (EA Engineering,
642 Science, and Technology, Inc., PBC [EA] 2021a), the objective of the SI is to identify whether
643 there has been a release to the environment at the AOI identified in the PA. For each AOI,
644 ARNG determines if further investigation is warranted, a removal action is required to address
645 immediate threats, or whether no further action is warranted. This SI evaluated groundwater and
646 soil for presence or absence of relevant compounds at the sampled AOI.

647

4.1 PROBLEM STATEMENT

649 ARNG will recommend AOIs for remedial investigation (RI) if site-related soil and groundwater
650 samples have concentrations of the relevant compounds above the OSD risk-based screening
651 levels. The SLs are presented in **Section 6.1**.

652

4.2 INFORMATION INPUTS

654 Primary information inputs for the SI include the following:

655

- 656 • The PA Report for the Santa Fe AASF (AECOM 2020)
- 657
- 658 • Analytical data collected during other environmental sampling efforts at each ARNG
659 facility
- 660
- 661 • Groundwater and soil sample data collected as part of this SI in accordance with the
662 site-specific UFP-QAPP Addendum (EA 2021a)
- 663
- 664 • Field data collected including groundwater elevation and water quality parameters
665 measured at the time of sampling.
- 666

666

4.3 STUDY BOUNDARIES

668 The scope of the SI was bounded horizontally by the property limits of the Facility (**Figure 2-2**).
669 Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is
670 required, the proper stakeholders will be notified, and necessary rights of entry will be obtained
671 by ARNG with property owner(s). The scope of the SI was vertically bounded as follows:
672 groundwater (110–185 ft bgs), soil from hand-auger borings (0–2 ft bgs), soil from direct-push
673 technology (DPT) borings (15 ft bgs), and soil from sonic drilling borings (197 ft bgs). Temporal
674 boundaries were limited to the earliest available time field resources were available to complete
675 the study.

676

4.4 ANALYTICAL APPROACH

678 Samples were analyzed in accordance with Department of Defense (DoD) Quality Systems
679 Manual (QSM) Version 5.3 by Eurofins Lancaster Laboratories Environmental, LLC, accredited
680 under the DoD Environmental Laboratory Accreditation Program (ELAP) (DoD ELAP);

681 Accreditation No. 1.01). PFAS data underwent 100 % Stage 2B validation in accordance with
682 the DoD General Data Validation Guidelines (2019) and DoD Data Validation Guidelines
683 Module 3: Data Validation Procedure of PFAS Analysis by QSM Table B-15 (2020).

684
685 Data were compared to applicable SLs and decision rules as defined in the UFP-QAPP
686 Addendum (EA 2021b).

688 **4.5 DATA USABILITY ASSESSMENT**

689 The Data Usability Assessment (DUA), which is provided in **Appendix A**, is an evaluation at the
690 conclusion of data collection activities that uses the results of both data verification and
691 validation in the context of the overall project decisions or objectives. Using both quantitative
692 and qualitative methods, the assessment determines whether project execution and the resulting
693 data have met installation-specific DQOs. Both sampling and analytical activities are considered
694 to assess whether the collected data are of the right type, quality, and quantity to support the
695 decision-making (DoD 2019a, 2019b; USEPA 2017).

696
697 Based on the DUA, the environmental data collected during the SI were found to be acceptable
698 and usable for this SI evaluation with the qualifications documented in the DUA and its
699 associated data validation reports. These data are of sufficient quality to meet the objectives and
700 requirements of the UFP-QAPP Addendum (EA 2021b).

701

5. SITE INSPECTION ACTIVITIES

702 This section describes the environmental investigation and sampling activities that occurred as
703 part of the SI. The SI sampling approach was based on the findings of the PA and was
704 implemented in accordance with the following approved documents:

705

- 706 • *Final Preliminary Assessment Report, Santa Fe Army Aviation Support Facility*, dated
707 August 2020 (AECOM 2020)
708
- 709 • *Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan, Site*
710 *Inspections for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations,*
711 *Nationwide*, dated December 2020 (EA 2020a)
712
- 713 • *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan*
714 *Addendum, Santa Fe Army Aviation Support Facility, Santa Fe, New Mexico* dated
715 December 2021 (EA 2021b)
716
- 717 • *Final Programmatic Accident Prevention Plan, Revision 1*, dated November 2020 (EA
718 2020b)
719
- 720 • *Final Accident Prevention Plan/Site Safety and Health Plan Addendum, Santa Fe Army*
721 *Aviation Support Facility, New Mexico*, dated August 2021 (EA 2021a).
722

723 The SI field activities were conducted during two mobilizations. Field activities for the first
724 mobilization were conducted from 7 to 8 February 2022 and consisted of hand augering and
725 surface soil sample collection. The second mobilization was conducted 25 April through 3 June
726 2022. Field activities included sonic and DPT drilling, collection of soil samples, installation of
727 permanent monitoring wells, groundwater gauging and sampling, and collection of spatial data.
728 Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2021a),
729 except as noted in **Section 5.8**.

730

731 The following samples were collected during the SI and analyzed for a subset of 24 compounds
732 via liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with QSM
733 Version 5.3 Table B-15 to fulfill the project DQOs:

734

- 735 • Eighteen (18) surface soil samples collected by hand auger from 16 locations
736
- 737 • Fifteen (15) shallow subsurface samples collected by direct push/sonic drilling from 10
738 locations
739
- 740 • Eight (8) deep subsurface samples collected from 6 locations by sonic drilling
741
- 742 • Six (6) groundwater samples from 5 groundwater monitoring wells
743
- 744 • Nineteen (19) field blanks

- 745
- Twenty-one (21) equipment rinsate samples.

746 **Figure 5-1** provides the sample locations for all media across the Facility. **Figure 5-2** displays
747 the sample locations with historical imagery to show features and Facility layout before the
748 facility renovation. **Table 5-1** presents the list of samples collected for each medium. Field
749 documentation is provided in **Appendix B**. A log of Daily Notice of Field Activity was
750 completed throughout the SI field activities, which is provided in **Appendix B1**. Field notes are
751 provided in **Appendix B2**. Survey data is presented in **Appendix B3**. Field change request forms
752 are provided in **Appendix B4**. Additionally, a photographic log of field activities is provided in
753 **Appendix C**.

754

755 **5.1 PRE-INVESTIGATION ACTIVITIES**

756 In preparation for the SI field activities, project team members participated in Technical Project
757 Planning (TPP) meetings, performed utility clearance, and sampled decontamination source
758 water. Details of these activities are presented below.

759

760 **5.1.1 Technical Project Planning**

761 The U.S. Army Corps of Engineers (USACE) TPP Process, Engineer Manual (EM) 200-1-2
762 (Department of the Army 2016) defines four phases to project planning: (1) defining the project
763 phase; (2) determining data needs; (3) developing data collection strategies; and (4) finalizing the
764 data collection plan. The process encourages stakeholder involvement in the SI, beginning with
765 defining overall project objectives, including DQOs, and formulating a sampling approach to
766 address the AOIs identified in the PA.

767

768 A combined TPP Meeting 1 and 2 was held on 1 October 2021, prior to SI field activities and
769 included a site walk with stakeholders. The combined TPP Meeting 1 and 2 was conducted in
770 general accordance with EM 200-1-2. The stakeholders for this SI include ARNG, NMARNG,
771 USACE, and the NMED, representatives familiar with the Facility, the regulations, and the
772 community. Stakeholders were provided the opportunity to make comments on the technical
773 sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the
774 combined TPP Meeting 1 and 2 was memorialized in the UFP-QAPP Addendum (EA 2021b).

775

776 A TPP Meeting 3 was held after the field event to discuss the results of the SI. Meeting minutes
777 for TPP 3 are included in **Appendix D** of this report. Future TPP meetings will provide an
778 opportunity to discuss the results and findings, and future actions, where warranted.

779

780 **5.1.2 Utility Clearance**

781 EA contracted MT Private Utility Locating Services, LLC, a private utility location service, to
782 perform utility clearance at the Facility. Utility clearance was performed at each of the proposed
783 boring locations on 7 February 2022 with input from the EA field team. It was discovered that
784 incorrect locations received utility clearance for AOI01-02 and AOI01-06. As a result, the
785 corrected locations were surveyed on 27 April 2022. General locating services were used to
786 complete the clearance. Additionally, the first 5 ft of each boring were pre-cleared by EA's

787 drilling subcontractors using a hand auger to verify utility clearance in shallow subsurface where
788 utilities would typically be encountered.

789

790 **5.1.3 Source Water and PFAS Sampling Equipment Acceptability**

791 The potable water source used for decontamination of drilling equipment was sampled prior to
792 the start of field activities and confirmed to be acceptable for this use during the SI. A potable
793 water source sample was collected at the wash rack on 14 October 2021, prior to mobilization,
794 and analyzed for PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15. The results
795 of the decontamination water sample associated with the wash rack spigot source used during the
796 SI are provided in **Appendices F and G**. A discussion of the results is presented in the DUA
797 (**Appendix A**).

798

799 Materials that were used within the sampling zone were confirmed as acceptable for use in the
800 PFAS sampling environment. The checklist of acceptable materials for use in the PFAS sampling
801 environment was provided in the Standard Operating Procedures provided as **Appendix B** to the
802 Programmatic UFP-QAPP (EA 2020a).

803

804 **5.2 SOIL BORINGS AND SOIL SAMPLING**

805 A hand auger was used to collect surface soil samples from 0 to 2 ft bgs. It was also used to
806 collect soil from the top 5 ft of the boring in compliance with utility clearance procedures. For
807 boring locations advanced to a depth greater than 5 ft, soil samples were collected via sonic or
808 DPT drilling methods in accordance with *025 Standard Operating Procedure for Soil Sampling*
809 (EA 2021b). Soil borings associated with monitoring wells were installed with a truck-mounted
810 Boart LS600 full-sized sonic rig. Continuous soil cores were collected to the target depth. For
811 15-ft borings, a Geoprobe® 7822DT dual-tube sampling system was used.

812

813 At hand auger borings, a soil sample was collected from 0 to 2 ft bgs with a total depth of 2 ft
814 bgs. Three discrete soil samples were collected for chemical analysis from all other soil borings:
815 one sample at the surface (0 to 2 ft bgs) and two subsurface soil samples. In 15-ft DPT borings,
816 subsurface soil samples were collected at 6–8 ft bgs and 13–15 ft bgs. In deeper soil borings
817 associated with monitoring wells and drilled with sonic, one subsurface soil sample was
818 collected at the 13–15 ft bgs interval, and one sample was collected approximately 1 ft above the
819 groundwater table. Total depth for soil borings associated with monitoring wells ranged from
820 110 to 184 ft bgs. Note that subsurface soil samples were not collected at SFAASF-03;
821 concentrations in sub-surface soil are considered to be represented by the samples collected at
822 SFAASF-03-PA due to the close proximity of the two borings.

823

824 All soil sample locations are shown on **Figures 5-1 and 5-2** and boring sample depths are
825 provided in **Table 5-1**. The soil boring locations were selected based on the AOI information
826 provided in the PA (AECOM 2020) and as agreed upon by stakeholders during the TPP and
827 review of the UFP-QAPP Addendum (EA 2021b), with several exceptions. Soil boring locations
828 AOI01-06B, AOI01-09, and SFAASF-03-PA are not included in the UFP-QAPP Addendum but
829 are discussed in **Section 5.8**.

830 During drilling, soil cores were continuously logged for lithological descriptions by a field
831 geologist using the Unified Soil Classification System. A photoionization detector (PID) was
832 used to screen the breathing zone during boring activities as a part of personal safety
833 requirements. Observations and measurements were recorded boring log forms in a non-treated
834 field logbook. Depth interval, recovery thickness, PID concentrations, moisture, relative density,
835 Munsell color, and Unified Soil Classification System texture were recorded. Soil borings
836 SFAASF-03 and AOI01-09 were not logged due to their close proximity (17 ft or less) to
837 soil borings SFAASF-03-PA and AOI01-01, respectively. The boring logs are provided in
838 **Appendix E.**

839
840 Boreholes advanced to a maximum depth of 2 ft bgs were filled with bentonite. Boreholes
841 advanced to a maximum depth of 15 ft bgs were backfilled with material removed from the
842 borehole and then bentonite pellets filled the remainder to land surface except for boring AOI01-
843 06B which was filled with bentonite and the cuttings were drummed.

844
845 Each sample was collected into a laboratory-supplied PFAS-free high-density polyethylene
846 (HDPE) bottle and labeled using a PFAS-free marker or pen. Samples were packaged on ice
847 and transported via Federal Express (FedEx) under standard chain-of-custody procedures to
848 the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM Version 5.3 Table
849 B-15), TOC (USEPA Method 9060A) and pH (USEPA Method 9045D) in accordance with the
850 UFP-QAPP Addendum (EA 2021b).

851 Field duplicate (FD) samples were collected at a rate of 10% and analyzed for the same
852 parameters as the accompanying samples. Matrix spike (MS)/matrix spike duplicates (MSDs)
853 were collected at a rate of 5% and analyzed for the same parameters as the accompanying
854 samples. In instances when non-dedicated sampling equipment was used, such as a hand auger
855 for the shallow soil samples, one equipment blank (EB) was collected per day and analyzed for
856 the same parameters as the soil samples. One field blank (FB) was collected per day. A
857 temperature blank was placed in each cooler to ensure that samples were preserved at or below
858 6 degrees Celsius (°C) during shipment. After removal of the drilling equipment, boreholes were
859 abandoned using bentonite chips. In borings installed on paved surfaces, the borings were
860 abandoned by backfilling with bentonite chips. Borings were installed in unpaved areas to avoid
861 disturbing concrete or asphalt surfaces.

862 863 **5.3 MONITORING WELL INSTALLATION AND GROUNDWATER GRAB** 864 **SAMPLING**

865 Monitoring wells were installed using a truck-mounted Boart LS600 full-sized sonic rig. Once
866 the borehole was advanced to the desired depth, a monitoring well was constructed of a 20-ft
867 section of 2-inch Schedule 80 polyvinyl chloride (PVC) screen with sufficient casing to reach the
868 ground surface. The screen intervals for the monitoring wells are provided in **Table 5-2.**

869
870 Two wells were installed and subsequently plugged and abandoned due to the lack of water
871 production (AOI01-09) or the presence of grout in the well (SFAASF-03-PA). Upon the
872 completion of SFAASF-03-PA, the well was gauged and found to contain grout. The well was
873 abandoned by filling the PVC pipe with bentonite chips from a depth of 197 to 138.8 ft and
874 adding water to hydrate overnight. The next day the top 5 ft of PVC was removed and a tremie

875 pipe was inserted to fill the rest of the well/borehole with mixed grout 136 ft to ground surface.
876 After AOI01-09 was completed to the target depth, the well was left overnight to allow any
877 groundwater to accumulate. No groundwater accumulated so the well was abandoned by
878 removing the entire PVC pipe and pumping mixed grout to fill the open borehole to ground
879 surface.

880
881 Groundwater samples were collected using a PFAS-free Geosub pump and PFAS-free HDPE
882 tubing. Samples were collected at least 1 week after well development. Each sample was
883 collected in laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker
884 or pen. The monitoring wells were purged at a rate determined in the field to reduce turbidity and
885 draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance,
886 pH, dissolved oxygen, and oxidation-reduction potential) were measured using a water quality
887 meter and recorded on the field sampling form (**Appendix B2**) before each grab sample was
888 collected in a separate container. Samples were packaged on ice and transported via FedEx under
889 standard chain-of-custody procedures to the laboratory and analyzed for PFAS by LC/MS/MS
890 compliant with QSM Version 5.3 Table B-15 in accordance with the UFP-QAPP Addendum (EA
891 2021b). Additionally, a separate groundwater sample was collected for the purpose of conducting
892 a field-administered shake test to observe the presence or absence of foam.

893
894 Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as
895 the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same
896 parameters as the accompanying samples. One FB per day was collected in accordance with the
897 UFP-QAPP Addendum (EA 2021b). A minimum of one EB was collected per day and analyzed
898 for the same parameters as the groundwater samples due to the use of a non-dedicated pump. A
899 temperature blank was placed in each cooler to ensure that samples were preserved at or below
900 6°C during shipment.

901

902 **5.4 SYNOPTIC WATER LEVEL MEASUREMENTS**

903 Groundwater levels were measured and used to calculate facility-wide groundwater elevations
904 and assess groundwater flow direction. Synoptic water-level elevation measurements were
905 collected on 3 June 2022 from the groundwater monitoring wells, taken from the survey mark
906 on the northern side of the well casing. Groundwater elevation maps for perched and regional
907 groundwater are provided in **Figures 2-5** and **2-6**, respectively. Groundwater elevation data are
908 provided in **Table 5-3**.

909

910 **5.5 SURVEYING**

911 The northern side of each new temporary well casing was surveyed using a Trimble R10
912 real-time kinematic differential Global Positioning System (GPS). Positions are provided in the
913 applicable Universal Transverse Mercator zone projection with North American Datum 1983
914 (horizontal) and North American Vertical Datum 1988 using Geoid 18 (vertical). Surveying data
915 were collected on 3 June 2022 and are provided in **Appendix B3**.

916

917 GPS locations for soil borings and land application of soil cuttings were collected using a
918 Trimble Geo 7x by EA on 19–20 May 2022 and 17 June 2022. Coordinates were differentially

919 corrected, and point locations meet accuracy objectives outlined in the UFP-QAPP Addendum
920 Worksheet #22 (EA 2021b). Coordinates are presented in **Appendix B3**.

921

922 **5.6 INVESTIGATION-DERIVED WASTE**

923 As of the date of this report, the disposal of PFAS investigation-derived waste (IDW) is not
924 regulated federally. PFAS IDW generated during the SI is considered non-hazardous waste. The
925 waste was managed according to a set of decision rules approved by ARNG, NMARNG, and
926 NMED and documented in Field Change Request 1. PFAS concentrations from Mobilization 1
927 were compared to the industrial screening levels published in the Risk Assessment Guidance for
928 Investigations and Remediation, Volume 1 (NMED 2021) for the purpose of directing IDW
929 management for Mobilizations 1 and 2.

930

931 Surface soil collected during Mobilization 1 had concentrations below NMED industrial SLs. In
932 accordance with the IDW decision rules outlined in Section 5.8, these cuttings were land applied.
933 All land application areas were recorded with a GPS. **Appendix B3** contains maps displaying
934 land application areas and a table of coordinates.

935

936 For Mobilization 2, in accordance with the IDW decision rules outlined in Section 5.8, in cases
937 where PFAS concentrations in surface soil were less than the NMED industrial SLs, cuttings
938 generated during Mobilization 2 from surface to the capillary fringe were land applied. Soil
939 cuttings from Mobilization 2 were drummed in borehole-specific drums if they were sourced
940 from the capillary fringe or below. Soil cuttings from above the capillary fringe were land
941 applied, with the exception of DPT boring location AOI01-06B. Cuttings from AOI01-06B were
942 drummed due to the lack of surface soil analytical results that could be used to characterize the
943 cuttings. All land application areas were recorded with a GPS. **Appendix B3** contains maps
944 displaying land application areas and a table of coordinates.

945

946 Liquid IDW (i.e., purge water, development water, and decontamination fluids) generated during
947 the SI activities were drummed. All liquid and solid IDW drums are currently stored at the
948 Facility.

949

950 Other solids such as spent personal protective equipment, plastic sheeting, tubing, and unused
951 monitoring well construction materials utilized during the field activities were disposed of as
952 municipal waste.

953

954 **5.7 LABORATORY ANALYTICAL METHODS**

955 Samples were analyzed by LC/MS/MS compliant with QSM Version 5.3 Table B-15 at Eurofins
956 Lancaster Laboratories Environmental, LLC, in Lancaster, Pennsylvania, a DoD ELAP-certified
957 laboratory. Soil samples were also analyzed for TOC using USEPA Method 9060A and pH by
958 USEPA Method 9045D.

959

960 **5.8 DEVIATIONS FROM UFP-QAPP ADDENDUM**

961 The following deviations from the UFP-QAPP Addendum occurred based on conditions
962 encountered during the field investigation activities. These deviations were discussed between

963 EA, ARNG, USACE, NMARNG, and the NMED and are documented in a Field Change
964 Request Form (**Appendix B4**). Deviations from the UFP-QAPP Addendum are noted below:
965

- 966 • The UFP-QAPP Addendum indicates that non-hazardous waste generated during SI
967 activities would be containerized in 55-gallon drums. Based on discussions with ARNG
968 and with the NMED, surface soil samples from each of the drilling locations were
969 collected during a first mobilization. PFAS concentrations were reviewed and compared
970 to state industrial standards for purposes of IDW management. NMED approved the land
971 application of soil cuttings down to the capillary fringe in borings where surface soil
972 concentrations did not exceed state standards. NMED granted approval via email on
973 January 18, 2022 (J. Rhoderick, email). Areas of land application were recorded with a
974 GPS. Locations are provided in a table and a map in **Appendix B3**. Solid IDW from the
975 capillary fringe down were containerized in drums.
976
- 977 • The UFP-QAPP Addendum states that borings will be advanced with air rotary or sonic
978 drilling; however, DPT was used to install 15-ft borings. The alternate technology was
979 used to reduce the length of the field event, as the DPT rig could install 15-ft boreholes
980 while the sonic rig was installing deeper boreholes.
981
- 982 • The UFP-QAPP Addendum identifies AOI01-01 as a 15-ft soil boring and AOI01-03 as a
983 soil boring/monitoring well location. Due to the results of the surface soil sampling
984 during the first mobilization, the project team decided to convert AOI01-01 a soil
985 boring/monitoring well and AOI01-03 to a 15-ft soil boring.
986
- 987 • Soil boring AOI01-06B was installed as a replacement for soil boring AOI01-06. The
988 location of the 0–2 ft surface soil sample from AOI01-06 was collected from the lowest
989 point in the area rather than from the edge of the pavement, as depicted in the UFP-QAPP
990 Addendum (Figure 17-1). Soil boring AOI01-06B was installed at a location in closer
991 proximity to the former parking apron, which was identified as a possible PFAS source.
992
- 993 • An additional soil boring (AOI01-09) was installed 11 ft northeast of monitoring well
994 AOI01-01, which was screened in regional groundwater. The purpose of the installing
995 AOI01-09 was to characterize the groundwater and capillary fringe of perched
996 groundwater if present. Perched groundwater was not observed during drilling and a
997 monitoring well was not installed at the location.
998

999 Additional deviations from the UFP-QAPP not included in the Field Change Request Form
1000 (**Appendix B4**) are described below:
1001

- 1002 • Monitoring wells installed in perched groundwater were constructed with 10 ft of screen
1003 rather than 20 ft of screen due to the limited thickness of the water-bearing zone.
1004
- 1005 • The deep soil sample from AOI01-01 was collected at 181–182 ft bgs, which was the
1006 1-ft interval above observed moisture in soil. Groundwater was later observed at 176 ft
1007 bgs. As a result, the deep sample collected from AOI01-01 may represent PFAS
1008 concentrations in saturated soil rather than the capillary fringe.

**Table 5-1. Samples by Medium
 AASF, Santa Fe, New Mexico
 Site Inspection Report**

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D422)	Comments
Soil Samples							
AOI01-01-SB-0-2	2/8/2022	0-2	X				
AOI01-01-SB-13-15	4/25/2022	13-15	X				
AOI01-01-SB-135-136	4/25/2022	135-136				X	
AOI01-01-SB-181-182	4/26/2022	181-182	X				
AOI01-02-SB-0-2	2/8/2022	0-2					
AOI01-02-SB-0-2-D	2/8/2022	0-2	X				FD
AOI01-02-SB-13-15	4/27/2022	13-15	X				
AOI01-02-SB-113-115	4/28/2022	113-115	X				
AOI01-02-SB-113-115-DUP	4/28/2022	113-115	X				FD
AOI01-02-SB-119-120	4/28/2022	119-120				X	
AOI01-03-SB-0-2	2/7/2022	0-2	X	X	X		
AOI01-03-SB-6-8	5/4/2022	6-8	X				
AOI01-03-SB-13-15	5/4/2022	13-15	X				
AOI01-04-SB-0-2	2/7/2022	0-2	X				
AOI01-04-SB-13-15	5/3/2022	13-15	X				
AOI01-04-SB-109-110	5/4/2022	109-110	X				
AOI01-04-SB-109-110- DUP	5/4/2022	109-110	X				FD
AOI01-05-SB-0-2	2/7/2022	0-2	X				
AOI01-05-SB-6-8	5/4/2022	6-8	X				
AOI01-05-SB-13-15	5/4/2022	13-15	X				
AOI01-06-SB-0-2	2/7/2022	0-2	X				
AOI01-06B-SB-0-2	5/4/2022	0-2	X				
AOI01-06B-SB-6-8	5/4/2022	6-8	X				
AOI01-06B-SB-13-15	5/4/2022	13-15	X				
AOI01-07-SB-0-2	2/8/2022	0-2	X				
AOI01-08-SB-0-2	2/8/2022	0-2	X				
AOI01-09-SB-0-2	5/9/2022	0-2	X				
AOI01-09-SB-13-15	5/5/2022	13-15	X				
AOI01-09-SB-111-112	5/6/2022	111-112	X				
SFAASF-01-SB-0-2	2/8/2022	0-2	X				
SFAASF-02-SB-0-2	2/8/2022	0-2	X	X	X		
SFAASF-02-SB-0-2-D	2/8/2022	0-2	X				FD
SFAASF-03-SB-0-2	5/7/2022	0-2	X				
SFAASF-03-PA-SB-0-2	2/7/2022	0-2	X				
SFAASF-03-PA-SB-13-15	5/1/2022	13-15	X				
SFAASF-03-PA-SB-183-184	5/2/2022	183-184	X				
SFAASF-04-SB-0-2	2/7/2022	0-2	X				
SFAASF-04-SB-13-15	4/28/2022	13-15	X				
SFAASF-04-SB-180-181	4/30/2022	180-181	X				

**Table 5-1. Samples by Medium
 AASF, Santa Fe, New Mexico
 Site Inspection Report**

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D422)	Comments
SFAASF-05-SB-0-2	2/7/2022	0-2	X				
SFAASF-05-SB-6-8	5/4/2022	6-8	X				
SFAASF-05-SB-13-15	5/4/2022	13-15	X				
SFAASF-05-SB-13-15-DUP	5/4/2022	13-15	X				FD
Groundwater Samples							
AOI01-01-GW	5/20/2022	NA	X				
AOI01-02-GW	5/20/2022	NA	X				
AOI01-02-GW-DUP	5/20/2022	NA	X				FD
AOI01-04-GW	5/20/2022	NA	X				
SFAASF-03-GW	5/19/2022	NA	X				
SFAASF-04-GW	5/19/2022	NA	X				
Blank Samples							
SFAASF-EB-01	2/7/2022	NA	X				EB
SFAASF-EB-02	2/8/2022	NA	X				EB
SFAASF-EB-03	4/25/2022	NA	X				EB
SFAASF-EB-04	4/26/2022	NA	X				EB
SFAASF-EB-05	4/26/2022	NA	X				EB
SFAASF-EB-06	4/27/2022	NA	X				EB
SFAASF-EB-07	4/28/2022	NA	X				EB
SFAASF-EB-08	4/28/2022	NA	X				EB
SFAASF-EB-09	4/29/2022	NA	X				EB
SFAASF-EB-10	4/30/2022	NA	X				EB
SFAASF-EB-11	5/1/2022	NA	X				EB
SFAASF-EB-12	5/2/2022	NA	X				EB
SFAASF-EB-13	5/3/2022	NA	X				EB
SFAASF-EB-14	5/4/2022	NA	X				EB
SFAASF-EB-15	5/4/2022	NA	X				EB
SFAASF-EB-16	5/5/2022	NA	X				EB
SFAASF-EB-17	5/6/2022	NA	X				EB
SFAASF-EB-18	5/7/2022	NA	X				EB
SFAASF-EB-19	5/9/2022	NA	X				EB
SFAASF-EB-20	5/19/2022	NA	X				EB
SFAASF-EB-21	5/20/2022	NA	X				EB
SFAASF-FB-01	2/7/2022	NA	X				FB
SFAASF-FB-02	2/8/2022	NA	X				FB
SFAASF-FB-03	4/25/2022	NA	X				FB
SFAASF-FB-04	4/26/2022	NA	X				FB
SFAASF-FB-05	4/27/2022	NA	X				FB
SFAASF-FB-06	4/28/2022	NA	X				FB
SFAASF-FB-07	4/29/2022	NA	X				FB

**Table 5-1. Samples by Medium
 AASF, Santa Fe, New Mexico
 Site Inspection Report**

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D422)	Comments
SFAASF-FB-08	4/30/2022	NA	X				FB
SFAASF-FB-09	5/1/2022	NA	X				FB
SFAASF-FB-10	5/2/2022	NA	X				FB
SFAASF-FB-11	5/3/2022	NA	X				FB
SFAASF-FB-12	5/4/2022	NA	X				FB
SFAASF-FB-13	5/5/2022	NA	X				FB
SFAASF-FB-14	5/6/2022	NA	X				FB
SFAASF-FB-15	5/7/2022	NA	X				FB
SFAASF-FB-16	5/8/2022	NA	X				FB
SFAASF-FB-17	5/9/2022	NA	X				FB
SFAASF-FB-18	5/19/2022	NA	X				FB
SFAASF-FB-19	5/20/2022	NA	X				FB
Notes: EB = Equipment blank FB = Field blank FD = Field duplicate NA = Not applicable							

1009

1010
 1011
 1012

**Table 5-2. Soil Boring Depths and Well Screen Intervals
 AASF, Santa Fe, New Mexico
 Site Inspection Report**

Areas of Interest	Boring Location	Soil Boring Depth (ft bgs)	Well Screen Interval (ft bgs)	Current Well Status
1	AOI01-01	192	170-190	Existing
	AOI01-02	119	107-117	Existing
	AOI01-03	15	-	-
	AOI01-04	115	105-115	Existing
	AOI01-05	15	-	-
	AOI01-06	2	-	-
	AOI01-06b	15	-	-
	AOI01-07	2	-	-
	AOI01-08	2	-	-
	AOI01-09	115	110-115	P&A
Historical WWTP Land Application Area	SFAASF-01	2	-	-
	SFAASF-02	2	-	-
Santa Fe AASF Boundary	SFAASF-03	197	175-195	Existing
	SFAASF-03-PA	197	175-195	P&A
	SFAASF-04	193	171-191	Existing
	SFAASF-05	15	-	-
Notes: P&A = Plugged and abandoned				

1013

1014

Table 5-3. Groundwater Elevation

1015

1016

**AASF, Santa Fe, New Mexico
 Site Inspection Report**

Monitoring Well ID	Top of Casing Elevation (ft amsl)	Depth to Water ¹ (ft btoc)	Groundwater Elevation (ft amsl)
AOI01-01	6,328.84	176.46	6,152.38
AOI01-02	6,324.96	110.96	6,214.00
AOI01-04	6,323.20	110.04	6,213.16
SFAASF-03	6,337.69	184.81	6,152.88
SFAASF-04	6,332.85	180.59	6,152.26
Notes: 1. Measured on 3 June 2022. btoc = Below top of casing ID = Identification			

1017

1018

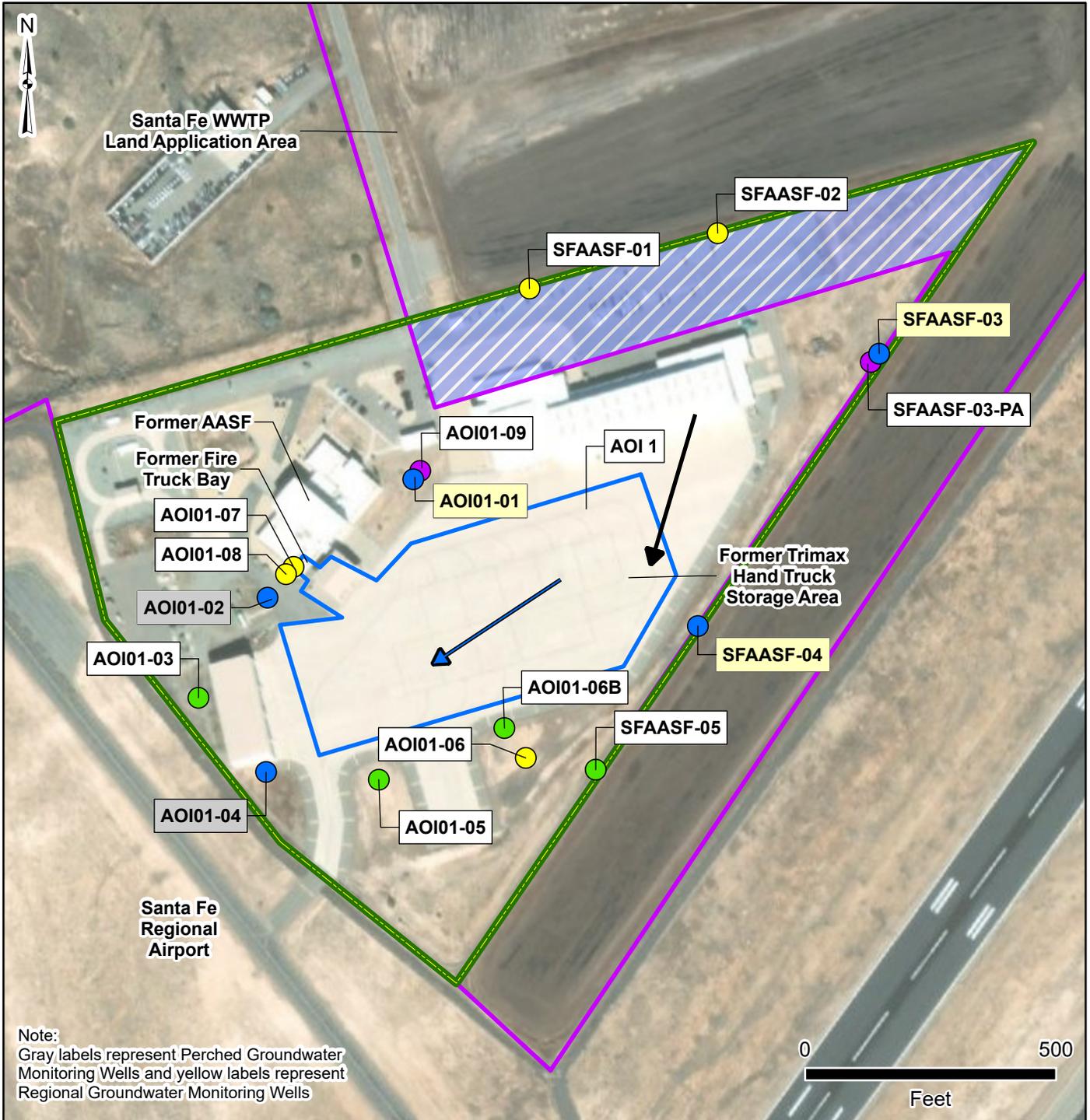
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Army National Guard Site Inspections
Site Inspection Report
Santa Fe AASF, New Mexico



Figure 5-1
Site Inspection Sample Locations



Note:
Gray labels represent Perched Groundwater Monitoring Wells and yellow labels represent Regional Groundwater Monitoring Wells

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Facility Data

- Facility Boundary
- Area of Interest
- Adjacent Potential Source Areas
- Historical WWTP Biosolid Area

Sample Locations

- DPT Soil Boring
- Hand Auger Soil Boring
- Sonic Soil Boring
- Sonic Soil Boring/Monitoring Well

Hydrology/Hydrogeology

- Surface Water Flow Direction
- Groundwater Flow Direction (Regional)

Data Sources:
ESRI 2022
AECOM 2020

Date:.....December 2022
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 13N

1021

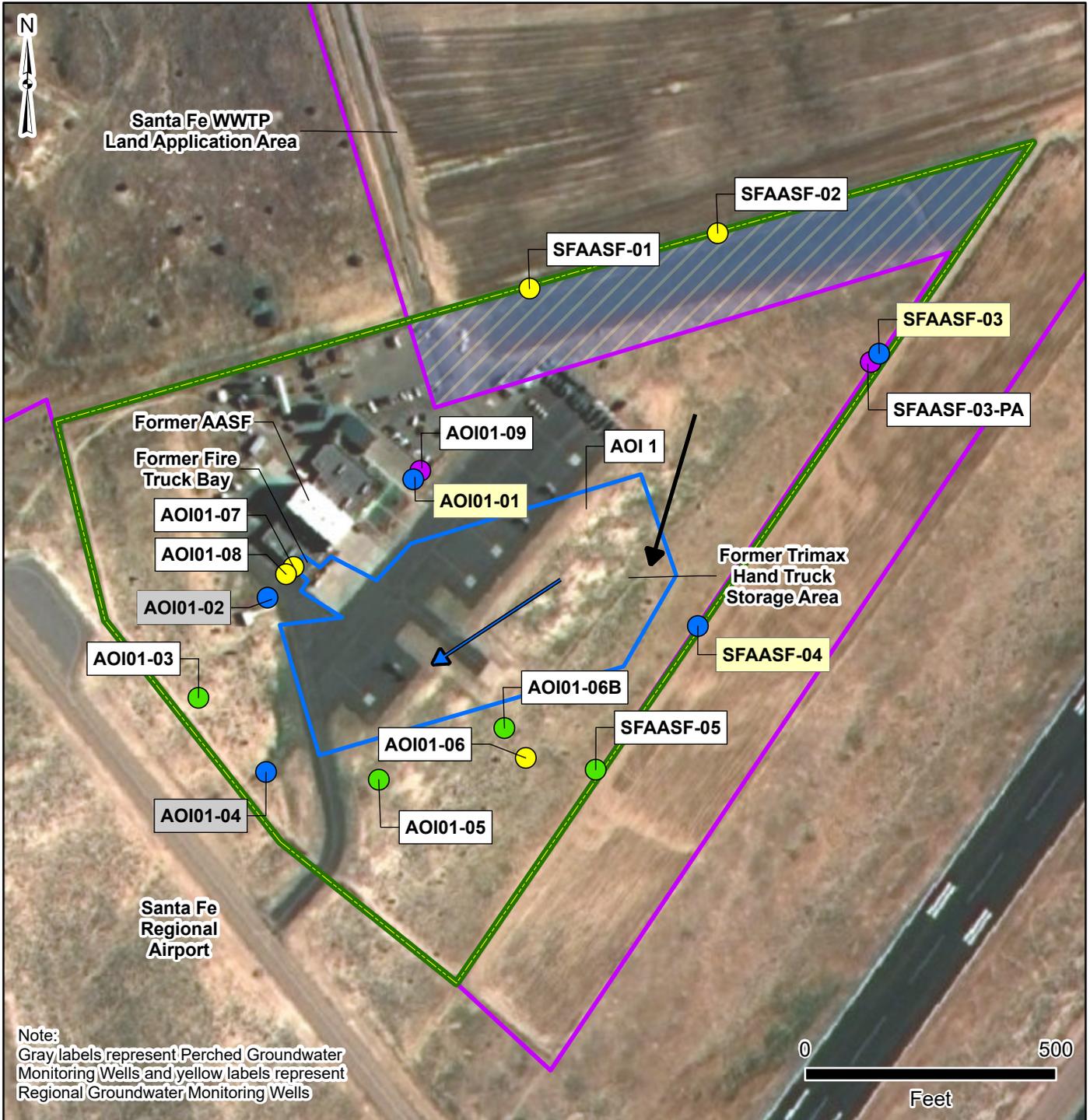
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Army National Guard Site Inspections
Site Inspection Report
Santa Fe AASF, New Mexico



Figure 5-2
Site Inspection Sample Locations
with Historical Imagery



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Facility Data

- Facility Boundary
- Area of Interest
- Adjacent Potential Source Areas
- Historical WWTP Biosolid Area

Sample Locations

- DPT Soil Boring
- Hand Auger Soil Boring
- Sonic Soil Boring
- Sonic Soil Boring/Monitoring Well

Hydrology/Hydrogeology

- Surface Water Flow Direction
- Groundwater Flow Direction (Regional)

Data Sources:
AECOM 2020
RGIS UNM 2005

Date:.....December 2022
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 13N

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1025

6. SITE INSPECTION RESULTS

1026 This section presents the analytical results of the SI. The SLs used in this evaluation are
 1027 presented in **Section 6.1**. A discussion of the results is provided in **Sections 6.3** and **6.4**. **Table**
 1028 **6-1** provides applicable screening levels. **Tables 6-2** through **6-5** present PFAS results for the
 1029 relevant compounds in soil and groundwater. Tables that contain all results are provided in
 1030 **Appendix F** and the laboratory reports are provided in **Appendix G**.

1031

1032

6.1 SCREENING LEVELS

1033 The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based
 1034 SLs for soil and groundwater, as described in a memorandum from the OSD dated 6 July 2022
 1035 (Assistant Secretary of Defense 2022). The ARNG program under which this SI was performed
 1036 follows this DoD policy. Should the maximum concentration for sampled media exceed the SLs
 1037 established in the OSD memorandum, the AOI may proceed to the next phase under CERCLA.
 1038 The SLs established in the OSD memorandum apply to the five compounds presented on
 1039 **Table 6-1**.

1040

1041

Table 6-1. Screening Levels (Soil and Groundwater)

Analyte ²	Residential (Soil) (µg/kg) ¹ 0 to 2 ft bgs	Industrial / Commercial Composite Worker (Soil) (µg/kg) ¹ 2 to 15 ft bgs	Tap Water (Groundwater) (ng/L) ¹
PFOA	19	250	6
PFOS	13	160	4
PFBS	1,900	25,000	601
PFHxS	130	1,600	39
PFNA	19	250	6

Notes:
 1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using USEPA's Regional Screening Level Calculator. Hazard Quotient = 0.1. May 2022.
 2. Screening values for HFPO-DA were established after SI planning and execution; and thus, not included as an analyte. Future CERCLA phases will include HFPO-DA if warranted.
 µg/kg = Microgram(s) per kilogram.
 ng/L = Nanogram(s) per liter.

1042

1043 The data in the subsequent sections are compared against the SLs presented in **Table 6-1**. The
 1044 SLs for groundwater are based on direct ingestion. The SLs for soil are based on incidental
 1045 ingestion and are applied to the depth intervals reasonably anticipated to be encountered by the
 1046 receptors identified at the facility: the residential scenario is applied to surface soil results (0–2 ft
 1047 bgs) and the industrial/commercial worker scenario is applied to all shallow subsurface soil
 1048 results (2–15 ft bgs). The SLs are not applied to deep subsurface soil results (greater than 15 ft
 1049 bgs) because 15 ft is the anticipated limit of construction activities.

1050 6.2 SOIL PHYSICOCHEMICAL ANALYSES

1051 To provide basic soil parameter information, soil samples were analyzed for TOC and pH, which
1052 are important for evaluating transport through the soil medium. **Appendix F** contains the results
1053 of the TOC and pH sampling.

1054
1055 The data collected in this investigation will be used in subsequent investigations, where
1056 appropriate, to assess fate and transport of PFAS contaminants. According to the Interstate
1057 Technology Regulatory Council (ITRC), several important PFAS partitioning mechanisms
1058 include hydrophobic and lipophobic effects, electrostatic interactions, and interfacial behaviors.
1059 At relevant environmental pH values, certain PFAS are present as organic anions; and are
1060 therefore, relatively mobile in groundwater (Xiao et al. 2015) but tend to associate with the
1061 organic carbon fraction that may be present in soil or sediment (Higgins and Luthy 2006; Guelfo
1062 and Higgins 2013). When sufficient organic carbon is present, organic carbon normalized
1063 distribution coefficients can help in evaluating transport potential, though other geochemical
1064 factors (e.g., pH and presence of polyvalent cations) may also affect PFAS sorption to solid
1065 phases (ITRC 2018).

1066 6.3 AOI 1

1068 This section presents the analytical results for soil and groundwater in comparison to SLs for
1069 AOI 1, which includes Former Firetruck Bay and Tri-Max™ Hand Truck Storage Area. The soil
1070 and groundwater results are summarized on **Tables 6-2** through **6-5**. Soil and groundwater
1071 results are presented on **Figures 6-1** through **6-7**.

1072
1073 In the sections below, estimated analyte concentrations are followed by a ‘J’ qualifier.
1074 Concentrations that are estimated and biased higher are followed by a ‘J+’ qualifier.

1075 6.3.1 AOI 1 - Soil Analytical Results

1076
1077 **Tables 6-2** through **6-4** summarize the detected compounds in soil. **Figures 6-1** through **6-5**
1078 present the ranges of detections in soil.

1079
1080 Soil was sampled at 10 boring locations associated with potential release areas at AOI 1. Soil
1081 was sampled from three intervals at locations AOI01-01, AOI01-02, AOI01-03, AOI01-04,
1082 AOI01-05, AOI01-06B, and AOI01-09; and one interval at locations AOI01-06, AOI01-07, and
1083 AOI01-08.

1084
1085 PFOS was detected in seven of 10 surface soil sample locations with concentrations exceeding
1086 the applicable SL in three surface soil sample locations (AOI01-02, AOI01-07, and AOI01-08).
1087 The highest PFOS concentration of 920 µg/kg was detected at AOI01-07. PFOA, PFNA, and
1088 PFHxS were detected in surface soil at AOI 1 at concentrations that did not exceed the applicable
1089 residential SLs. PFOA was detected in 8 of 10 surface soil sample locations at concentrations
1090 below the SL of 19 µg/kg. PFOA had a maximum reported concentration of 1.2 µg/kg (AOI01-
1091 07). PFHxS was detected in 5 the 10 surface soil sample locations at concentrations below the
1092 SL of 130 µg/kg. PFHxS had a maximum reported concentration of 8.3 µg/kg (AOI01-07).
1093 PFNA was detected in 3 of the 10 surface soil sample locations at concentrations below the SL

1094 of 19 µg/kg. PFNA had a maximum reported concentration of 3.8 µg/kg (AOI01-07). PFBS
1095 was not detected in any of the 10 surface soil sample locations at AOI 1.

1096
1097 Shallow subsurface soil³ samples collected from 2 to 15 ft bgs did not exceed the SLs for the
1098 relevant compounds in any of the sample locations. PFOS was detected in AOI01-02, AOI01-03,
1099 and AOI01-04 at concentrations ranging up to 5.9 µg/kg. PFOA was detected in two locations,
1100 AOI01-02 and AOI01-04, with a maximum concentration of 0.59 J µg/kg (AOI01-02). PFHxS
1101 was detected in three soils samples, AOI01-02, AOI01-03, and AOI01-04, with a maximum
1102 concentration of 3 µg/kg (AOI01-02). PFNA was detected in one location (AOI01-04) at a
1103 concentration of 0.37 J µg/kg.

1104
1105 PFBS was not detected in any of the deep subsurface soil samples. In AOI01-02, PFHxS was
1106 detected at a concentration of 0.32 J µg/kg. In AOI01-04, PFOS, PFOA, PFHxS,
1107 and PFNA were detected at concentrations of 2.2 J+ µg/kg, 0.48 J µg/kg, 1.1 J µg/kg, and
1108 0.32 J µg/kg, respectively.

1109 1110 **6.3.2 AOI 1 - Groundwater Results**

1111 **Figures 6-6 and 6-7** present the ranges of detections in groundwater. **Table 6-5** summarizes the
1112 groundwater results.

1113
1114 Groundwater samples were collected from three permanent monitoring wells associated with the
1115 potential release area AOI 1. Two wells, AOI01-02 and AOI01-04, are screened in perched
1116 groundwater between 105 to 117 ft bgs; one well, AOI01-01, is screened regional groundwater
1117 between 170 to 190 ft bgs. PFOA and PFHxS were detected in perched groundwater at
1118 concentrations exceeding the applicable SLs. The maximum concentrations of PFOA and PFHxS
1119 of 38 ng/L and 230 ng/L, respectively, were detected at AOI01-04. PFBS was detected below the
1120 applicable SL in both perched groundwater wells. PFOS and PFNA were not detected in perched
1121 groundwater.

1122
1123 PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in AOI01-01, which is screened in
1124 regional groundwater.

1125
1126 A shake test was administered to samples collected from each of the three monitoring wells in
1127 AOI 1. Foam was not observed in any of the samples.

1128 1129 **6.3.3 AOI 1 - Conclusions**

1130 Based on the results of the SI, four relevant compounds (PFOA, PFOS, PFHxS, and PFNA) were
1131 detected in AOI 1. PFOS exceeded the SL in surface soil. Three of the five relevant compounds
1132 (PFOA, PFHxS, and PFBS) were detected in groundwater at AOI 1. PFOA and PFHxS exceeded
1133 SLs in groundwater. Based on the exceedance of the SLs, further evaluation at AOI 1 is
1134 warranted.

³ Shallow subsurface soil also referred to as intermediate depth.

1135 **6.4 HISTORICAL WASTEWATER TREATMENT PLANT BIOSOLID**
1136 **APPLICATION AREA SAMPLE LOCATIONS**

1137 Based on historical aerial photographs, application of biosolids extended into the current Santa
1138 Fe AASF lease area; biosolid land application extended to the north end of the current AASF
1139 building prior to the 2012 renovations of the facility. This section presents the analytical results
1140 for soil in comparison to SLs for sample locations within the historical WWTP biosolid land
1141 application area that extends onto the current Santa Fe AASF lease area. **Tables 6-2** through **6-5**
1142 summarize detected compounds in soil. **Figures 6-1** through **6-5** present the ranges of detections
1143 in soil.

1144
1145 **6.4.1 Historical Wastewater Treatment Plant Biosolid Application Area – Soil Analytical**
1146 **Results**

1147 **Tables 6-2** through **6-4** summarize the detected compounds in soil. **Figures 6-1** through **6-5**
1148 present the ranges of detections in soil.

1149
1150 Soil was sampled at two boring locations (SFAASF-01 and SFAASF-02) within the historical
1151 WWTP biosolid application area, as identified using historical aerial photography. Only surface
1152 soil was sampled at these locations.

1153
1154 PFOS and PFOA concentrations in surface soils exceeded SLs both sample locations within the
1155 historical WWTP biosolid application area. PFBS, PFNA, and PFHxS in soil, when detected, did
1156 not exceed the SLs. PFOS exceeded the applicable SL in both surface soil sample locations. The
1157 highest PFOS concentration of 60 µg/kg was detected at SFAASF-02. PFOA was detected in
1158 both surface soil sample locations with the concentration exceeding the applicable SL in one
1159 surface soil sample locations (SFAASF-02), which had a reported concentration of 33 µg/kg.
1160 PFHxS and PFNA were detected below their respective applicable SLs in both sample locations.
1161 PFBS was detected below the applicable SL in surface soil at one location (SFAASF-02).

1162
1163 **6.4.2 Historical Wastewater Treatment Plant Biosolid Application Area – Groundwater**
1164 **Results**

1165 Groundwater was not sampled within the historical WWTP biosolid application area; however,
1166 groundwater samples at AOI01-01 are considered downgradient from the historical WWTP
1167 biosolid application area and upgradient of AOI 1, and samples from SFAASF-03 and SFAASF-
1168 04 are also considered downgradient from offsite biosolid application areas. There were no
1169 detections of the relevant compounds in these samples. Subsurface soil was not sampled at these
1170 locations and perched water was not encountered, thus the fate and transport of the relevant
1171 compounds in the surface soil is unknown.

1172
1173 **6.4.3 Historical Wastewater Treatment Plant Biosolid Application Area – Conclusions**

1174 During the SI, PFBS, PFNA, and PFHxS were detected below SLs in surface soil samples. PFOS
1175 and PFOA were detected above SLs. Elevated PFAS concentrations within the historical WWTP
1176 biosolid land application area may be a result of the historical application of WWTP biosolids to
1177 the land currently leased by NMARNG or the current application of WWTP biosolids on the

1178 adjacent property. Sub-surface soils and groundwater were not sampled at these locations. Based
1179 on the exceedance of SLs in surface soil within the historical WWTP biosolid application area,
1180 further evaluation is warranted.

1181

1182 **6.5 BOUNDARY SAMPLE LOCATIONS**

1183 This section presents the analytical results for soil and groundwater in comparison to SLs for the
1184 boundary sample locations. **Tables 6-2** through **6-5** summarize the detected compounds in soil
1185 and groundwater. **Figures 6-1** through **6-7** present the ranges of detections in soil and
1186 groundwater.

1187

1188 **6.5.1 Boundary Sample Locations – Soil Analytical Results**

1189 **Tables 6-2** through **6-4** summarize the detected compounds in soil. **Figures 6-1** through **6-5**
1190 present the ranges of detections in soil.

1191

1192 Soil was sampled at four boring locations associated with the facility boundary. Soil was
1193 sampled from three intervals at locations SFAASF-03-PA, SFAASF-04, and SFAASF-05. Only
1194 surface soil was sampled at SFAASF-03.

1195

1196 PFOS and PFOA were detected below SLs in surface soils at the facility boundary. PFBS,
1197 PFNA, and PFHxS were not detected. PFOS was detected below the SL in three of four
1198 boundary surface soil samples. The highest PFOS concentration of 0.94 µg/kg was detected at
1199 SFAASF-04. PFOA was detected below the SL in three of four surface soil sample locations
1200 with a maximum concentration of 0.96 µg/kg at SFAASF-05. PFHxS, PFNA, and PFBS were
1201 not detected. Relevant compounds were not detected in subsurface soil collected from these
1202 locations.

1203

1204 **6.5.2 Boundary Sample Locations – Groundwater Results**

1205 **Table 6-5** summarizes the groundwater results. **Figures 6-6** and **6-7** present the ranges of
1206 detections in groundwater.

1207

1208 Groundwater samples were collected from two well locations along the facility boundary
1209 (SFAASF-03 and SFAASF-04). The boundary wells were completed in regional groundwater
1210 due to the lack of observed perched groundwater. None of the relevant compounds were detected
1211 in groundwater samples collected from boundary wells.

1212

1213 A shake test was administered to samples collected from both monitoring wells along the facility
1214 boundary. Foam was not observed in either sample.

1215

1216 **6.5.3 Boundary Sample Locations – Conclusions**

1217 Based on the results of the SI, PFBS, PFNA, and PFHxS were not detected in samples at the
1218 facility boundary. PFOS and PFOA were detected below SLs in surface soil. Relevant
1219 compounds were not detected in sub-surface soil.

1220

1221 Relevant compounds were not detected in groundwater monitoring wells installed for the
1222 purpose of characterizing off-facility contamination. Samples representing off-facility
1223 groundwater quality to the west (SFAASF-03 and SFAASF-04) and to the northwest (AOI01-01)
1224 suggest that PFAS compounds are not present in the regional groundwater upgradient of AOI 1.
1225 Perched groundwater was not observed at boundary monitoring well locations during the SI.
1226
1227 Based on the lack of SL exceedances in groundwater and soil at the boundary, further evaluation
1228 is not warranted.

Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil, Site Inspection Report, Santa Fe AASF

Analyte ^{1,2}	Screening Level ^{1,2}	AOI01-01		AOI01-02		AOI01-02		AOI01-03		AOI01-04		AOI01-05		AOI01-06		AOI01-06B		AOI01-07	
		Result	Qual	Result	Qual	Result	Qual												
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																			
Perfluorobutanesulfonic acid (PFBS)	1900	ND	U	ND	U	ND	U												
Perfluorohexanesulfonic acid (PFHxS)	130	0.41	J	0.5	J	0.96		1.4		0.64		ND	U	ND	U	ND	U	8.3	
Perfluorononanoic acid (PFNA)	19	ND	U	0.32	J	0.51	J	ND	U	ND	U	ND	U	ND	U	ND	U	3.8	
Perfluorooctanesulfonic acid (PFOS)	13	3.1		61		86		6.5		3.6		ND	U	ND	U	ND	U	920	
Perfluorooctanoic acid (PFOA)	19	0.64		0.26	J	0.53	J	0.39	J	0.36	J	ND	U	ND	U	ND	U	1.2	
Notes: J = Estimated concentration. U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). J+ = Estimated concentration, biased high. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). However, the associated numerical value is approximate. µg/kg = Microgram(s) per kilogram. 1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022. 2. The Screening Levels for soil are based on a residential scenario for direct ingestion of contaminated soil. Values exceeding the Screening Level are shaded gray. bgs = Below ground surface. ft = Foot (feet). ND = Analyte not detected above the LOD (LOD values are presented in Appendix F). Qual = Qualifier.																			

Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil, Site Inspection Report, Santa Fe AASF

Location ID	AOI01-08	AOI01-09		SFAASF-01		SFAASF-02		SFAASF-02		SFAASF-02		SFAASF-03-PA		SFAASF-03		SFAASF-04		SFAASF-05		
	Sample Name	AOI01-08-SB-0-2	AOI01-09-SB-0-2		SFAASF-01-SB-0-2		SFAASF-02-SB-0-2		SFAASF-02-SB-0-2-D		SFAASF-02-SB-0-2		SFAASF-03-PA-SB-0-2		SFAASF-03-SB-0-2		SFAASF-04-SB-0-2		SFAASF-05-SB-0-2	
Parent Sample ID											SFAASF-02-SB-0-2									
Sample Date	2/8/2022	5/9/2022		2/8/2022		2/8/2022		2/8/2022		2/8/2022		2/7/2022		5/7/2022		2/7/2022		2/7/2022		
Depth (bgs ft)	0-2	0-2		0-2		0-2		0-2		0-2		0-2		0-2		0-2		0-2		
Analyte ^{1,2}	Screening Level ^{1,2}	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																				
Perfluorobutanesulfonic acid (PFBS)	1900	ND	U	ND	U	ND	U	0.58	J	0.59	J	ND	U	ND	U	ND	U	ND	U	
Perfluorohexanesulfonic acid (PFHxS)	130	ND	J	ND	U	2.7		4.5		4.7		ND	U	ND	U	ND	U	ND	U	
Perfluorononanoic acid (PFNA)	19	ND	U	0.4	J	1.8		2.9		2.9		ND	U	ND	U	ND	U	ND	U	
Perfluorooctanesulfonic acid (PFOS)	13	21		7.5		42		60		49		0.48	J	ND	U	0.94		0.93		
Perfluorooctanoic acid (PFOA)	19	0.47	J	0.68		19		30		33		0.53	J	ND	U	0.6	J	0.96		
Notes: J = Estimated concentration. U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). J+ = Estimated concentration, biased high. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). However, the associated numerical value is approximate. µg/kg = Microgram(s) per kilogram. 1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022. 2. The Screening Levels for soil are based on a residential scenario for direct ingestion of contaminated soil. Values exceeding the Screening Level are shaded gray. bgs = Below ground surface. ft = Foot (feet). ND = Analyte not detected above the LOD (LOD values are presented in Appendix F). Qual = Qualifier.																				

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Detections in Shallow Subsurface Soil, Site Inspection Report, Santa Fe AASF

Location ID	AOI01-01	AOI01-02	AOI01-03	AOI01-03	AOI01-04	AOI01-05	AOI01-05	AOI01-06B									
	Sample Name	AOI01-01-SB-13-15	AOI01-02-SB-13-15	AOI01-03-SB-13-15	AOI01-03-SB-6-8	AOI01-04-SB-13-15	AOI01-05-SB-13-15	AOI01-05-SB-6-8	AOI01-06B-SB-13-15								
Parent Sample ID																	
Sample Date	4/25/2022	4/27/2022	5/4/2022	5/4/2022	5/3/2022	5/4/2022	5/4/2022	5/4/2022									
Depth (bgs ft)	13-15	13-15	13-15	6-8	13-15	13-15	6-8	13-15									
Analyte ^{1,2}	Screening Level ^{1,2}	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																	
Perfluorobutanesulfonic acid (PFBS)	25000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1600	ND	U	3		0.27	J	0.23	J	1.2		ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	250	ND	U	ND	U	ND	U	ND	U	0.37	J	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	ND	U	1.2		5.9		0.66		3.2		ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	250	ND	U	0.59	J	ND	U	ND	U	0.52	J	ND	U	ND	U	ND	U
Notes: 1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022. 2. The Screening Levels for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario. J = Estimated concentration. U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). However, the associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Foot (feet) below ground surface. ND = Analyte not detected above the LOD (LOD values are presented in Appendix F). µg/kg = Microgram(s) per kilogram. Qual = Qualifier.																	

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Detections in Shallow Subsurface Soil, Site Inspection Report, Santa Fe AASF

	Location ID	AOI01-06B	AOI01-09	SFAASF-03-PA	SFAASF-04	SFAASF-05	SFAASF-05	SFAASF-05							
	Sample Name	AOI01-06B-SB-6-8	AOI01-09-SB-13-15	SFAASF-03-PA-SB-13-15	SFAASF-04-SB-13-15	SFAASF-05-SB-13-15	SFAASF-05-SB-13-15-DUP	SFAASF-05-SB-6-8							
	Parent Sample ID						SFAASF-05-SB-13-15								
	Sample Date	5/4/2022	5/5/2022	5/1/2022	4/28/2022	5/4/2022	5/4/2022	5/4/2022							
	Depth (bgs ft)	6-8	13-15	13-15	13-15	13-15	13-15	6-8							
Analyte ^{1,2}	Screening Level ^{1,2}	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)															
Perfluorobutanesulfonic acid (PFBS)	25000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1600	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Notes: 1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022. 2. The Screening Levels for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario. J = Estimated concentration. U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). However, the associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Foot (feet) below ground surface. ND = Analyte not detected above the LOD (LOD values are presented in Appendix F). µg/kg = Microgram(s) per kilogram. Qual = Qualifier.															

Table 6-4. PFOA, PFOS, PFBS, PFNA, and PFHxS Detections in Deep Subsurface Soil, Site Inspection Report, Santa Fe AASF

Location ID	AOI01-01		AOI01-02		AOI01-02		AOI01-04		AOI01-04		AOI01-09		SFAASF-03-PA		SFAASF-04	
	Sample Name	Parent Sample ID	Sample Name	Parent Sample ID	Sample Name	Parent Sample ID										
Sample Date	4/26/2022		4/28/2022		4/28/2022		5/4/2022		5/4/2022		5/6/2022		5/2/2022		4/30/2022	
Depth (bgs ft)	181-182		113-115		113-115		109-110		109-110		111-112		183-184		180-181	
Analyte ¹	Result	Qual	Result	Qual	Result	Qual										
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																
Perfluorobutanesulfonic acid (PFBS)	ND	U	ND	U	ND	U										
Perfluorohexanesulfonic acid (PFHxS)	ND	U	0.32	J	ND	U	1.1	J	ND	UJ	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	ND	U	ND	U	ND	U	0.32	J	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	ND	U	ND	U	ND	U	2.2	J+	ND	UJ	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	ND	U	ND	U	ND	U	0.48	J	ND	U	ND	U	ND	U	ND	U
Notes: J = Estimated concentration. U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). J+ = Estimated concentration, biased high. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). However, the associated numerical value is approximate. µg/kg = Microgram(s) per kilogram. ft bgs = Foot (feet) below ground surface. ND = Analyte not detected above the LOD (LOD values are presented in Appendix F). Qual = Qualifier.																

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Table 6-5. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater, Site Inspection Report, Santa Fe AASF

Analyte ¹	Screening Level ¹	AOI01-01		AOI01-02		AOI01-02		AOI01-04		SFAASF-03		SFAASF-04	
		Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (ng/L)													
Perfluorobutanesulfonic acid (PFBS)	601	ND	U	120		130		30		ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	39	ND	U	72		74		230		ND	U	ND	U
Perfluorononanoic acid (PFNA)	6	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	4	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	6	ND	U	2.5		2.3	J+	38		ND	U	ND	U
Notes: 1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022. J = Estimated concentration. U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). J+ = Estimated concentration, biased high. Values exceeding the Screening Level are shaded gray. ND = Analyte not detected above the LOD (LOD values are presented in Appendix F). ng/L = Nanogram(s) per liter. Qual = Qualifier.													

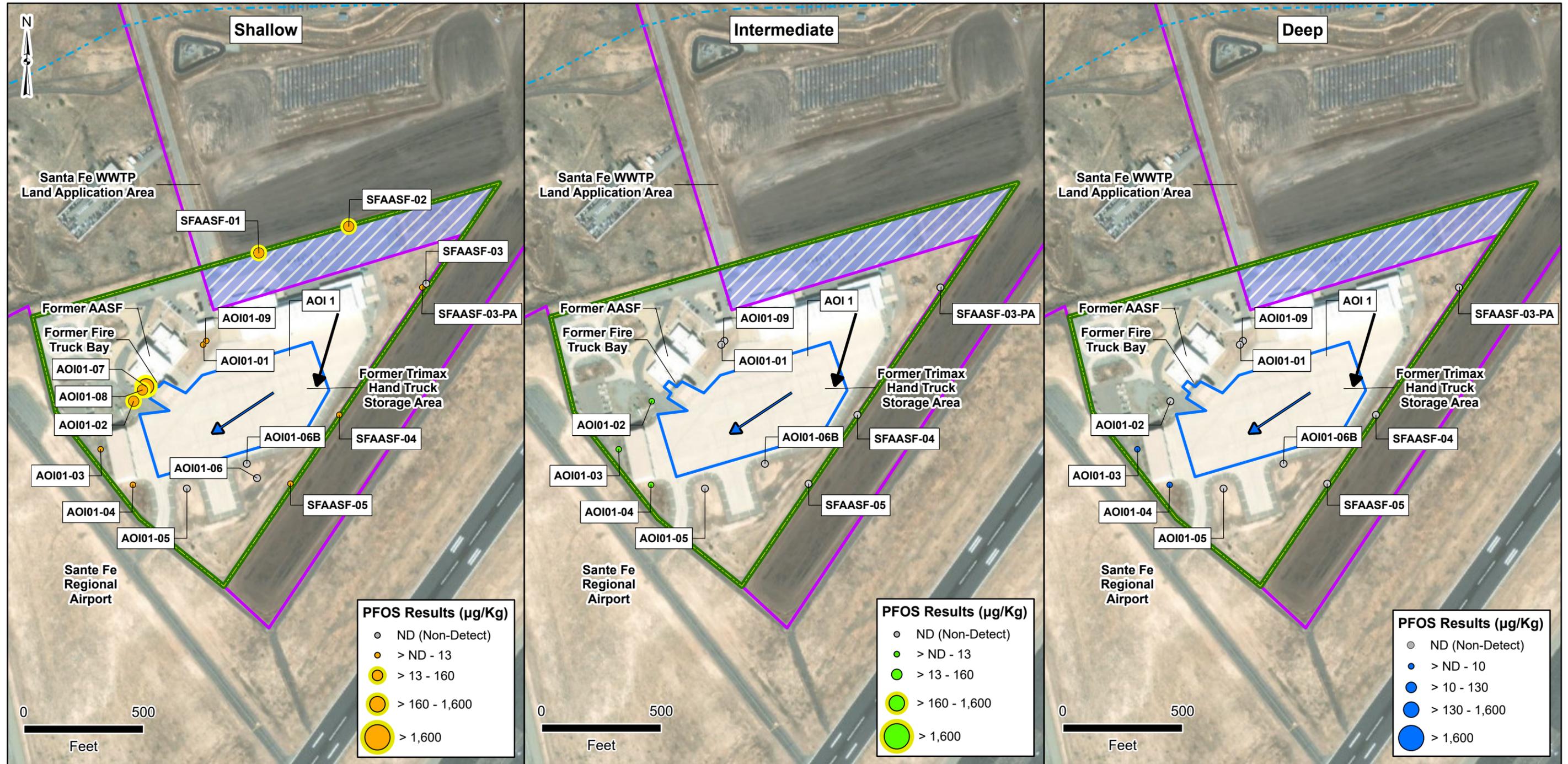
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Figure 6-1
 AOI 1
 PFOS Detections in Soil



- Facility Data**
- ▭ Facility Boundary
 - ▭ Area of Interest
 - ▭ Adjacent Potential Source Areas
 - ▭ Historical WWTP Biosolid Area
- Hydrology/Hydrogeology**
- ➡ Surface Water Flow Direction
 - ➡ Groundwater Flow Direction (Regional)

Notes:
 PFOS = Perfluorooctanesulfonic acid
 Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
 ESRI 2022
 AECOM 2019

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

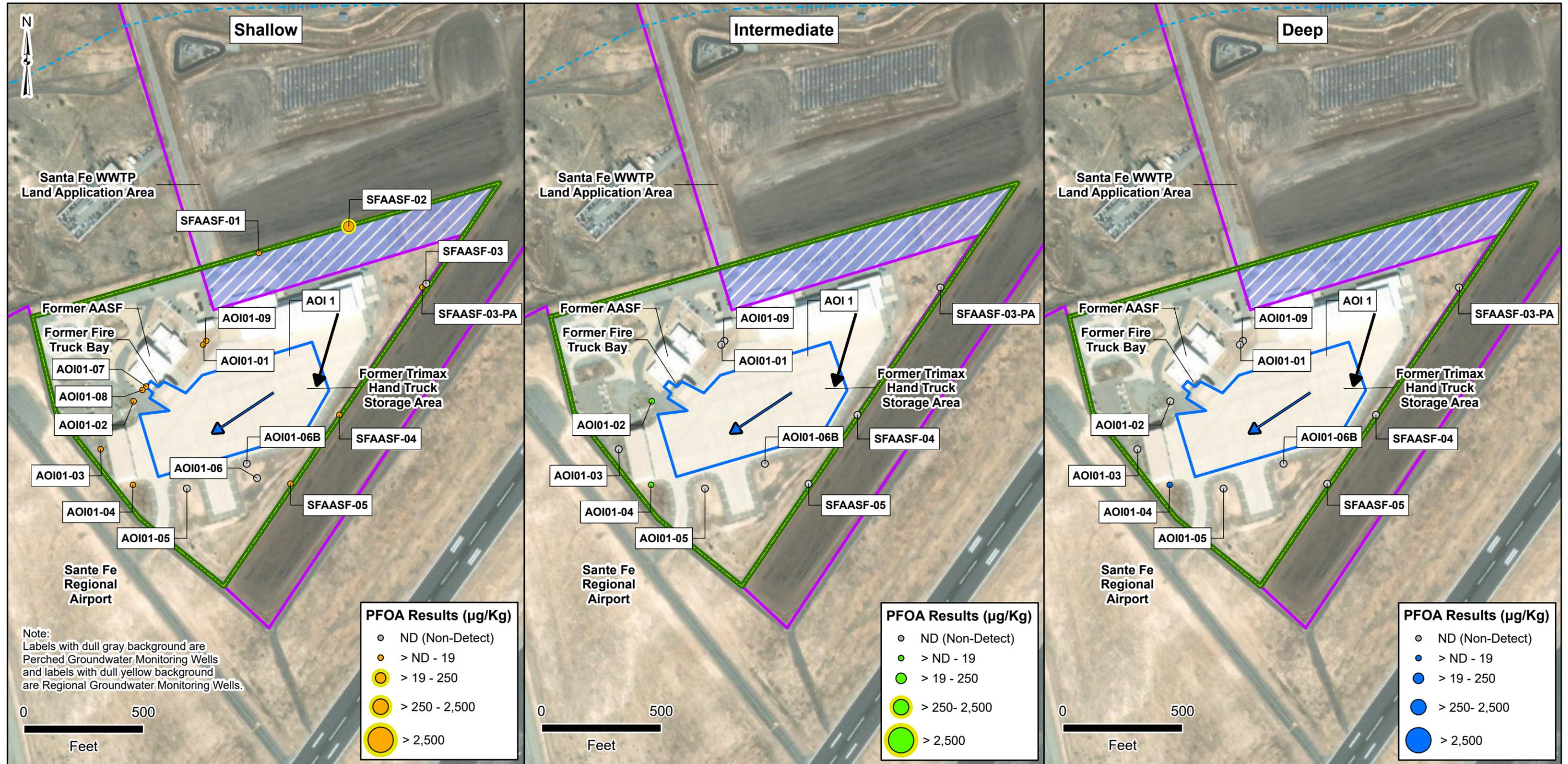
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 Santa Fe, New Mexico

Figure 6-2
 AOI 1
 PFOA Detections in Soil



- Facility Data**
- Green dashed line: Facility Boundary
 - Blue solid line: Area of Interest
 - Purple dashed line: Adjacent Potential Source Areas
 - Blue hatched area: Historical WWTP Biosolid Area
- Hydrology/Hydrogeology**
- Blue arrow: Surface Water Flow Direction
 - Black arrow: Groundwater Flow Direction (Regional)

Notes:
 PFOA = Perfluorooctanoic acid
 Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
 ESRI 2022
 AECOM 2019

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

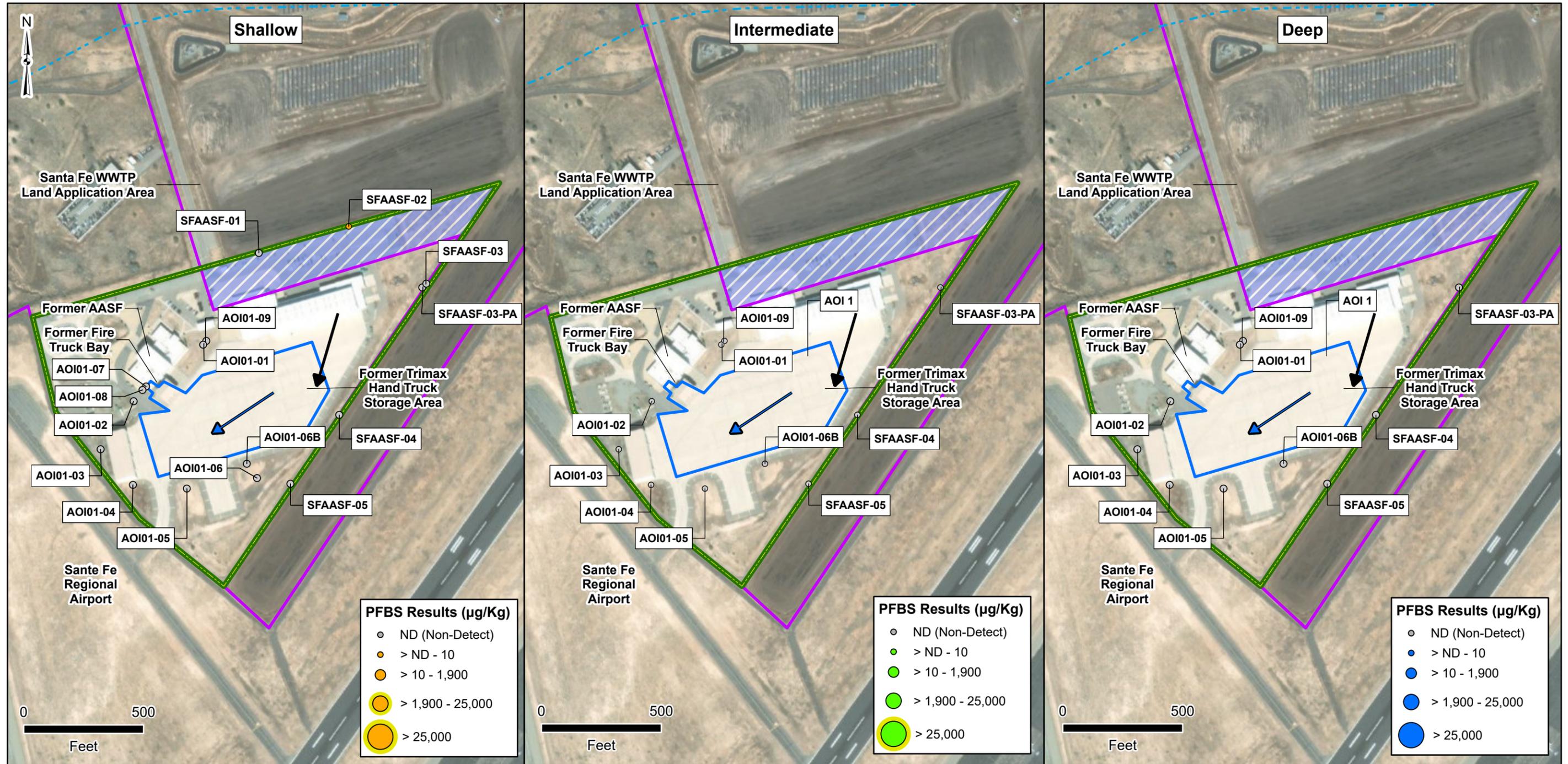
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Army National Guard Site Inspections
 Site Inspection Report
 Santa Fe, New Mexico

Figure 6-3
 AOI 1
 PFBS Detections in Soil



Notes:
 PFBS = Perfluorobutanesulfonic acid
 Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
 ESRI 2022
 AECOM 2019

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

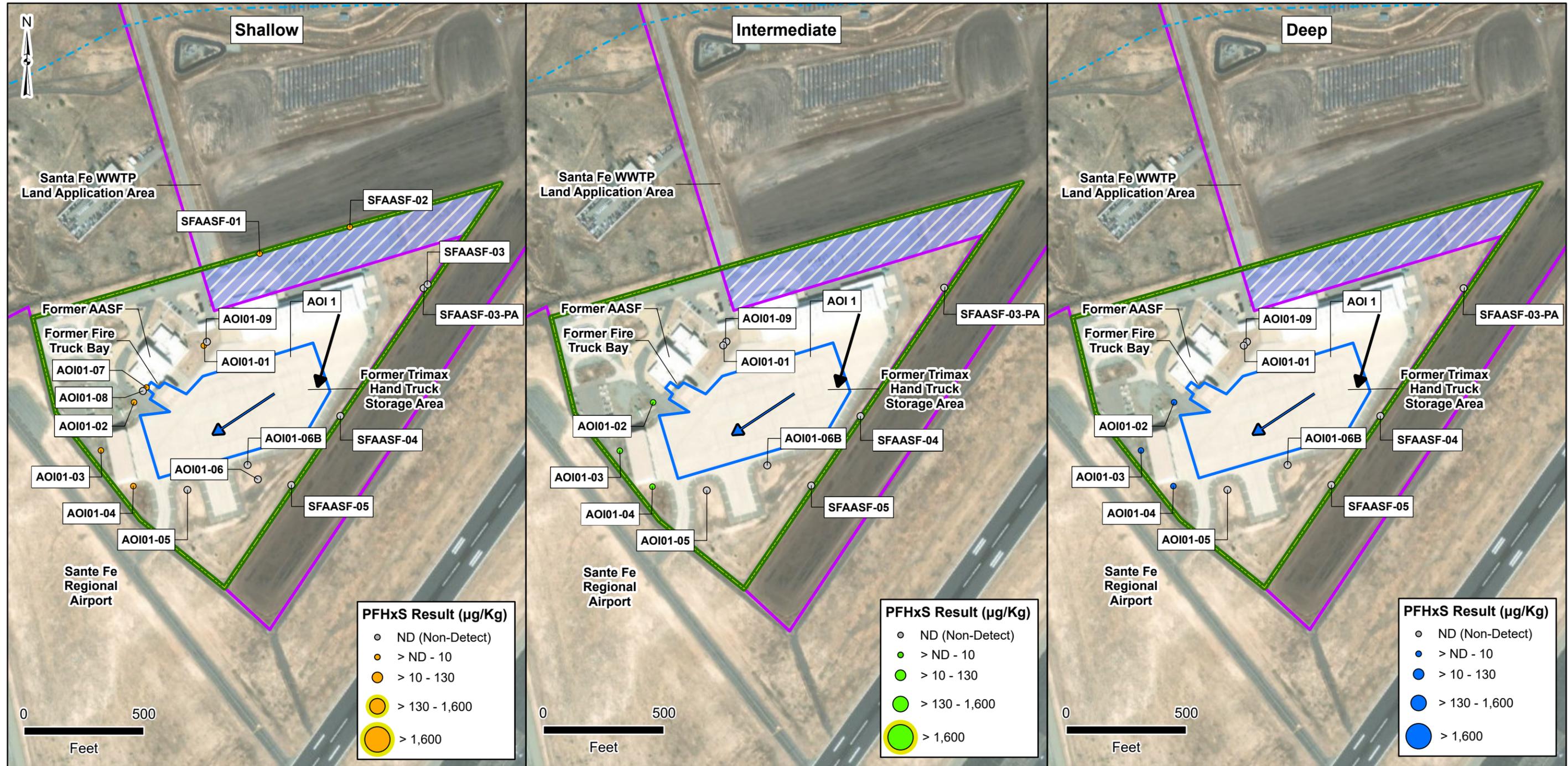
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Army National Guard Site Inspections
 Site Inspection Report
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Figure 6-4
 AOI 1
 PFHxS Detections in Soil



Notes:
 PFHxS = Perfluorohexanesulfonic acid
 Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
 ESRI 2022
 AECOM 2019

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

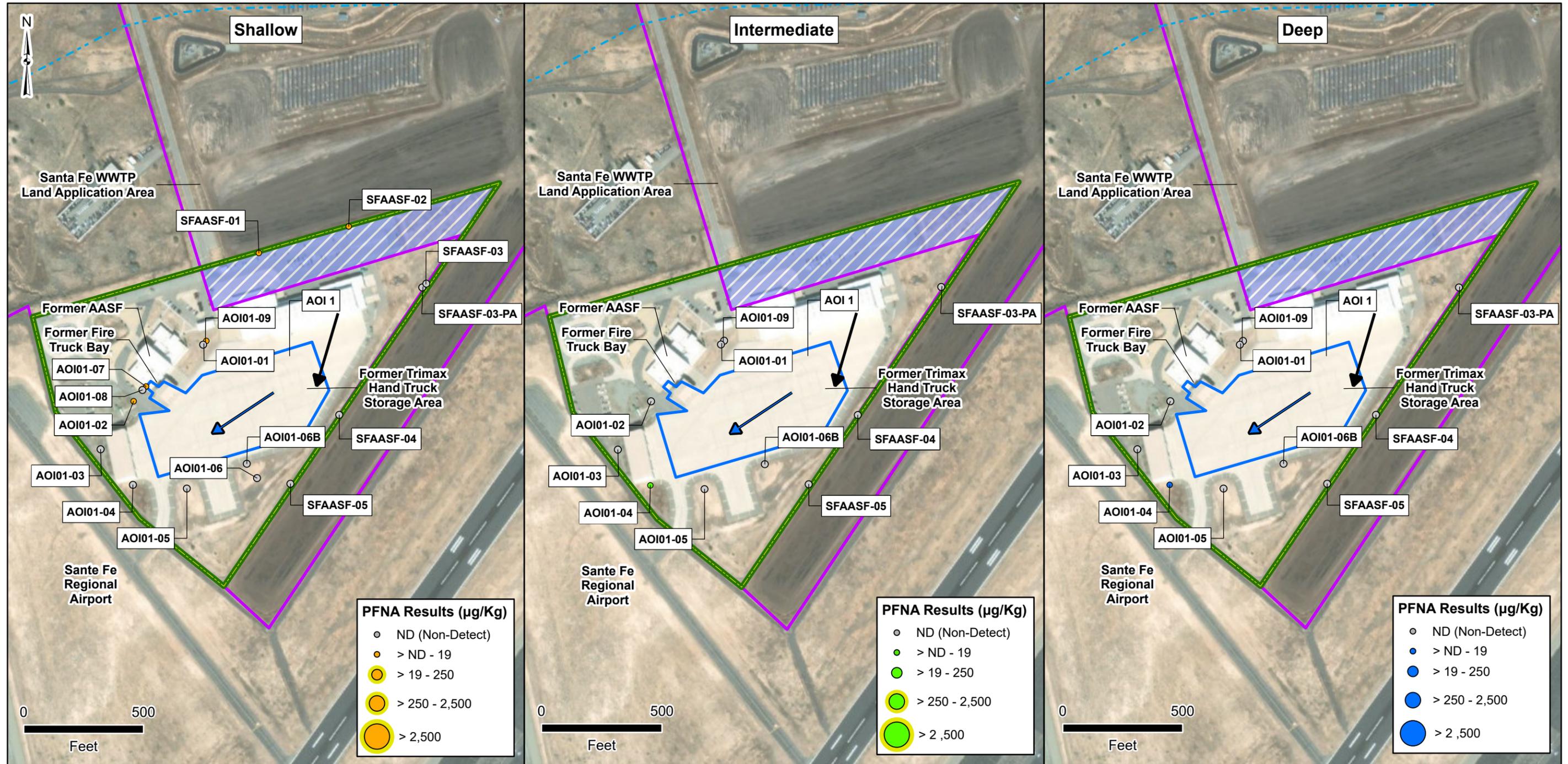
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Army National Guard Site Inspections
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 Santa Fe, New Mexico

Figure 6-5
 AOI 1
 PFNA Detections in Soil



- Facility Data**
- Facility Boundary
 - Area of Interest
 - Adjacent Potential Source Areas
 - Historical WWTP Biosolid Area
- Hydrology/Hydrogeology**
- Surface Water Flow Direction
 - Groundwater Flow Direction (Regional)

Notes:
 PFNA = Perfluorononanoic acid
 Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
 ESRI 2022
 AECOM 2019

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

1257

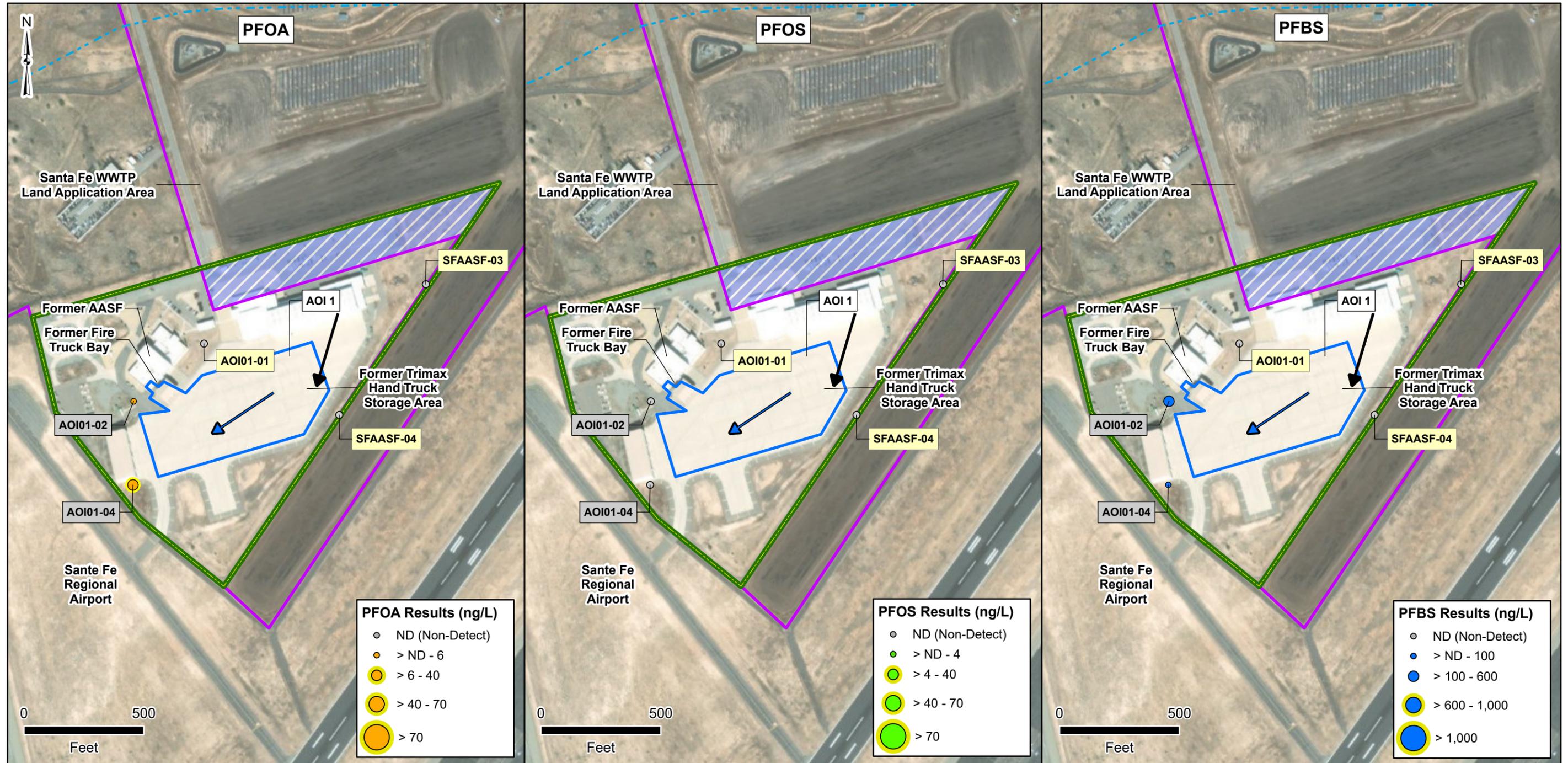
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Army National Guard Site Inspections
 Site Inspection Report
 Santa Fe, New Mexico



Figure 6-6
 AOI 1
 PFOA, PFOS and PFBS Detections in Groundwater



- Facility Data**
- ▭ Facility Boundary
 - ▭ Area of Interest
 - ▭ Adjacent Potential Source Areas
 - ▭ Historical WWTP Biosolid Area
- Hydrology/Hydrogeology**
- ➡ Surface Water Flow Direction
 - ➡ Groundwater Flow Direction (Regional)

Notes:
 PFOA = Perfluorooctanesulfonic acid
 PFOS = Perfluorooctanoic acid
 PFBS = Perfluorobutanesulfonic acid
 Exceedances of the OSD SL are depicted with a yellow halo.
 Gray labels represent Perched Groundwater Monitoring Wells and yellow labels represent Regional Groundwater Monitoring Wells

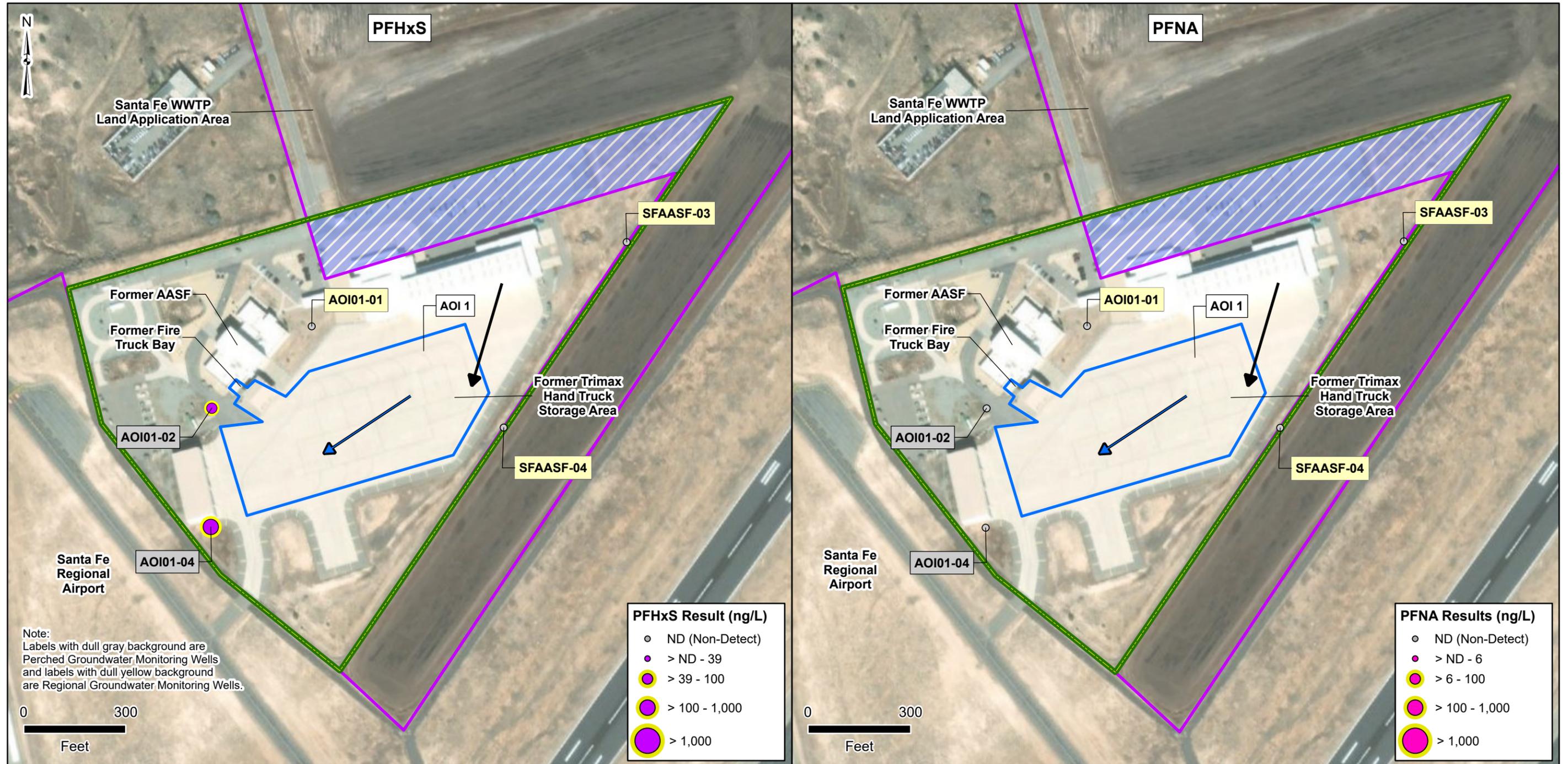
Data Sources:
 ESRI 2022
 AECOM 2019

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

1260

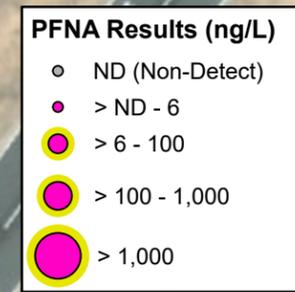
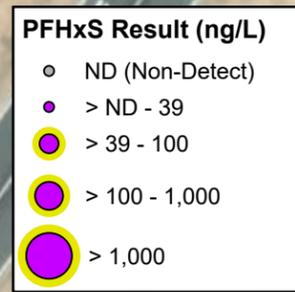
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Figure 6-7
 AOI 1
 PFHxS and PFNA Detections in Groundwater



Path: G:\Federal\Nationwide\PFAS\WMAES_634250383\PROJECTS\SI\Report\SantaFe\SantaFeSiteReport.aprx

Note:
 Labels with dull gray background are Perched Groundwater Monitoring Wells and labels with dull yellow background are Regional Groundwater Monitoring Wells.



- | | |
|---------------------------------|---------------------------------------|
| Facility Data | Hydrology/Hydrogeology |
| Facility Boundary | Surface Water Flow Direction |
| Area of Interest | Groundwater Flow Direction (Regional) |
| Adjacent Potential Source Areas | |
| Historical WWTP Biosolid Area | |

Notes:
 PFHxS = Perfluorohexanesulfonic acid
 PFNA = Perfluorononanoic acid
 Exceedances of the OSD SL are depicted with a yellow halo.
 Gray labels represent Perched Groundwater Monitoring Wells and yellow labels represent Regional Groundwater Monitoring Wells

Data Sources:
 ESRI 2020
 AECOM 2020

Date:.....December 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

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1264

7. EXPOSURE PATHWAYS

1265 The conceptual site model (CSM) for the AOI, revised based on the SI findings, is presented on
1266 **Figure 7-1**. Please note that while the CSM discussion assists in determining if a receptor may
1267 be impacted, the decision to move from SI to RI or interim action is determined based upon
1268 exceedances of the SLs for the relevant compounds and whether the release is more than likely
1269 attributable to the DoD. A CSM was also created for the Historical WWTP Biosolid Application
1270 Area. Because the potential source of contamination in this area is not likely a result of DoD
1271 activities, a complete pathway will not initiate the decision to move from SI to RI or to trigger a
1272 removal action but can result in additional investigation.

1273

1274 A CSM presents the current understanding of the site conditions with respect to known and
1275 suspected sources, potential transport mechanisms and migration pathways, and potentially
1276 exposed human receptors. A human exposure pathway is considered potentially complete when
1277 the following conditions are present:

1278

- 1279 1 Contaminant source
- 1280 2 Environmental fate and transport
- 1281 3 Exposure point
- 1282 4 Exposure route
- 1283 5 Potentially exposed populations.

1284

1285 If any of these elements are missing, the pathway is incomplete. The CSM figure uses an empty
1286 circle symbol to represent an incomplete exposure pathway. Areas with no identified complete
1287 pathway generally warrant no further action. However, the pathway is considered potentially
1288 complete if the relevant compounds are detected, in which case the CSM figure uses a half-filled
1289 circle symbol to represent a potentially complete exposure pathway. Additionally, a completely
1290 filled circle symbol is used to indicate when a potentially complete exposure pathway has
1291 detections of relevant compounds above the SLs. Areas with an identified potentially complete
1292 pathway that have detections of the relevant compounds above the SLs may warrant further
1293 investigation. Although the CSM indicates whether potentially complete exposure pathways may
1294 exist, the recommendation for future study in a RI or no action at this time is based on the
1295 comparison of the SI analytical results for the relevant compounds to the SLs.

1296

1297 In general, the potential PFAS exposure pathways are ingestion and inhalation. Human exposure
1298 via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant
1299 pathway compared to ingestion; however, exposure data for dermal pathways are sparse and
1300 continue to be the subject of PFAS toxicological study. The receptors evaluated are consistent
1301 with those listed in USEPA guidance for risk screening (USEPA 2001). Receptors at the Facility
1302 include facility workers (e.g., staff and visiting soldiers), and construction workers. Construction
1303 workers are only considered as potential future receptors due to the lack of current construction
1304 activity at the Facility. Receptors also include off-facility residential for drinking water receptors.
1305 Trespassers are not considered as receptors due to the presence of secured entry and exit points
1306 at the Facility. The CSM for AOI 1, revised based on the SI findings, is presented on **Figure 7-1**.
1307 The CSM created for the Historical WWTP Biosolid Application Area is presented on
1308 **Figure 7-2**.

1309

1310 **7.1 SOIL EXPOSURE PATHWAY**

1311 The SI results for soil were used to determine whether a potentially complete pathway exists
1312 between the source and potential receptors at AOI 1 or the historical WWTP biosolid application
1313 area based on the aforementioned criteria.

1314
1315 **7.1.1 AOI 1**

1316 AOI 1 encompasses potential PFAS release areas associated with an AFFF-equipped firetruck
1317 parked within the former AASF building and Tri-Max™ 70/30 hand trucks stored at various
1318 places around the flight line and paved parking apron. AFFF releases could have occurred
1319 directly onto surface soil but may also have infiltrated soil via cracks in pavement or joints
1320 between areas that are paved with different materials.

1321
1322 PFOS was detected at 7 of 10 surface soil sample locations with concentrations exceeding the
1323 applicable SL in three surface soil sample locations completed at AOI 1. PFOA, PFHxS, and
1324 PFNA were detected at concentrations less than SLs at multiple locations within AOI 1. Facility
1325 workers and construction workers could contact constituents in surface soil via incidental
1326 ingestion and inhalation of dust. Therefore, the surface soil exposure pathways for facility
1327 workers and construction workers are potentially complete.

1328
1329 PFOS, PFOA, PFHxS, and PFNA were detected in sub-surface soil at concentrations less than
1330 SLs. Ground disturbing activities to subsurface soil could also result in exposure to those
1331 compounds by construction workers via ingestion. Therefore, the exposure pathways for
1332 inhalation and ingestion are potentially complete for future construction workers. The CSM is
1333 presented in **Figure 7-1**.

1334
1335 PFAS were detected in AOI 1 groundwater samples, indicating a complete soil to perched
1336 groundwater pathway. It is not known if the perched groundwater is in hydrologic
1337 communication with the deeper regional aquifer.

1338
1339 **7.1.2 Historical Wastewater Treatment Plant Biosolid Application Area**

1340 The historical WWTP Biosolid Application Area encompasses the potential PFAS release area
1341 located within the facility boundary. Biosolids historically applied to this area may have
1342 contained PFAS.

1343
1344 PFOS was detected at both surface soil sample locations with concentrations exceeding the
1345 applicable SL. PFOA was detected at both locations, with the concentration exceeding the SL at
1346 SFAASF-02. PFBS, PFHxS, and PFNA were detected at concentrations less than SLs at one or
1347 more locations. Facility workers and construction workers could contact constituents in surface
1348 soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway
1349 for facility workers and construction workers are potentially complete.

1350
1351 Subsurface soil samples were not collected during the SI. As a result, the pathways of subsurface
1352 soil to construction workers via inhalation and ingestion are considered potentially complete
1353 pending further assessment.

1354 Due to the presence of PFAS in soil, a potentially complete soil to groundwater pathway exists.
1355 The CSM is presented in **Figure 7-2**.

1356
1357 **7.2 GROUNDWATER EXPOSURE PATHWAY**

1358 The SI results for relevant compounds in groundwater were used to determine whether a
1359 potentially complete pathway exists between the source and potential receptors based on the
1360 aforementioned criteria.

1361
1362 **7.2.1 AOI 1**

1363 PFHxS and PFOA were detected above applicable SLs in AOI 1 perched groundwater. PFBS
1364 was detected below the SL. Domestic wells are present in a direction that is potentially
1365 downgradient of AOI 1. Although it is unclear if the contaminated perched groundwater is in
1366 communication with the regional aquifer, the potential for a complete pathway is present. As a
1367 result, the groundwater exposure pathway is considered potentially complete for off-facility
1368 residents via ingestion. The CSM is presented in **Figure 7-1**.

1369
1370 **7.2.2 Historical Wastewater Treatment Plant Biosolid Application Area**

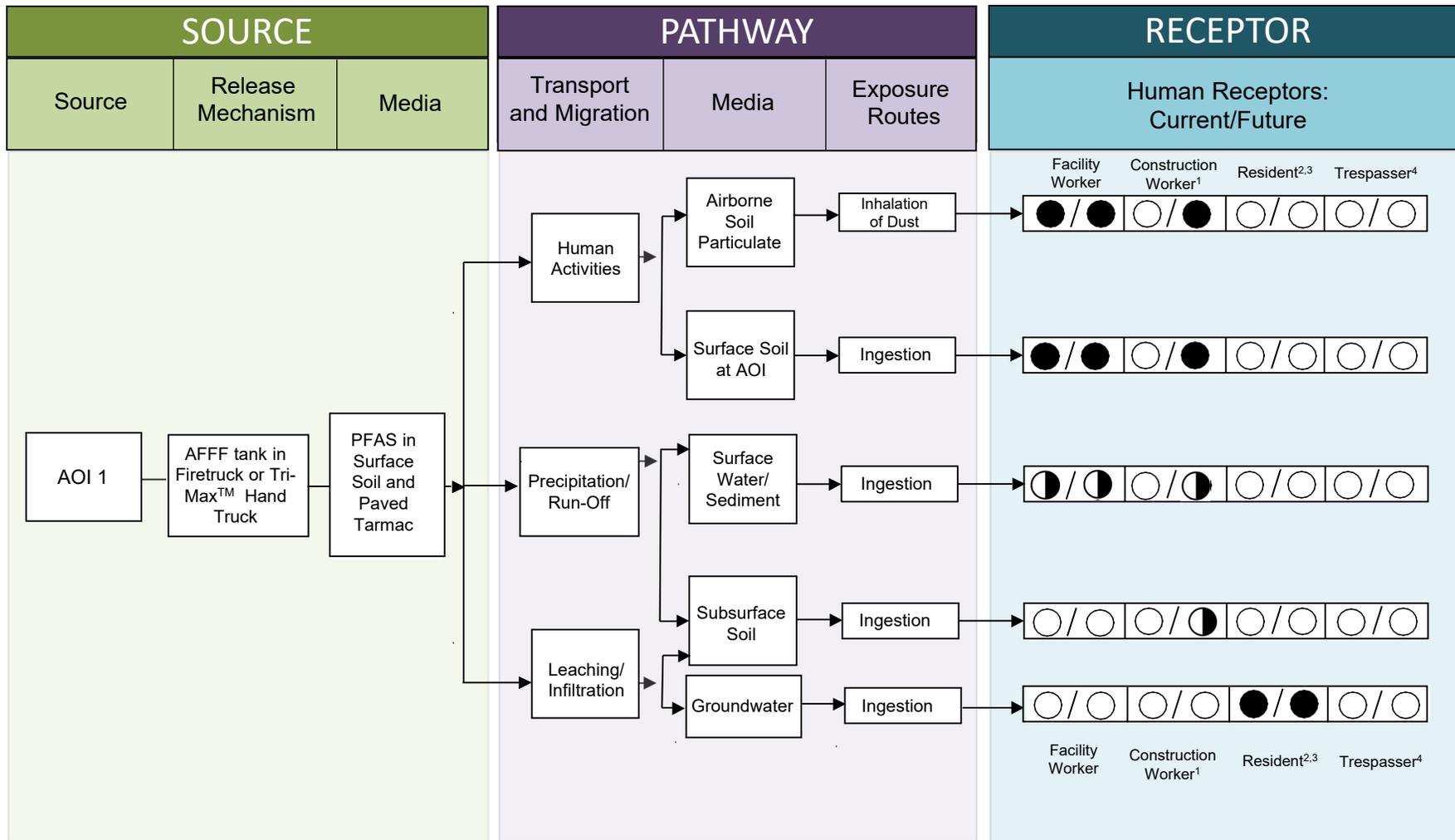
1371 Relevant compounds were not detected in groundwater downgradient from the historical
1372 wastewater treatment plant biosolid application area. However, subsurface soil was not sampled
1373 and perched water was not encountered, and the fate and transport of PFAS at this location is
1374 unknown. As a result, the groundwater exposure pathway to off-facility residents
1375 via ingestion is potentially complete pending further assessment. The CSM is presented in
1376 **Figure 7-2**.

1377
1378 **7.3 SURFACE WATER/ SEDIMENT EXPOSURE PATHWAY**

1379 Surface water flow at the Facility is generally to the southwest. Two stormwater retention basins
1380 are present adjacent to the tarmac and a stormwater detention pond is present north of the former
1381 AASF. PFAS was not detected in surface soil collected from the stormwater retention basins
1382 adjacent to the tarmac; however, samples were not collected from the stormwater retention pond.
1383 The stormwater retention pond may receive runoff from PFAS-contaminated areas. As a result,
1384 the surface water/sediment exposure pathway is considered potentially complete.

1385

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LEGEND

-  Flow-Chart Stops
-  Flow-Chart Continues
-  Partial / Possible Flow
-  Incomplete Pathway
-  Potentially Complete Pathway
-  Potentially Complete Pathway with Exceedance of Screening Level

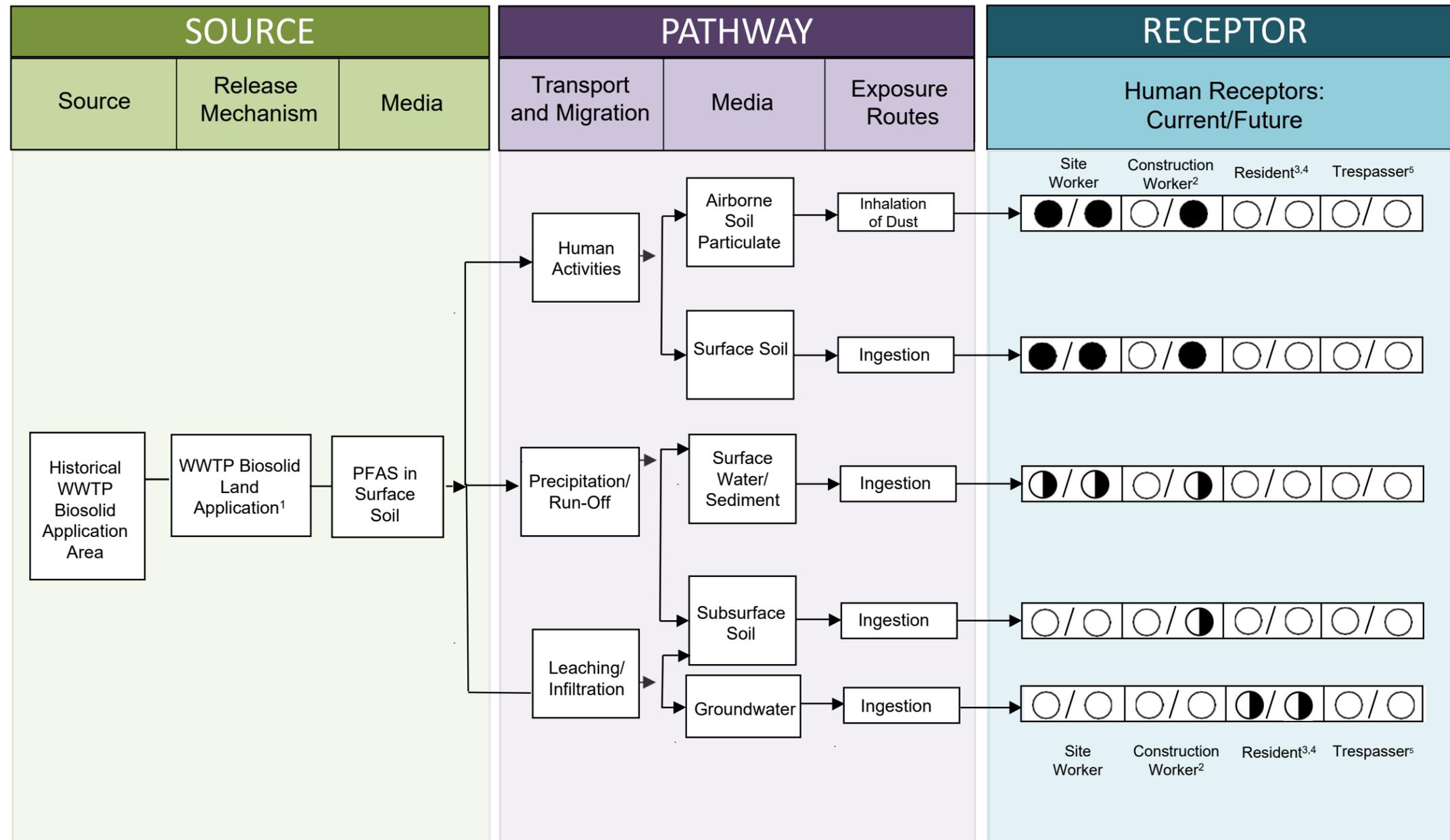
Notes:

1. No current active construction at the facility.
2. The resident refers to off-Facility drinking water receptors.
3. Inhalation of dust for off-Facility receptors is likely insignificant.
4. Trespassers are not considered likely due to the high level of security at the facility.

Figure 7-1
Conceptual Site Model
AOI 1 Santa Fe AASF

1388

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LEGEND

- Flow-Chart Stops
- ▶— Flow-Chart Continues
- - -▶- Partial / Possible Flow
- Incomplete Pathway
- ◐ Potentially Complete Pathway
- Potentially Complete Pathway with Exceedance of Screening Level

Notes:

1. Likely release mechanism for contaminated media is not the result of DoD activities.
2. No current active construction at the facility.
3. The resident refers to off-Facility drinking water receptors.
4. Inhalation of dust for off-Facility receptors is likely insignificant.
5. Trespassers are not considered likely due to the high level of security at the facility.

Figure 7-2
 Conceptual Site Model
 Historical WWTP Biosolid Application Area
 Santa Fe AASF

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1392

8. SUMMARY AND OUTCOME

1393 This section summarizes SI activities and findings. The most significant findings are summarized
1394 in this section and are reproduced directly or abstracted from information contained in this
1395 report. The outcome provides general and comparative interpretations of the findings relative to
1396 the SLs.

1397

8.1 SITE INSPECTION ACTIVITIES SUMMARY

1399 The SI field activities were conducted during two mobilizations. Field activities for the first
1400 mobilization were conducted from 7 to 8 February 2022 and consisted of hand augering and
1401 surface soil sample collection. The second mobilization was conducted 25 April through 3 June
1402 2022. Field activities included sonic and DPT drilling, collection of soil samples, installation of
1403 permanent monitoring wells, groundwater gauging and sampling, and collection of spatial data.
1404 Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2021a),
1405 except as noted in **Section 5.8**.

1406

1407 To fulfill the project DQOs set forth in the approved SI UFP-QAPP Addendum (EA 2021),
1408 samples were collected and analyzed for a subset of 24 compounds by LC/MS/MS compliant
1409 with QSM 5.3 Table B-15. The 24 PFAS analyzed as part of the ARNG SI program are specified
1410 in **Section 5.6** of this SI Report. Samples collected and analyzed are as follows:

1411

- 1412 • Thirty-eight (38) soil grab samples from 16 boring locations

1413

- 1414 • Five (5) grab groundwater samples from five permanent monitoring wells

1415

- 1416 • Forty-six (46) quality assurance/quality control samples.

1417

1418 An SI is conducted when the PA determines an AOI exists based on probable use, storage, and/or
1419 disposal of PFAS-containing materials. The SI includes multi-media sampling at the AOI to
1420 determine whether or not a release has occurred. The SI may conclude further investigation is
1421 warranted, a removal action is required to address immediate threats, or no further action is
1422 required. Additionally, the CSM was refined to assess whether a potentially complete pathway
1423 exists between the source and potential receptors for potential exposure at the AOI, which is
1424 described in **Section 7**.

1425

8.2 OUTCOME

1427 Based on the results of this SI, further evaluation under CERCLA is warranted in an RI for AOI
1428 1 (**Table 8-1**). The Historical WWTP Biosolid Application Area will also be assessed to
1429 determine if the contamination present poses a detrimental impact on human health for personnel
1430 at the Facility or the environment. Based on the CSMs developed and revised based on the SI
1431 findings, the exposure pathways are potentially complete for facility workers and construction
1432 workers during surface soil-disturbing activities and to construction workers during subsurface
1433 soil-disturbing activities from historical DoD activities. These pathways are also potentially
1434 complete from historical non-ARNG activities at the historical WWTP biosolid application area.
1435 Additionally, there are potentially complete exposure pathways for residential drinking water

1436 receptors from releases during historical DoD activities and from historical non-ARNG sources
1437 at the Facility. Sample analytical concentrations collected during this SI were compared against
1438 the project SLs in soil and groundwater, as described in **Table 6-1**.

1439

1440 A summary of the results of the SI data relative to the SLs is as follows:

1441

1442 • At AOI 1:

1443

1444 — PFOS was detected in surface soil above the SL in three of the 10 sampling locations
1445 with a maximum concentration of 920 µg/kg. PFOA, PFNA, and PFHxS were
1446 detected in soil samples at concentrations which did not exceed the SLs. PFBS was
1447 not detected in any soil samples collected from AOI 1.

1448

1449 — PFOA and PFHxS were detected in groundwater at concentrations above the SL with
1450 a maximum concentration of 38 ng/L and 230 ng/L, respectively. PFHxS exceeded
1451 the SL in two of the three groundwater wells. Both wells with exceedances are
1452 screened in perched groundwater, downgradient of the suspected source area. PFBS
1453 was detected in both downgradient wells, but concentrations did not exceed the SL.
1454 PFOA and PFNA were not detected in groundwater at AOI 1.

1455

1456 • At the Historical WWTP Biosolids Area:

1457

1458 — PFOA was detected in both surface soil sample locations and exceeded the SL in
1459 one location with a maximum concentration of 33 µg/kg.

1460

1461 — PFOS was detected in both surface soil sample locations above the SL with a
1462 maximum concentration of 60 µg/kg.

1463

1464 — PFBS, PFHxS, and PFNA were detected below SLs in one or more surface soil
1465 samples.

1466

1467 — Neither subsurface soil nor groundwater were sampled in this area.

1468

1469 • At the facility boundary:

1470

1471 — PFOA and PFOS were detected in three of four surface soil samples at
1472 concentrations below SLs. PFNA, PFBS, and PFHxS were not detected in surface
1473 soil samples.

1474

1475 — PFOA, PFOS, PFBS, PFNA, and PFHxS were not detected in shallow or deep
1476 subsurface soil samples.

1477

1478 — PFOA, PFOS, PFBS, PFNA, and PFHxS were not detected in groundwater
1479 samples.

1480

1481 Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA
 1482 (commonly referred to as GenX) was not included as an analyte at the time of this SI, as
 1483 screening values were established after SI planning and execution. However, ARNG will add
 1484 HFPO-DA to the list of constituents sampled during the next phase of CERCLA if warranted.
 1485

1486 **Table 8-1** summarizes the SI results for soil and groundwater used to determine if AOI 1 should
 1487 be considered for further investigation under CERCLA and undergo an RI. It also summarizes SI
 1488 results to determine if the historical WWTP biosolid application area should be considered for
 1489 non-CERCLA evaluation.
 1490

1491 **Table 8-1. Summary of Site Inspection Findings**

Area	Potential Release Area	Soil	Groundwater-On-Site	Groundwater – Facility Boundary	Future Action
AOI 1	Former Firetruck Bay and Tri-Max™ Hand Truck Storage Area	●	●	○	Proceed to RI
Historical WWTP Biosolid Application Area	Historical WWTP Biosolid Application	●	◐	○	Further Evaluation ¹
Notes:					
1. This area will be assessed during the RI to determine if the contamination present poses a detrimental impact on human health for personnel at the facility or the environment					

1492

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Appendix A

Data Usability Assessment and Data Validation Reports

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DATA USABILITY ASSESSMENT

The Data Usability Assessment is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment determines whether project execution and the resulting data have met installation-specific data quality objectives (DQOs). Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision-making.

Data quality indicators (DQIs) (precision, accuracy, representativeness, comparability, completeness, and sensitivity) are important components in assessing data usability. These DQIs are evaluated in the subsequent sections. The results of the evaluation demonstrate that the data presented in this Site Inspection (SI) Report are of high quality overall. Although most of the SI data are considered reliable, some degree of uncertainty can be associated with the data collected. Specific factors that may contribute to the uncertainty of the data evaluation are described below. The Data Validation Report (**Appendix A**) presents explanations for all qualified data in greater detail.

PRECISION

Precision is the degree of agreement among repeated measurements of the same characteristic on the same sample or on separate samples collected as close as possible in time and place. Field sampling precision is measured with the field duplicate relative percent differences (RPD), and laboratory precision is measured with RPDs for laboratory duplicates, such as laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs and matrix spike (MS) and matrix spike duplicate (MSD) pairs.

LCS/LCSD pairs were prepared by addition of known concentrations of each analyte to a matrix-free media known to be free of target analytes. Results for LCS/LCSD pairs met the criterion of $RPD \leq 30$ percent (%), as specified in the Final Site Inspection Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) Addendum, Santa Fe Army Aviation Support Facility, Santa Fe, New Mexico dated December 2021 (EA 2021), demonstrating that the analytical system was in control during sample preparation and analysis.

Matrix spike (MS)/matrix spike duplicate (MSD) pairs were prepared, analyzed, and reported for each preparation batch for PFAS analysis at a rate of 5%. MS/MSD results met the criterion of $RPD \leq 30\%$, as specified in the UFP-QAPP Addendum (EA 2021), demonstrating good analytical precision for the matrix being tested.

Field duplicate samples were collected at a rate of 10% to assess the overall sampling and measurement precision for this sampling effort. The field duplicate samples were within the project established precision limits presented in the UFP-QAPP Addendum (50% for solid samples, 30% for water samples) (EA 2021) or differences were less than the average limit of quantitation (LOQ), indicating acceptable sampling and analytical precision, with the following exceptions. Perfluorohexanesulfonic acid (PFHxS) and perfluorooctanesulfonic acid (PFOS)

47 were detected in parent sample AOI01-04-SB-109-110 but not in duplicate sample AOI01-04-
48 SB-109-110-DUP. The results were J or UJ qualified and are usable as qualified.

49
50 **ACCURACY**

51
52 Accuracy is a measure of confidence in a measurement. The smaller the difference between the
53 measurement of a parameter and its “true” or expected value, the more accurate the
54 measurement. The more precise or reproducible the result, the more reliable or accurate the
55 result. Accuracy is measured through percent recoveries in calibration verification samples,
56 LCS/LCSD, and MS/MSD, and through extraction internal standards (EIS).

57
58 LCS/LCSD samples were prepared by addition of known concentrations of each analyte to a
59 matrix-free media known to be free of target analytes. LCS/LCSD samples were analyzed for
60 each analytical batch and demonstrated that the analytical system was in control during
61 sample preparation and analysis, with the following exceptions. perfluorohexanoic acid
62 (PFHxA), perfluoroheptanoic acid, perfluorodecanoic acid, perfluorotridecanoic acid,
63 perfluorotetradecanoic acid, PFHxS, perfluoroheptanesulfonic acid, perfluorononanesulfonic
64 acid and/or 4:2 fluorotelomer sulfonic acid recoveries were low in LCS/LCSDs associated with
65 field and equipment blanks. No data were qualified.

66
67 MS/MSDs were performed on soil samples SFAASF-04-SB-0-2 and AOI01-01-SB-13-15 and
68 groundwater sample SFAASF-04-GW. Analyte recoveries in MS/MSD samples demonstrated
69 that the analytical system was in control for both soil and water.

70
71 EIS were added by the laboratory during sample extraction to measure relative responses of
72 target analytes and used to correct for bias associated with matrix interferences and sample
73 preparation efficiencies, injection volume variances, mass spectrometry ionization efficiencies,
74 and other associated preparation and analytical anomalies. Several field samples displayed EIS
75 area counts less than the lower quality control (QC) limit of 50%. Four positive field sample
76 results were associated with EIS recoveries less than the QC limit, but greater than 20%, and
77 were qualified “J+”; these qualified results are considered usable as estimated values with a
78 positive bias. Twenty non-detect field sample results associated with EIS recoveries less than
79 the QC limit, but greater than 20%, were qualified UJ; these qualified results are also considered
80 usable. The non-detect results for N-methylperfluorooctane sulfonamidoacetic acid
81 (NMeFOSAA) and N-ethylperfluorooctane sulfonamidoacetic acid (NEtFOSAA) in one soil
82 sample and the non-detect result for NMeFOSAA in three other soil samples were associated
83 with EIS recoveries less than 20%, and were qualified “X” by the validator, indicating that these
84 results needed further evaluation during the Data Usability Assessment. As stated above, EIS
85 recoveries are used to correct sample results for bias resulting from sample matrix as well as
86 analytical variability; because the sample data are corrected based on the EIS recoveries, low
87 recoveries do not necessarily impact data usability. Therefore, the project team has determined
88 that results with very low EIS recoveries are usable for project purposes, and these five non-
89 detect NMeFOSAA and NEtFOSAA soil results were UJ qualified.

90 Calibration verifications were performed routinely to ensure that instrument responses for all
91 calibrated analytes were within established QC criteria. All calibration verifications were within
92 the project established precision limits presented in the UFP-QAPP Addendum (EA 2021).
93

94 Transition ion ratios were outside the QSM-specified limits for one soil result and two
95 groundwater results, which were qualified J. These data are usable as qualified.
96

97 **REPRESENTATIVENESS**

98

99 Representativeness qualitatively expresses the degree to which data accurately reflect site
100 conditions. Factors that affect the representativeness of analytical data include appropriate
101 sample population definitions, proper sample collection and preservation techniques, analytical
102 holding times, use of standard analytical methods, and determination of matrix or analyte
103 interferences.
104

105 Relating to the use of standard analytical methods, the laboratory followed the method as
106 established in PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS)
107 compliant with QSM Version 5.3 Table B-15, including the specific preparation requirements
108 (i.e., ENVI-Carb or equivalent used), mass calibration, spectra, all the ion transitions identified
109 in Table B-15 were monitored, standards that contained both branch and linear isomers when
110 available were used, and isotopically labeled standards were used for quantitation. The
111 laboratory used approved standard methods in accordance with the UFP-QAPP Addendum
112 (EA 2021) for all analyses.
113

114 Field QC samples were collected to assess the representativeness of the data collected. Field
115 duplicates were collected at a rate of 10% and MS/MSD samples were collected at a rate of 5%.
116 Appropriate preservation techniques were followed by the field staff, and maximum holding
117 times for extraction and analysis were met by the laboratory.
118

119 Instrument blanks and method blanks were prepared by the laboratory in each batch as a negative
120 control. Instrument blanks and method blanks were non-detect for all target analytes with the
121 following exceptions. PFOS was detected in one laboratory blank associated with the analysis of
122 field samples. Two PFOS results less than the LOQ were qualified U based on this detection.
123

124 Equipment blanks (EBs) and field blanks (FBs) were also collected for groundwater and soil
125 samples. PFOS was above the detection limit in multiple EBs and FBs. PFBS was detected in
126 four EBs. PFOSA was detected in two EBs and one FB. PFHxA, PFOA, and PFBA were
127 detected in two EBs, and PFHxS was detected in one EB. Two detections of PFOS in associated
128 field samples (one parent sample and one duplicate) were less than five times the concentration
129 detected in the blank, but greater than the LOQ and were qualified J+. These qualified results
130 are considered usable as estimated values with a positive bias. The detections of PFOS in
131 associated field samples that were less than the limit of detection were the same results
132 associated with a laboratory blank detection (see above) and were qualified as U. These results
133 are usable as qualified and treated as non-detects. PFOS detections in associated samples that
134 were greater than five times the concentration detected in the blank were not qualified.

135 **COMPARABILITY**

136

137 Comparability is the extent to which data from one study can be compared directly to either past
138 data from the current project or data from another study. Using standardized sampling and
139 analytical methods, units of reporting, and site selection procedures help ensure comparability.
140 Standard field sampling and typical laboratory protocols were used during the SI and are
141 considered comparable to ongoing investigations.

142

143 **COMPLETENESS**

144

145 Completeness is a measure of the amount of valid data obtained from a measurement system
146 compared to the amount of data expected under normal conditions. The laboratory provided data
147 meeting system QC acceptance criteria for all samples tested. Project completeness was
148 determined by evaluating the planned versus actual quantities of data. Percent completeness per
149 parameter is as follows and reflects the exclusion of “R” flagged data:

150

151 • PFAS in groundwater by LC/MS/MS compliant with QSM Version 5.3 Table B-15 at
152 100%

153

154 • PFAS in soil by LC/MS/MS compliant with QSM Version 5.3 Table B-15 at 100%.

155

156 **SENSITIVITY**

157

158 Sensitivity is the capability of a test method or instrument to discriminate between measurement
159 responses representing different levels (e.g., concentrations) of a variable of interest. Examples
160 of QC measures for determining sensitivity include laboratory fortified blanks, a detection limit
161 study, and calibration standards at the LOQ. In order to meet the needs of the data users, project
162 data must meet the measurement performance criteria for sensitivity and project LOQs specified
163 in the UFP-QAPP Addendum (EA 2021). The laboratory provided applicable calibration
164 standards at the LOQ and reported all field sample results at the lowest possible dilution.
165 Additionally, any analytes detected below the LOQ and above the detection limit were reported
166 and qualified “J” as estimated values by the laboratory.

167

168 **DATA USABILITY SUMMARY**

169

170 Overall, the data are usable for evaluating the presence or absence of PFAS at the Facility.
171 Sufficient usable data were obtained to meet the objectives of the SI and to complete the
172 comparison to risk-based screening levels.



Data Validation Report

Santa Fe Army Aviation Support Facility
Santa Fe, New Mexico
Project # 3031200026.3000.****

Prepared for:

Army National Guard Headquarters
111 S. George Mason Drive, Arlington, VA 22204

11/11/2021

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List of Acronyms

%	percent
4:2 FTS	4:2 fluorotelomer sulfonic acid
ARNG	Army National Guard
CCV	continuing calibration verification
COC	chain of custody
DoD	Department of Defense
EA	EA Engineering, Science, and Technology, Inc., PBC
EIS	extracted internal standard
Eurofins	Eurofins Environment Testing America
ICAL	initial calibration
ICV	initial calibration verification
ID	identification
ISC	instrument sensitivity check
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
MS	matrix spike
MSD	matrix spike duplicate
ng/L	nanograms per liter
PFAS	per- and polyfluoroalkyl substances
QAPP	quality assurance project plan
QC	quality control
QSM	Quality Systems Manual for Environmental Laboratories
RPD	relative percent difference
UFP	Uniform Federal Policy
Wood	Wood Environment & Infrastructure, Solutions, Inc.

1.0 Introduction

EA Engineering, Science, and Technology, Inc., PBC (EA) collected one aqueous sample on 14 October 2021 and submitted the sample to Eurofins Environment Testing America (Eurofins), located in Lancaster, Pennsylvania, where the sample was received on 15 October 2021 and assigned to job number 410-59356-1. Eurofins analyzed the sample for per- and polyfluoroalkyl substances (PFAS) by liquid chromatography tandem mass spectrometry compliant with Table B-15 of the Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3. The field sample identification (ID), collection date and time, and laboratory sample ID are presented in Table 1.

Table 1: Field Sample Submitted to Eurofins
 Santa Fe Army Aviation Support Facility, Santa Fe, New Mexico

Field Sample ID	Collection Date and Time	Laboratory Sample ID
SFAASF-PW-01	10/14/21 10:47	410-59356-1

2.0 Data Validation Methodology

Wood Environment & Infrastructure Solutions, Inc. (Wood) performed DoD Stage 2B validation with review of the manual integration on data from the samples. The Stage 2B validation includes review of sample and instrument quality control (QC) results in the laboratory's analytical report and reported on QC summary forms, without review or validation of the raw analytical data. This data validation has been performed in accordance with:

- EA, 2020. Final Programmatic Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP), Site Inspection for Per- and Polyfluoroalkyl Substances Impacted Sites, Army National Guard (ARNG) Installations, Nationwide, December.
- DoD, 2019a. DoD QSM, Version 5.3. May.
- DoD, 2019b. General Data Validation Guidelines, Revision 1. November.
- DoD, 2020. Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15. May.

The laboratory's certified analytical report and supporting documentation were reviewed to assess the following:

- Data package and electronic data deliverable completeness;
- Laboratory case narrative review;
- Chain of custody (COC) compliance;
- Holding time compliance;
- QC sample frequency;
- Initial calibration (ICAL), initial calibration verification (ICV), and continuing calibration verification (CCV) compliance with method specified criteria;
- Presence or absence of laboratory contamination as demonstrated by laboratory blanks;



- Accuracy and bias as demonstrated by recovery of surrogate spikes, laboratory control sample (LCS), and matrix spike (MS) samples;
- Internal standard recoveries;
- Analytical precision as relative percent difference (RPD) of analyte concentration between LCS/LCS duplicate (LCSD), laboratory duplicates, or MS/MS duplicate (MSD);
- Sampling and analytical precision as RPD of analyte concentration between primary samples and field duplicates;
- Assessment of field contamination as demonstrated by equipment and field blanks; and
- Insofar as possible, the degree of conformance to method requirements and good laboratory practices.

In general, it is important to recognize that no analytical data are guaranteed to be correct, even if all QC audits are passed. Strict QC serves to increase confidence in data, but any reported value may potentially contain error.

3.0 Explanation of Data Quality Indicators

Summary explanations of the specific data quality indicators reviewed during this data quality review are presented below.

3.1 Laboratory Control Sample Accuracy and Precision

LCSs and LCSDs are aliquots of analyte free matrices that are spiked with the analytes of interest for an analytical method, or a representative subset of those analytes. The spiked matrix is then processed through the same analytical procedures as the samples they accompany. LCS recovery and precision are an indication of a laboratory's ability to successfully perform an analytical method in an interference free matrix.

3.2 Matrix Spike Accuracy and Precision

MSs and MSDs are prepared by adding known amounts of the analytes of interest for an analytical method, or a representative subset of those analytes, to an aliquot of sample. The spiked sample is then processed through the same extraction, concentration, cleanup, and analytical procedures as the unspiked samples in an analytical batch.

MS recovery and precision are an indication of a laboratory's ability to successfully recover an analyte in the matrix of a specific sample or closely related sample matrices. It is important not to apply MS results for any specific sample to other samples without understanding how the sample matrices are related.

3.3 Blank Detections

Blank samples are aliquots of analyte free matrix that are used as negative controls to verify that the sample collection, storage, preparation, and analysis system does not produce false positive results.

Equipment blanks are prepared by passing analyte free water through or over sample collection equipment and collecting the water in sample containers. Equipment blanks are used to monitor for possible sample contamination during the sample collection process and serve as a check on the effectiveness of field decontamination procedures.

Field blanks are prepared by pouring an aliquot of analyte free water into a sample container in the field. Field blanks are analyzed for the analytical suite required for the project. Field blanks are used to monitor for possible sample contamination originating from the water used for equipment decontamination.

Laboratory blanks are processed by the laboratory using the same procedures as the field samples.

3.4 Laboratory and Field Duplicate Precision

Laboratory and field duplicate analyses verify acceptable method precision by the laboratory at the time of preparation and analysis and/or sampling precision at the time of collection.

4.0 Definitions of Qualifiers that May be Used During Data Validation

The qualifiers used in the text are the qualifiers applied for each individual QC issue and may not reflect the final qualifiers applied to the data.

- J The reported result is an estimated quantity with an unknown bias.
- J+ The result is an estimated quantity, but the result may be biased high.
- J- The result is an estimated quantity, but the result may be biased low.
- U The analyte was not detected and was reported as less than the limit of detection (LOD). The LOD has been adjusted for any dilution or concentration of the sample.
- UU The analyte was not detected and was reported as less than the LOD. However, the associated numerical value is approximate.
- X The sample results were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

5.0 Qualification Reason Codes

Wood applied the following reason codes to the data during validation:

- EMPC The ion transition ratio is outside of expected limits.
- TR The detected concentration is less than the limit of quantitation (LOQ).

6.0 Chain of Custody and Sample Receipt Condition Documentation

The sample was received at the laboratory under proper COC, intact, properly preserved, and at a temperature within the QAPP-specified temperature range of 2 to 6 degrees Celsius.

7.0 Specific Data Validation Findings

Data validation findings are presented in Sections 7.1 through 8.0.

7.1 Per- and Polyfluoroalkyl Substances Analysis

PFAS results generated by Eurofins may be considered usable with the limitations summarized in Sections 7.1 through 8.0.

7.1.1 Holding Time Compliance

The sample was extracted for PFAS within the QAPP-specified maximum holding time of 14 days from sample collection for water samples and the extract was analyzed within the QAPP-specified maximum hold time of 28 days from extraction.

7.1.2 Initial Calibration Compliance

The ICAL associated with the analysis of this sample met the QAPP-specified criteria of the calibration standards calculating to 70 to 130 percent (%) of their true concentrations and either correlation coefficients greater than or equal to 0.99 or relative standard deviations of the response factors less than or equal to 20%.

7.1.3 Initial Calibration Verification Accuracy

ICV recoveries were within the QAPP-specified 70% to 130% limits.

7.1.4 Instrument Sensitivity Check Standard Accuracy

Instrument sensitivity check (ISC) recoveries were within the QSM-specified 70 to 130% limits and samples were analyzed no more than 12 hours after a reported ISC.

7.1.5 Continuing Calibration Verification Accuracy

CCV recoveries were within the QAPP-specified 70 to 130% limits.

7.1.6 Laboratory Blank Detections

PFAS were not detected in the laboratory blank associated with the sample reviewed in this report.

7.1.7 Equipment and Field Blank Detections

EA did not collect equipment or field blanks with the sample reviewed in this report.

7.1.8 Laboratory Control Sample Accuracy and Precision

LCS recoveries were within QSM 5.3-specified limits and RPDs between LCS and LCSD results were less than the QSM-specified maxima of 30%.

7.1.9 Matrix Spikes/ Matrix Spike Duplicates Accuracy and Precision

Eurofins did not perform MS and MSD analyses on the sample reviewed in this report.

7.1.10 Laboratory Duplicate Precision

Eurofins did not perform a duplicate analysis on the sample reviewed in this report.

7.1.11 Extracted Internal Standard Accuracy

Extracted internal standard (EIS) recoveries were within the QAPP-specified limits of 50 to 150% of areas measured in the ICAL midpoint standard or 50 to 150% of the areas measured in the initial CCV on days when ICAL is not performed, with the following exception:

- Recovery of the EIS M2-4:2 fluorotelomer sulfonic acid (4:2 FTS) was high at 160% in sample SFAASF-PW-01. 4:2 FTS was not detected in the sample and data usability is not adversely affected by the high EIS recovery.

7.1.12 Data Reporting and Analytical Procedures

Eurofins I qualified results when ion transition ratios were outside of expected limits. Wood J qualified Eurofins' I qualified results. (Qualifier and reason code: J, EMPC)

Eurofins J qualified results with detected concentrations less than the LOQ. Wood agrees these results are quantitatively uncertain and has maintained the laboratory's J qualifiers. (J, TR)

8.0 Field Duplicate Precision

EA did not collect a field duplicate with the sample reviewed in this report.

9.0 Summary and Conclusions

Wood reviewed a total of 24 records from sample SFAASF-PW-01.

During validation Wood J qualified four results because the detected concentrations were less than the LOQ and/or because the ion transition ratio was outside of expected limits.

Data qualified during validation are summarized in Table 2.

Table 2: Qualifiers Applied During Validation
 Santa Fe Army Aviation Support Facility, Santa Fe, New Mexico

Sample ID	Analyte	Concentration	Qualifier and Reason Code
SFAASF-PW-01	Perfluoroheptanoic acid	0.49 ng/L	J EMPC, TR
SFAASF-PW-01	Perfluorooctanoic acid	0.56 ng/L	J TR
SFAASF-PW-01	Perfluorobutanesulfonic acid	0.62 ng/L	J TR
SFAASF-PW-01	Perfluorooctanesulfonic acid	0.48 ng/L	J TR

Note:

ng/L = nanograms per liter



10.0 References

- EA, 2020. Final Programmatic UFP-QAPP, Site Inspection for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide, December.
- DoD, 2019a. DoD QSM, Version 5.3. May.
- DoD, 2019b. General Data Validation Guidelines, Revision 1. November.
- DoD, 2020. Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15.

11.0 Limitations

This report was prepared for ARNG by Wood Environment & Infrastructure Solutions, Inc. The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Wood services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This Data Validation report is intended to be used by ARNG for the Nationwide ARNG Installations Site Inspections for Per- and Polyfluoroalkyl Substances project only, subject to the terms and conditions of its contract with Wood. Any other use of, or reliance on, this report by any third party is at that party's sole risk.



Data Validation Report

Santa Fe Army Aviation Support Facility
Santa Fe, New Mexico
Project # 3031200026.3000.****

Prepared for:

Army National Guard Headquarters
111 S. George Mason Drive, Arlington, VA 22204

2/25/2022

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Table 2: Field Duplicate Detections

Table 3: Qualifiers Applied During Validation

List of Acronyms

%	percent
ARNG	Army National Guard
CCV	continuing calibration verification
COC	chain of custody
DoD	Department of Defense
EA	EA Engineering, Science, and Technology, Inc., PBC
EIS	extracted internal standard
Eurofins	Eurofins Environment Testing America
ICAL	initial calibration
ICV	initial calibration verification
ID	identification
ISC	instrument sensitivity check
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
MS	matrix spike
MSD	matrix spike duplicate
NEtFOSAA	ethyl perfluorooctanesulfonamidoacetic acid
NMeFOSAA	methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
QAPP	quality assurance project plan
QC	quality control
QSM	Quality Systems Manual for Environmental Laboratories
RPD	relative percent difference
UFP	Uniform Federal Policy
Wood	Wood Environment & Infrastructure, Solutions, Inc.

1.0 Introduction

EA Engineering, Science, and Technology, Inc., PBC (EA) collected 19 samples, including 15 soil samples, two equipment blanks, and two field blanks on 7 and 8 February 2022 and submitted the sample to Eurofins Environment Testing America (Eurofins), located in Lancaster, Pennsylvania, where the samples were received on 9 February 2022 and assigned to job number 410-72247-1. Eurofins analyzed the sample for per- and polyfluoroalkyl substances (PFAS) by liquid chromatography tandem mass spectrometry compliant with Table B-15 of the Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3. The field sample identification (ID), collection date and time, and laboratory sample ID are presented in Table 1.

2.0 Data Validation Methodology

Wood Environment & Infrastructure Solutions, Inc. (Wood) performed DoD Stage 2B validation with review of the manual integration on data from the samples. The Stage 2B validation includes review of sample and instrument quality control (QC) results in the laboratory's analytical report and reported on QC summary forms, without review or validation of the raw analytical data. This data validation has been performed in accordance with:

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The laboratory's certified analytical report and supporting documentation were reviewed to assess the following:

- Data package and electronic data deliverable completeness;
- Laboratory case narrative review;
- Chain of custody (COC) compliance;
- Holding time compliance;
- QC sample frequency;
- Initial calibration (ICAL), initial calibration verification (ICV), and continuing calibration verification (CCV) compliance with method specified criteria;
- Presence or absence of laboratory contamination as demonstrated by laboratory blanks;
- Accuracy and bias as demonstrated by recovery of surrogate spikes, laboratory control sample (LCS), and matrix spike (MS) samples;
- Internal standard recoveries;
- Analytical precision as relative percent difference (RPD) of analyte concentration between LCS/LCS duplicate (LCSD), laboratory duplicates, or MS/MS duplicate (MSD);

- Sampling and analytical precision as RPD of analyte concentration between primary samples and field duplicates;
- Assessment of field contamination as demonstrated by equipment and field blanks; and
- Insofar as possible, the degree of conformance to method requirements and good laboratory practices.

In general, it is important to recognize that no analytical data are guaranteed to be correct, even if all QC audits are passed. Strict QC serves to increase confidence in data, but any reported value may potentially contain error.

3.0 Explanation of Data Quality Indicators

Summary explanations of the specific data quality indicators reviewed during this data quality review are presented below.

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LCSs and LCSDs are aliquots of analyte free matrices that are spiked with the analytes of interest for an analytical method, or a representative subset of those analytes. The spiked matrix is then processed through the same analytical procedures as the samples they accompany. LCS recovery and precision are an indication of a laboratory's ability to successfully perform an analytical method in an interference free matrix.

3.2 Matrix Spike Accuracy and Precision

MSs and MSDs are prepared by adding known amounts of the analytes of interest for an analytical method, or a representative subset of those analytes, to an aliquot of sample. The spiked sample is then processed through the same extraction, concentration, cleanup, and analytical procedures as the unspiked samples in an analytical batch.

MS recovery and precision are an indication of a laboratory's ability to successfully recover an analyte in the matrix of a specific sample or closely related sample matrices. It is important not to apply MS results for any specific sample to other samples without understanding how the sample matrices are related.

3.3 Blank Detections

Blank samples are aliquots of analyte free matrix that are used as negative controls to verify that the sample collection, storage, preparation, and analysis system does not produce false positive results.

Equipment blanks are prepared by passing analyte free water through or over sample collection equipment and collecting the water in sample containers. Equipment blanks are used to monitor for possible sample contamination during the sample collection process and serve as a check on the effectiveness of field decontamination procedures.

Field blanks are prepared by pouring an aliquot of analyte free water into a sample container in the field. Field blanks are analyzed for the analytical suite required for the project. Field blanks are used to monitor for possible sample contamination originating from the water used for equipment decontamination.

Laboratory blanks are processed by the laboratory using the same procedures as the field samples.

3.4 Laboratory and Field Duplicate Precision

Laboratory and field duplicate analyses verify acceptable method precision by the laboratory at the time of preparation and analysis and/or sampling precision at the time of collection.

4.0 Definitions of Qualifiers that May be Used During Data Validation

The qualifiers used in the text are the qualifiers applied for each individual QC issue and may not reflect the final qualifiers applied to the data.

- J The reported result is an estimated quantity with an unknown bias.
- J+ The result is an estimated quantity, but the result may be biased high.
- J- The result is an estimated quantity, but the result may be biased low.
- U The analyte was not detected and was reported as less than the limit of detection (LOD). The LOD has been adjusted for any dilution or concentration of the sample.
- UJ The analyte was not detected and was reported as less than the LOD. However, the associated numerical value is approximate.
- X The sample results were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

5.0 Qualification Reason Codes

Wood applied the following reason codes to the data during validation:

- EMPC The ion transition ratio is outside of expected limits.
- ISL Low extracted internal standard (EIS) recovery.
- TR The detected concentration is less than the limit of quantitation (LOQ).

6.0 Chain of Custody and Sample Receipt Condition Documentation

The sample was received at the laboratory under proper COC, intact, properly preserved, and at a temperature within the QAPP-specified temperature range of 2 to 6 degrees Celsius, with the following exception:

- According to the case narrative:
 - The collection date recorded on the COC for sample SFAASF-01-SB-0-2 was 28 February 2022 and the matrix was recorded as being water. Eurofins logged in the sample using the date and matrix recorded on the label.
 - Samples AOI01-04-SB-0-2 and AOI01-03-SB-0-2 were listed as AOI1-04-SB-0-2 and AOI1-03-SB-0-2 on the COC. Eurofins contacted the client and were instructed to log the samples as AOI01-04-SB-0-2 and AOI01-03-SB-0-2.
- The samples arrived at the laboratory with a temperature below the range specified in the QAPP, however, it does not appear that the samples were frozen and data usability is not adversely affected by the low temperature.

7.0 Specific Data Validation Findings

Data validation findings are presented in Sections 7.1 through 8.0.

7.1 Per- and Polyfluoroalkyl Substances Analysis

PFAS results generated by Eurofins may be considered usable with the limitations summarized in Sections 7.1 through 8.0.

7.1.1 Holding Time Compliance

The samples were extracted for PFAS within the QAPP-specified maximum holding time of 14 days from sample collection for water samples or 28 days from collection for soil samples and the extracts were analyzed within the QAPP-specified maximum hold time of 28 days from extraction.

7.1.2 Initial Calibration Compliance

The ICAL associated with the analysis of these samples met the QAPP-specified criteria of the calibration standards calculating to 70 to 130 percent (%) of their true concentrations and either correlation coefficients greater than or equal to 0.99 or relative standard deviations of the response factors less than or equal to 20%.

7.1.3 Initial Calibration Verification Accuracy

ICV recoveries were within the QAPP-specified 70% to 130% limits.

7.1.4 Instrument Sensitivity Check Standard Accuracy

Instrument sensitivity check (ISC) recoveries were within the QSM-specified 70 to 130% limits and samples were analyzed no more than 12 hours after a reported ISC.

7.1.5 Continuing Calibration Verification Accuracy

CCV recoveries were within the QAPP-specified 70 to 130% limits.

7.1.6 Laboratory Blank Detections

PFAS were not detected in the laboratory blanks associated with the samples reviewed in this report.

7.1.7 Equipment and Field Blank Detections

Target analytes were not detected in the equipment and field blanks associated with the samples reviewed in this report.

7.1.8 Laboratory Control Sample Accuracy and Precision

LCS and LCSD recoveries were within QSM 5.3-specified limits and RPDs between LCS and LCSD results were less than the QAPP-specified maximum of 30%.

7.1.9 Matrix Spikes/ Matrix Spike Duplicates Accuracy and Precision

Eurofins performed MS and MSD analyses on sample SFAASF-04-SB-0-2. MS and MSD recoveries were within QSM 5.3-specified limits and RPDs between MS and MSD results were less than the QAPP-specified maximum of 30%.

7.1.10 Laboratory Duplicate Precision

Eurofins did not perform duplicate analyses on any of the samples reviewed in this report.

7.1.11 Extracted Internal Standard Accuracy

The EISs reported in the Isotope Dilution Summaries associated with the samples reviewed in this report were incorrectly calculated using the average initial calibration (ICAL) response, however, the EISs were reported correctly in Form VIII: PFAS ISOTOPE DILUTION SUMMARY AREA AND RETENTION TIME SUMMARY, in accordance with the criteria listed below. For this report, Wood used this form to evaluate the recoveries of the EISs.

EIS area counts were within the QAPP-specified limits of 50 to 150% of areas measured in the ICAL midpoint standard or 50 to 150% of the areas measured in the initial CCV on days when ICAL is not performed, with the following exception:

- Recoveries of EIS d₃-N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA) and d₃-N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA) were low in the analysis of samples AOI01-01-SB-0-2 (37%, 23%), AOI01-02-SB-0-2-D (16%, 9.4%), AOI01-04-SB-0-2 (27%, 18%), AOI01-07-SB-0-2 (48%, 33%), AOI01-08-SB-0-2 (40%, 34%), SFAASF-03-SB-0-2 (40%, 29%), SFAASF-04-SB-0-2 (26%, 16%), and SFAASF-05-SB-0-2 (27%, 19%). Data limitations are summarized below.
 - Wood X qualified the non-detect NEtFOSAA and NMeFOSAA results from sample AOI01-02-SB-0-2-D; and the non-detect NMeFOSAA results from samples AOI01-04-SB-0-2, SFAASF-04-SB-0-2, and SFAASF-05-SB-0-2 due to extremely low EIS recoveries. (Qualification and reason code: X, ISL)
 - Wood J+ qualified the detected NEtFOSAA result from sample SFAASF-05-SB-0-2 because of low EIS recovery. (Qualifier and reason code: J+, ISL)
 - Wood UJ qualified the non-detect NEtFOSAA and NMeFOSAA results from samples SFAASF-03-SB-0-2, AOI01-01-SB-0-2, AOI01-07-SB-0-2, and AOI01-08-SB-0-2; and the non-detect NEtFOSAA results from samples AOI01-04-SB-0-2 and SFAASF-04-SB-0-2 because of the low EIS recoveries. (Qualifier and reason code: UJ, ISL)
- Recoveries of EIS d₃-NMeFOSAA were low in the analysis of samples AOI01-02-SB-0-2 (41%), SFAASF-01-SB-0-2 (39%), and SFAASF-02-SB-0-2-D (48%). Wood J+ qualified the detected NMeFOSAA results from samples SFAASF-01-SB-0-2 and SFAASF-02-SB-0-2-D; and UJ qualified the non-detect NMeFOSAA result from sample AOI01-02-SB-0-2 because of the low EIS recoveries. (Qualifier and reason code: J+/UJ, ISL)

7.1.12 Data Reporting and Analytical Procedures

Eurofins I qualified results when ion transition ratios were outside of expected limits. Wood J qualified Eurofins' I qualified results. (Qualifier and reason code: J, EMPC)

Eurofins J qualified results with detected concentrations less than the LOQ. Wood agrees these results are quantitatively uncertain and has maintained the laboratory's J qualifiers. (J, TR)

8.0 Field Duplicate Precision

Wood collected field duplicates with samples:

- SFAASF-02-SB-0-2 (SFAASF-02-SB-0-2-D); and
- AOI01-02-SB-0-2 (AOI01-02-SB-0-2-D).

Target analyte detections are summarized in Table 2. Precision values were less than the QAPP-specified maximum of 50% or differences between analyte concentrations were less than the LOQ.

9.0 Summary and Conclusions

Wood reviewed a total of 360 records from field samples during the validation and applied the following qualifiers to the data:

- X: Wood X qualified five records (1.4%) due to extremely low EIS recoveries.
- J+: Wood J+ qualified three records (0.83%) as having potential high analytical bias due to low EIS recoveries..
- J/UJ: Wood J or UJ qualified 59 records (16%) due to low EIS recoveries, detected concentrations were less than the LOQ and/or the ion transition ratio was outside of expected limits.

Data qualified during validation are summarized in Table 3.

10.0 References

EA, 2020. Final Programmatic UFP-QAPP, Site Inspection for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide, December.

DoD, 2019a. DoD QSM, Version 5.3. May.

DoD, 2019b. General Data Validation Guidelines, Revision 1. November.

DoD, 2020. Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15.

11.0 Limitations

This report was prepared for EA by Wood Environment & Infrastructure Solutions, Inc. The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Wood services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This Data Validation report is intended to be used by EA for the Nationwide ARNG Installations Site Inspections for Per- and Polyfluoroalkyl Substances project only, subject to the terms and conditions of its contract with Wood. Any other use of, or reliance on, this report by any third party is at that party's sole risk.



wood.

Tables



Table 1
Field Samples Submitted to Eurofins Environment Testing America
Santa Fe Army Aviation Support Facility
Santa Fe, New Mexico

Sample Identification	Matrix	Collection Date	Laboratory Sample Identification	Notes
SFAASF-03-SB-0-2	Solid	2/7/2022 11:30	410-72247-1	
SFAASF-04-SB-0-2	Solid	2/7/2022 12:10	410-72247-2	
SFAASF-05-SB-0-2	Solid	2/7/2022 12:53	410-72247-3	
AOI01-06-SB-0-2	Solid	2/7/2022 13:10	410-72247-4	
AOI01-05-SB-0-2	Solid	2/7/2022 13:25	410-72247-5	
AOI01-04-SB-0-2	Solid	2/7/2022 13:40	410-72247-6	
AOI01-03-SB-0-2	Solid	2/7/2022 14:00	410-72247-7	
SFAASF-EB-01	Water	2/7/2022 11:50	410-72247-8	Equipment Blank
SFAASF-FB-01	Water	2/7/2022 12:00	410-72247-9	Field Blank
SFAASF-01-SB-0-2	Solid	2/8/2022 10:20	410-72247-10	
SFAASF-02-SB-0-2	Solid	2/8/2022 10:55	410-72247-11	
SFAASF-02-SB-0-2-D	Solid	2/8/2022 10:55	410-72247-12	Field Duplicate
AOI01-08-SB-0-2	Solid	2/8/2022 11:56	410-72247-13	
AOI01-07-SB-0-2	Solid	2/8/2022 12:22	410-72247-14	
AOI01-02-SB-0-2	Solid	2/8/2022 12:58	410-72247-15	
AOI01-02-SB-0-2-D	Solid	2/8/2022 12:58	410-72247-16	Field Duplicate
AOI01-01-SB-0-2	Solid	2/8/2022 13:50	410-72247-17	
SFAASF-EB-02	Water	2/8/2022 10:40	410-72247-18	Equipment Blank
SFAASF-FB-02	Water	2/8/2022 12:00	410-72247-19	Field Blank

Table 2
Field Duplicate Detections
Santa Fe Army Aviation Support Facility
Santa Fe, New Mexico

Analyte	Average Limit of Quantitation	Primary Sample	Field Duplicate	Relative Percent Difference	Notes
Samples SFAASF-02-SB-0-2 and SFAASF-02-SB-0-2-D					
Perfluorohexanoic acid	0.66 ng/g	3.8	3.9	2.6%	
Perfluoroheptanoic acid	0.66 ng/g	8.2	9.1	10%	
Perfluorooctanoic acid	0.66 ng/g	30	33	10%	
Perfluorononanoic acid	0.66 ng/g	2.9	2.9	0%	
Perfluorodecanoic acid	0.66 ng/g	6.1	5.4	12%	
Perfluorotridecanoic acid	0.66 ng/g	0.26 J	0.22 J	17%	
Perfluorotetradecanoic acid	0.66 ng/g	0.68	0.60 J	13%	
Perfluorobutanesulfonic acid	2.2 ng/g	0.58 J	0.59 J	1.7%	
Perfluorohexanesulfonic acid	0.66 ng/g	4.5	4.7	4.3%	
Perfluorooctanesulfonic acid	0.66 ng/g	60	49	20%	
NEtFOSAA	2.2 ng/g	12	9.8	20%	
NMeFOSAA	2.2 ng/g	1.4 J	1.1 J	24%	
Perfluoropentanesulfonic acid	3.3 ng/g	0.64 J	0.74 J	14%	
Perfluoroheptanesulfonic acid	0.66 ng/g	0.82	0.73	12%	
Perfluorodecanesulfonic acid	0.66 ng/g	13	9.5	31%	
Perfluorooctanesulfonamide	0.66 ng/g	2.3	1.7	30%	
Perfluoropentanoic acid	0.66 ng/g	1.9	1.9	0%	
Perfluoroundecanoic acid	0.66 ng/g	1.1	0.87	23%	
Perfluorododecanoic acid	0.66 ng/g	2.3	2.1	9.1%	
Samples AOI01-02-SB-0-2 and AOI01-02-SB-0-2-D					
Perfluorooctanoic acid	0.65 ng/g	0.26 J	0.53 J	68%	± LOQ
Perfluorononanoic acid	0.65 ng/g	0.32 J	0.51 J	46%	
Perfluorodecanoic acid	0.65 ng/g	0.34 J	0.46 U	NC	
Perfluorohexanesulfonic acid	0.65 ng/g	0.50 J	0.96	63%	± LOQ
Perfluorooctanesulfonic acid	0.65 ng/g	61	86	34%	
Perfluorodecanesulfonic acid	0.65 ng/g	0.33 J	0.46 U	NC	

Notes:

NC = not calculable
ng/g = nanograms per gram

Qualifier Definitions:

J = The reported result was an estimated value.
U = The analyte was not detected and was reported as less than the limit of detection (LOD). The LOD has been adjusted for any dilution or concentration of the sample.

Reason Code:

± LOQ = The difference between sample and field duplicate analyte concentrations is less than the limit of quantitation, demonstrating acceptable sampling and analytical precision.

Table 3
Qualifiers Added During Validation
Santa Fe Army Aviation Support Facility
Santa Fe, New Mexico

Sample Identification	Analyte	Result	Qualifier and Reason Code(s)
AOI01-01-SB-0-2	NEtFOSAA	0.41 ng/g	UJ ISL
AOI01-01-SB-0-2	NMeFOSAA	0.41 ng/g	UJ ISL
AOI01-01-SB-0-2	Perfluorohexanesulfonic acid	0.41 ng/g	J TR
AOI01-01-SB-0-2	Perfluorohexanoic acid	0.25 ng/g	J TR
AOI01-02-SB-0-2	NMeFOSAA	0.43 ng/g	UJ ISL
AOI01-02-SB-0-2	Perfluorodecanesulfonic acid	0.33 ng/g	J TR
AOI01-02-SB-0-2	Perfluorodecanoic acid	0.34 ng/g	J TR
AOI01-02-SB-0-2	Perfluorohexanesulfonic acid	0.50 ng/g	J TR
AOI01-02-SB-0-2	Perfluorononanoic acid	0.32 ng/g	J TR
AOI01-02-SB-0-2	Perfluorooctanoic acid	0.26 ng/g	J TR
AOI01-02-SB-0-2-D	NEtFOSAA	0.46 ng/g	X ISL
AOI01-02-SB-0-2-D	NMeFOSAA	0.46 ng/g	X ISL
AOI01-02-SB-0-2-D	Perfluorononanoic acid	0.51 ng/g	J TR
AOI01-02-SB-0-2-D	Perfluorooctanoic acid	0.53 ng/g	J TR
AOI01-03-SB-0-2	Perfluorooctanoic acid	0.39 ng/g	J TR
AOI01-04-SB-0-2	NEtFOSAA	0.42 ng/g	UJ ISL
AOI01-04-SB-0-2	NMeFOSAA	0.42 ng/g	X ISL
AOI01-04-SB-0-2	Perfluorohexanoic acid	0.32 ng/g	J TR
AOI01-04-SB-0-2	Perfluorooctanoic acid	0.36 ng/g	J TR
AOI01-07-SB-0-2	NEtFOSAA	0.44 ng/g	UJ ISL
AOI01-07-SB-0-2	NMeFOSAA	0.44 ng/g	UJ ISL
AOI01-07-SB-0-2	Perfluoroheptanoic acid	0.43 ng/g	J TR
AOI01-07-SB-0-2	Perfluoropentanesulfonic acid	0.30 ng/g	J TR
AOI01-07-SB-0-2	Perfluoropentanoic acid	0.48 ng/g	J TR
AOI01-07-SB-0-2	Perfluoroundecanoic acid	0.56 ng/g	J TR
AOI01-08-SB-0-2	NEtFOSAA	0.47 ng/g	UJ ISL
AOI01-08-SB-0-2	NMeFOSAA	0.47 ng/g	UJ ISL
AOI01-08-SB-0-2	Perfluorohexanesulfonic acid	0.30 ng/g	J TR
AOI01-08-SB-0-2	Perfluorooctanoic acid	0.47 ng/g	J EMPC, TR
SFAASF-01-SB-0-2	NMeFOSAA	0.93 ng/g	J+ ISL, TR
SFAASF-01-SB-0-2	Perfluoroheptanesulfonic acid	0.45 ng/g	J TR
SFAASF-01-SB-0-2	Perfluoropentanesulfonic acid	0.45 ng/g	J TR
SFAASF-01-SB-0-2	Perfluoropentanoic acid	0.52 ng/g	J TR
SFAASF-01-SB-0-2	Perfluorotetradecanoic acid	0.60 ng/g	J TR
SFAASF-01-SB-0-2	Perfluorotridecanoic acid	0.27 ng/g	J TR
SFAASF-02-SB-0-2	NMeFOSAA	1.4 ng/g	J TR
SFAASF-02-SB-0-2	Perfluorobutanesulfonic acid	0.58 ng/g	J TR
SFAASF-02-SB-0-2	Perfluoropentanesulfonic acid	0.64 ng/g	J TR
SFAASF-02-SB-0-2	Perfluorotridecanoic acid	0.26 ng/g	J TR
SFAASF-02-SB-0-2-D	NMeFOSAA	1.1 ng/g	J+ ISL, TR
SFAASF-02-SB-0-2-D	Perfluorobutanesulfonic acid	0.59 ng/g	J TR
SFAASF-02-SB-0-2-D	Perfluoropentanesulfonic acid	0.74 ng/g	J TR
SFAASF-02-SB-0-2-D	Perfluorotetradecanoic acid	0.60 ng/g	J TR
SFAASF-02-SB-0-2-D	Perfluorotridecanoic acid	0.22 ng/g	J TR
SFAASF-03-SB-0-2	NEtFOSAA	0.43 ng/g	UJ ISL
SFAASF-03-SB-0-2	NMeFOSAA	0.43 ng/g	UJ ISL
SFAASF-03-SB-0-2	Perfluorodecanoic acid	0.22 ng/g	J TR

Table 3
Qualifiers Added During Validation
Santa Fe Army Aviation Support Facility
Santa Fe, New Mexico

Sample Identification	Analyte	Result	Qualifier and Reason Code(s)
SFAASF-03-SB-0-2	Perfluorohexanoic acid	0.45 ng/g	J TR
SFAASF-03-SB-0-2	Perfluorooctanesulfonic acid	0.48 ng/g	J TR
SFAASF-03-SB-0-2	Perfluorooctanoic acid	0.53 ng/g	J TR
SFAASF-03-SB-0-2	Perfluoropentanoic acid	0.29 ng/g	J TR
SFAASF-04-SB-0-2	NEtFOSAA	0.43 ng/g	UJ ISL
SFAASF-04-SB-0-2	NMeFOSAA	0.43 ng/g	X ISL
SFAASF-04-SB-0-2	Perfluorodecanesulfonic acid	0.37 ng/g	J TR
SFAASF-04-SB-0-2	Perfluorodecanoic acid	0.47 ng/g	J TR
SFAASF-04-SB-0-2	Perfluorododecanoic acid	0.22 ng/g	J TR
SFAASF-04-SB-0-2	Perfluoroheptanoic acid	0.47 ng/g	J TR
SFAASF-04-SB-0-2	Perfluorohexanoic acid	0.48 ng/g	J TR
SFAASF-04-SB-0-2	Perfluorooctanoic acid	0.60 ng/g	J TR
SFAASF-04-SB-0-2	Perfluoropentanoic acid	0.23 ng/g	J TR
SFAASF-05-SB-0-2	NEtFOSAA	0.48 ng/g	J+ ISL, EMPC, TR
SFAASF-05-SB-0-2	NMeFOSAA	0.42 ng/g	X ISL
SFAASF-05-SB-0-2	Perfluorodecanesulfonic acid	0.28 ng/g	J TR
SFAASF-05-SB-0-2	Perfluorodecanoic acid	0.27 ng/g	J TR
SFAASF-05-SB-0-2	Perfluoroheptanoic acid	0.33 ng/g	J TR
SFAASF-05-SB-0-2	Perfluorohexanoic acid	0.43 ng/g	J TR
SFAASF-05-SB-0-2	Perfluoropentanoic acid	0.24 ng/g	J TR

Notes:

ng/g = nanograms per gram

NEtFOSAA = ethyl perfluorooctanesulfonamidoacetic acid

NMeFOSAA = methyl perfluorooctanesulfonamidoacetic acid

Qualifiers:

J = The reported result was an estimated value.

J+ = The reported result was an estimated value with a potential high bias.

UJ = The analyte was not detected and was reported as less than the limit of detection. However, the associated numerical value is approximate.

X = The sample results were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Reason Codes:

EMPC = Ion transition ratio is outside of expected limits.

ISL = Low extracted internal standard recovery.

TR = The detected analyte concentration is less than the limit of quantitation.



Data Validation Report

Santa Fe Army Aviation Support Facility
Santa Fe, New Mexico
Project # 3031200026.3000.****

Prepared for:

Army National Guard Headquarters
111 S. George Mason Drive, Arlington, VA 22204

6/27/2022

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Table 1: Field Samples Submitted to Eurofins

Table 2: Target Analyte Detections in Primary and Field Duplicate Samples

Table 3: Qualifiers Applied During Validation



List of Acronyms

°C	degrees Celsius
%	percent
ARNG	Army National Guard
CCV	continuing calibration verification
COC	chain of custody
DoD	Department of Defense
EA	EA Engineering, Science, and Technology, Inc., PBC
EIS	extracted internal standard
Eurofins	Eurofins Environment Testing America
FTS	fluorotelomer sulfonic acid
g	grams
ICAL	initial calibration
ICV	initial calibration verification
ID	identification
ISC	instrument sensitivity check
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
mL	milliliters
MS	matrix spike
MSD	matrix spike duplicate
NEtFOSAA	ethyl perfluorooctanesulfonamidoacetic acid
ng/g	nanograms per gram
ng/L	nanograms per liter
NMeFOSAA	methyl perfluorooctanesulfonamidoacetic acid
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHpS	perfluoroheptanesulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNS	perfluorononanesulfonic acid
PFOA	perfluorooctanoic acid

PFOS	perfluorooctanesulfonic acid
PFOSA	perfluorooctanesulfonamide
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
QAPP	quality assurance project plan
QC	quality control
QSM	Quality Systems Manual for Environmental Laboratories
RPD	relative percent difference
UFP	Uniform Federal Policy
Wood	Wood Environment & Infrastructure, Solutions, Inc.



1.0 Introduction

EA Engineering, Science, and Technology, Inc., PBC (EA) collected 26 soil samples (including 3 field duplicates) and 41 water samples (including 1 field duplicate, 18 equipment blanks, and 17 field blanks) between 25 April and 20 May 2022. EA submitted the samples to Eurofins Environment Testing America (Eurofins), located in Lancaster, Pennsylvania, where the samples were received between 27 April and 21 May 2022 and assigned to job number 410-81788-1, 410-82129-1, 410-82454-1, 410-82468-1, 410-83020-1, 410-83061-1, 410-83313-1, and 410-84932-1. Eurofins analyzed the samples for per- and polyfluoroalkyl substances (PFAS) by liquid chromatography tandem mass spectrometry compliant with Table B-15 of the Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3. The field sample identifications (IDs), collection dates and times, and laboratory sample IDs are presented in Table 1.

2.0 Data Validation Methodology

Wood Environment & Infrastructure Solutions, Inc. (Wood) performed DoD Stage 2B validation with review of the manual integration on PFAS data from the samples. The Stage 2B validation includes review of sample and instrument quality control (QC) results in the laboratory's analytical report and reported on QC summary forms, without review or validation of the raw analytical data. This data validation has been performed in accordance with:

- EA, 2020. Final Programmatic Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP), Site Inspection for Per- and Polyfluoroalkyl Substances Impacted Sites, Army National Guard (ARNG) Installations, Nationwide, December.
- DoD, 2019a. DoD QSM, Version 5.3. May.
- DoD, 2019b. General Data Validation Guidelines, Revision 1. November.
- DoD, 2020. Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15. May.

The laboratory's certified analytical report and supporting documentation were reviewed to assess the following:

- Data package and electronic data deliverable completeness;
- Laboratory case narrative review;
- Chain of custody (COC) compliance;
- Holding time compliance;
- QC sample frequency;
- Initial calibration (ICAL), initial calibration verification (ICV), and continuing calibration verification (CCV) compliance with method specified criteria;
- Presence or absence of laboratory contamination as demonstrated by laboratory blanks;
- Accuracy and bias as demonstrated by recovery of surrogate spikes, laboratory control sample (LCS), and matrix spike (MS) samples;
- Internal standard recoveries;

- Analytical precision as relative percent difference (RPD) of analyte concentration between LCS/LCS duplicate (LCSD), laboratory duplicates, or MS/MS duplicate (MSD);
- Sampling and analytical precision as RPD of analyte concentration between primary samples and field duplicates;
- Assessment of field contamination as demonstrated by equipment and field blanks; and
- Insofar as possible, the degree of conformance to method requirements and good laboratory practices.

In general, it is important to recognize that no analytical data are guaranteed to be correct, even if all QC audits are passed. Strict QC serves to increase confidence in data, but any reported value may potentially contain error.

3.0 Explanation of Data Quality Indicators

Summary explanations of the specific data quality indicators reviewed during this data quality review are presented below.

3.1 Laboratory Control Sample Accuracy and Precision

LCSs and LCSDs are aliquots of analyte free matrices that are spiked with the analytes of interest for an analytical method, or a representative subset of those analytes. The spiked matrix is then processed through the same analytical procedures as the samples they accompany. LCS recovery and precision are an indication of a laboratory's ability to successfully perform an analytical method in an interference free matrix.

3.2 Matrix Spike Accuracy and Precision

MSs and MSDs are prepared by adding known amounts of the analytes of interest for an analytical method, or a representative subset of those analytes, to an aliquot of sample. The spiked sample is then processed through the same extraction, concentration, cleanup, and analytical procedures as the unspiked samples in an analytical batch.

MS recovery and precision are an indication of a laboratory's ability to successfully recover an analyte in the matrix of a specific sample or closely related sample matrices. It is important not to apply MS results for any specific sample to other samples without understanding how the sample matrices are related.

3.3 Blank Detections

Blank samples are aliquots of analyte free matrix that are used as negative controls to verify that the sample collection, storage, preparation, and analysis system does not produce false positive results.

Equipment blanks are prepared by passing analyte free water through or over sample collection equipment and collecting the water in sample containers. Equipment blanks are used to monitor for possible sample contamination during the sample collection process and serve as a check on the effectiveness of field decontamination procedures.

Field blanks are prepared by pouring an aliquot of analyte free water into a sample container in the field. Field blanks are analyzed for the analytical suite required for the project. Field blanks are used to monitor for possible sample contamination originating from the water used for equipment decontamination.

Laboratory blanks are processed by the laboratory using the same procedures as the field samples.

3.4 Laboratory and Field Duplicate Precision

Laboratory and field duplicate analyses verify acceptable method precision by the laboratory at the time of preparation and analysis and/or sampling precision at the time of collection.

4.0 Definitions of Qualifiers that May be Used During Data Validation

The qualifiers used in the text are the qualifiers applied for each individual QC issue and may not reflect the final qualifiers applied to the data.

- J The reported result is an estimated quantity with an unknown bias.
- J+ The result is an estimated quantity, but the result may be biased high.
- J- The result is an estimated quantity, but the result may be biased low.
- U The analyte was not detected and was reported as less than the limit of detection (LOD). The LOD has been adjusted for any dilution or concentration of the sample.
- UJ The analyte was not detected and was reported as less than the LOD. However, the associated numerical value is approximate.
- X The sample results were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

5.0 Qualification Reason Codes

Wood applied the following reason codes to the data during validation:

- EBG The analyte was detected in the associated equipment blank and the concentration detected in the sample was greater than the limit of quantitation (LOQ) and less than five times the concentration detected in the blank.
- EBL The analyte was detected in the associated equipment blank and the concentration detected in the sample was greater than the LOD and less than the LOQ.
- EMPC The ion transition ratio is outside of expected limits.
- FBL The analyte was detected in the associated field blank and the concentration detected in the sample was greater than the LOD and less than the LOQ.
- FDD Imprecision between primary and field duplicate results.
- ISL Low extracted internal standard (EIS) recovery.
- LBL The analyte was detected in the associated laboratory blank and the concentration detected in the sample was greater than the LOD and less than the LOQ.
- TR The detected concentration is less than the LOQ.

6.0 Chain of Custody and Sample Receipt Condition Documentation

Samples were received at the laboratory under proper COC, intact, properly preserved, and at temperatures within the QAPP-specified temperature range of 2 to 6 degrees Celsius (°C), with the following exceptions:

- According to the case narratives, all sample arrived at the laboratory at temperatures less than the QAPP-specified minimum of 2 °C, with measured temperatures between 0.4 and 1.9 °C. There is no evidence that the samples were frozen or otherwise compromised and in accordance with the DoD data validation guidelines, no data were qualified based on the low sample receipt temperatures.
- According to the case narrative, the samples reported AOI01-01-SB-13-15 and AOI01-01-SB-181-182 were recorded on the COC as AOI01-01-13-15 and AOI01-01-181. At EA's request, Eurofins updated the sample IDs.
- According to the case narrative, the samples reported as AOI01-02-SB-13-15, AOI01-02-SB-113-115, and AOI01-02-SB-113-115-DUP were recorded on the COC as AOI01-02-13-15, AOI01-02-113-115, and AOI01-02-113-115-DUP. At EA's request, Eurofins updated the sample IDs.
- According to the case narrative, the samples reported as SFAASF-03-PA-SB-13-15 and SFAASF-03-PA-SB-183-184 were recorded on the COC as SFAASF-03-SB-13-15 and SFAASF-03-SB-183. At EA's request, Eurofins updated the sample IDs.
- According to the case narrative, the sample reported as SFAASF-04-SB-180-181 was recorded on the COC as SFAASF-04-SB-180. At EA's request, Eurofins updated the sample ID.
- According to the case narrative, the samples reported as AOI01-04-SB-109-110 and AOI01-04-SB-109-110-DUP were recorded on the COC as AOI01-04-SB-109 and AOI01-04-SB-109-DUP. At EA's request, Eurofins updated the sample IDs.
- EA requested that Eurofins update IDs for the samples recorded on the COC as AOI01-06-SB-0-2, AOI01-06-SB-6-8, and AOI01-06-SB-13-15 to AOI01-06B-SB-0-2, AOI01-06B-SB-6-8, and AOI01-06B-SB-13-15, respectively. Eurofins reissued the report and EDD with the updated sample IDs.

7.0 Specific Data Validation Findings

Data validation findings are presented in Sections 7.1 through 8.0.

7.1 Per- and Polyfluoroalkyl Substances Analysis

PFAS results generated by Eurofins may be considered usable with the limitations summarized in Sections 7.1 through 8.0.

7.1.1 Holding Time Compliance

The samples were extracted for PFAS within the QAPP-specified maximum holding time of 14 days from sample collection for water samples or 28 days from collection for soil samples and the extracts were analyzed within the QAPP-specified maximum hold time of 28 days from extraction.

7.1.2 Initial Calibration Compliance

The ICAL associated with the analysis of these samples met the QAPP-specified criteria of the calibration standards calculating to 70 to 130 percent (%) of their true concentrations and either correlation

coefficients greater than or equal to 0.99 or relative standard deviations of the response factors less than or equal to 20%.

7.1.3 Initial Calibration Verification Accuracy

ICV recoveries were within the QAPP-specified 70% to 130% limits.

7.1.4 Instrument Sensitivity Check Standard Accuracy

Instrument sensitivity check (ISC) recoveries were within the QSM-specified 70 to 130% limits and samples were analyzed no more than 12 hours after a reported ISC.

7.1.5 Continuing Calibration Verification Accuracy

CCV recoveries were within the QAPP-specified 70 to 130% limits.

7.1.6 Laboratory Blank Detections

PFAS were not detected in the laboratory blanks associated with the samples reviewed in this report, with the following exceptions:

- Perfluorooctanesulfonic acid (PFOS) was detected at a concentration of 0.604 nanograms per liter (ng/L) in the laboratory blank associated with the extraction of samples AOI01-01-GW, AOI01-02-GW, AOI01-02-GW-DUP, AOI01-04-GW, SFAASF-03-GW, and SFAASF-04-GW; equipment blanks SFAASF-EB-20 and SFAASF-EB-21; and field blanks SFAASF-FB-18 and SFAASF-FB-19. Data limitations are summarized below.
 - Wood U qualified the PFOS results from samples AOI01-04-GW and SFAASF-03-GW at the LOQs of 1.8 ng/L and 1.7 ng/L, respectively, because the concentrations detected in the samples, at 0.54 ng/L and 0.92 ng/L, respectively, were greater than the LODs but less than the LOQs. (Qualifier and reason code: U, LBL)
 - PFOS either was not detected in the remaining field samples or the concentrations detected in the samples were greater than the LOQ and greater than five times the concentration detected in the blank. Data usability is not adversely affected by the blank detection.
 - Wood does not qualify data from QC samples that are being used to assess data from field samples and no data from the equipment or field blanks were qualified based on the laboratory blank detection.
- PFOS was detected at a concentration of 0.632 ng/L in the laboratory blank associated with the extraction of equipment blanks SFAASF-EB-04 and SFAASF-EB-05, field blanks SFAASF-FB-03 and SFAASF-FB-04, and the non-reportable extraction of equipment blank SFAASF-EB-03. Wood does not qualify data from QC samples that are being used to assess data from field samples and no data were qualified based on the blank detection.
- PFOS was detected at a concentration of 0.526 ng/L in the laboratory blank associated with the extraction of equipment blank SFAASF-EB-03 and the non-reportable extractions equipment and field blanks SFAASF-EB-05, SFAASF-FB-03, and SFAASF-FB-04. Wood does not qualify data from QC samples that are being used to assess data from field samples and no data were qualified based on the blank detection.
- PFOS was detected at a concentration of 0.652 ng/L in the laboratory blank associated with the extraction of equipment blank SFAASF-EB-07 and the non-reportable extraction of field blank

SFAASF-FB-06. PFOS was not detected in the associated equipment blank and no data were qualified based on the blank detection.

- PFOS was detected at a concentration of 0.659 ng/L in the laboratory blank associated with the extraction of field blanks SFAASF-FB-05 and SFAASF-FB-06, and the non-reportable extraction of equipment blank SFAASF-EB-07. Wood does not qualify data from QC samples that are being used to assess data from field samples and no data were qualified based on the blank detection.
- PFOS and perfluorooctanesulfonamide (PFOSA) were detected at concentrations of 0.911 ng/L and 0.560 ng/L, respectively, in the laboratory blank associated with the extraction of equipment blanks SFAASF-EB-10 and SFAASF-EB-11, and field blank SFAASF-FB-09. Wood does not qualify data from QC samples that are being used to assess data from field samples and no data were qualified based on the blank detections.
- PFOS was detected at a concentration of 0.831 ng/L in the laboratory blank associated with the extraction of equipment blanks SFAASF-EB-12, SFAASF-EB-14, SFAASF-EB-15; and field blanks SFAASF-FB-10, SFAASF-FB-11, and SFAASF-FB-12. Wood does not qualify data from QC samples that are being used to assess data from field samples and no data were qualified based on the blank detection.
- PFOS was detected at a concentration of 0.503 ng/L in the laboratory blank associated with the extraction of field blanks SFAASF-FB-07 and SFAASF-FB-08, and the non-reportable extraction of equipment blank SFAASF-EB-10. Wood does not qualify data from QC samples that are being used to assess data from field samples and no data were qualified based on the blank detection.

7.1.7 Equipment and Field Blank Detections

Wood used the following equation to assess the detections in the aqueous equipment blank against detections in the associated solid samples.

$$\text{Concentration} \left(\frac{\text{ng}}{\text{g}} \right) = \frac{\text{Concentration} \left(\frac{\text{ng}}{\text{L}} \right) * 250 \text{ mL} * 4 \text{ mL}}{1 \text{ mL} * 1,000 \frac{\text{mL}}{\text{L}} * 1 \text{ g}}$$

Where:

ng/g = nanograms per gram

250 mL is a standard aqueous sample volume in milliliters,

4 mL is the standard extract volume for a soil sample,

1 mL is the standard extract volume for a water sample,

1,000 is the conversion from milliliters to liters, and

1 g is the standard soil mass used for extraction in grams.

Target analytes were not detected in the equipment and field blanks associated with the samples reviewed in this report, with the following exceptions:

- PFOS was detected at a concentration of 0.70 ng/L (equivalent to 0.70 ng/g) in equipment blank SFAASF-EB-14, associated with sample AOI01-04-SB-109-110 and its field duplicate AOI01-04-SB-109-110-DUP. Data limitations are summarized below:

- Wood J+ qualified the PFOS result from sample AOI01-04-SB-109-110 because the concentration detected in the sample was greater than the LOQ and less than five times the concentration detected in the blank. (Qualifier and reason code: J+, EBG)
- PFOS was not detected in sample AOI01-04-SB-109-110-DUP and data usability is not adversely affected by the blank detection.
- PFOS was detected at a concentration of 1.0 ng/L in field blank SFAASF-FB-18, associated with samples SFAASF-03-GW and SFAASF-04-GW. Data limitations are summarized below.
 - Wood U qualified the PFOS result from sample SFAASF-03-GW at the LOQ of 1.7 ng/L because the concentrations detected in the sample, at 0.92 ng/L, was greater than the LOD but less than the LOQ. (Qualifier and reason code: U, FBL)
 - PFOS was not detected in sample SFAASF-04-GW and data usability is not adversely affected by the blank detection.
- PFOS and PFOSA were detected at concentrations of 1.2 ng/L and 1.4 ng/L, respectively, in equipment blank SFAASF-EB-20, associated with samples SFAASF-03-GW and SFAASF-04-GW. Data limitations are summarized below.
 - Wood U qualified the PFOS result from sample SFAASF-03-GW at the LOQ of 1.7 ng/L because the concentrations detected in the sample, at 0.92 ng/L, was greater than the LOD but less than the LOQ. (Qualifier and reason code: U, EBL)
 - PFOSA was not detected in either sample, PFOS was not detected in sample SFAASF-04-GW, and data usability is not adversely affected by the blank detections.
- PFOS was detected at a concentration of 0.87 ng/L in field blank SFAASF-FB-19, associated with samples AOI01-01-GW, AOI01-02-GW, AOI01-02-GW-DUP, and AOI01-04-GW. Data limitations are summarized below.
 - Wood U qualified the PFOS result from sample AOI01-04-GW at the LOQ of 1.8 ng/L because the concentration detected in the sample, at 0.54 ng/L, was greater than the LOD but less than the LOQ. (Qualifier and reason code: U, FBL)
 - PFOS was not detected in the remaining associated samples and data usability is not adversely affected by the blank detection.
- Perfluorohexanoic acid (PFHxA [0.42 ng/L]), perfluorooctanoic acid (PFOA [0.45 ng/L]), perfluorohexanesulfonic acid (PFHxS [2.0 ng/L]), and PFOS (5.7 ng/L) were detected in equipment blank SFAASF-EB-21, associated with samples AOI01-01-GW, AOI01-02-GW, AOI01-02-GW-DUP, and AOI01-04-GW. Data limitations are summarized below.
 - Wood J+ qualified the PFOA result from sample AOI01-02-GW-DUP because the concentration detected in the sample was greater than the LOQ and equal to than five times the concentration detected in the blank. (Qualifier and reason code: J+, EBG)
 - Wood U qualified the PFOS result from sample AOI01-04-GW at the LOQ of 1.8 ng/L because the concentration detected in the sample, at 0.54 ng/L, was greater than the LOD but less than the LOQ. (Qualifier and reason code: U, EBL)
 - The remaining analytes either were not detected in the associated samples or the detected concentrations were greater than the LOQ and greater than five times the concentrations detected in the blank. Data usability is not adversely affected by the blank detections.

- PFOS was detected at concentrations of 0.63 ng/L and 0.61 ng/L in equipment and field blanks SFAASF-EB-03 and SFAASF-FB-03, associated with sample AOI01-01-SB-13-15. PFOS was not detected in the associated sample and data usability is not adversely affected by the blank detections.
- PFOS was detected at a concentration of 0.53 ng/L in field blank SFAASF-FB-04, associated with sample AOI01-01-SB-181-182. PFOS was not detected in the associated sample and data usability is not adversely affected by the blank detection.
- PFHxA (0.54 ng/L), PFOA (0.66 ng/L), PFOSA (3.3 ng/L), and perfluorobutanoic acid (PFBA [3.2 ng/L]) were detected in equipment blank SFAASF-EB-05, associated with sample AOI01-01-SB-181-182. These analytes were not detected in the associated sample and data usability is not adversely affected by the blank detections.
- Perfluorobutanesulfonic acid (PFBS) and PFBA were detected at concentrations of 0.67 ng/L and 3.1 ng/L, respectively, in equipment blank SFAASF-EB-07 and PFOS was detected at a concentration of 0.60 ng/L in field blank SFAASF-FB-06, associated with sample AOI01-02-SB-113-115 and its field duplicate AOI01-02-SB-113-115-DUP. These analytes were not detected in the associated samples and data usability is not adversely affected by the blank detections.
- PFBS and PFOS were detected at concentration of 0.52 ng/L and 0.69 ng/L, respectively, in equipment blank SFAASF-EB-11 and PFOS was detected at a concentration of 0.72 ng/L in field blank SFAASF-FB-09, associated with sample SFAASF-03-PA-SB-13-15. Target analytes were not detected in the associated sample and data usability is not adversely affected by the blank detection.
- PFOS and PFOSA were detected at concentrations of 0.84 ng/L and 0.53 ng/L, respectively, in field blank SFAASF-FB-10, associated with sample SFAASF-03-PA-SB-183-184. Target analytes were not detected in the associated sample and data usability is not adversely affected by the blank detections.
- PFBS was detected at a concentration of 1.1 ng/L in equipment blank SFAASF-EB-10, associated with sample SFAASF-04-SB-180-181. Target analyte was not detected in the associated sample and data usability is not affected by the blank detection.
- PFOS was detected at a concentration of 0.64 ng/L in equipment blank SFAASF-EB-16, associated with sample AOI01-09-SB-13-15. Target analyte was not detected in the associated sample and data usability is not adversely affected by the blank detection.
- PFBS and PFOS were detected at concentrations of 0.47 ng/L and 0.48 ng/L, respectively, in equipment blank SFAASF-EB-18, associated with sample SFAASF-03-SB-0-2. Target analytes were not detected in the associated sample and data usability id not adversely affected by the blank detections.

7.1.8 Laboratory Control Sample Accuracy and Precision

LCS and LCSD recoveries were within QSM 5.3-specified limits and RPDs between LCS and LCSD results were less than the QAPP-specified maximum of 30%, with the following exceptions:

- PFHxA (66%, 64%), perfluoroheptanoic acid (PFHpA [68%, LCS]), perfluorodecanoic acid (PFDA [66%, LCS]), perfluorotridecanoic acid (PFTTrDA [56%, LCS]), perfluorotetradecanoic acid (PFTTeDA [68%, 68%]), PFHxS (67%, LCSD), perfluoroheptanesulfonic acid (PFHpS [67%, 65%]), and perfluorononanesulfonic acid (PFNS [66%, 68%]) recoveries were low in the LCS and/or LCSD associated with the extraction of equipment blank SFAASF-EB-07. Wood does not qualify data from QC samples that are being used to assess data from field samples and no data were qualified based on the low LCS recoveries.

- 4:2 Fluorotelomer sulfonic acid (FTS) recovery was high at 144% in the LCSD associated with the extraction of field blanks SFAASF-FB-05 and SFAASF-FB-06. Wood does not qualify data from QC samples that are being used to assess data from field samples and no data were qualified based on the high LCSD recovery.
- 4:2 FTS recovery was high at 151% in the LCS and LCSD associated with the extraction of equipment blank SFAASF-EB-03 and the non-reportable extractions equipment and field blanks SFAASF-EB-05, SFAASF-FB-03, and SFAASF-FB-04. Wood does not qualify data from QC samples that are being used to assess data from field samples and no data were qualified based on the high LCS and LCSD recoveries.

7.1.9 Matrix Spikes/ Matrix Spike Duplicates Accuracy and Precision

Eurofins performed MS and MSD analyses on samples AOI01-01-SB-13-15 and SFAASF-04-GW. MS and MSD recoveries were within QSM 5.3-specified limits and RPDs between MS and MSD results were less than the QAPP-specified maximum of 30%.

7.1.10 Laboratory Duplicate Precision

Eurofins did not perform duplicate analyses on any of the samples reviewed in this report.

7.1.11 Extracted Internal Standard Accuracy

Eurofins' reported EIS recoveries are based on the average response from the initial calibration instead of the area counts from either the ICAL midpoint standard or the areas measured in the initial CCV. For this assessment Wood recalculated EIS recoveries for field samples based on QC summary form VIII.

Wood did not recalculate EISs that were only associated with QC samples because data from field samples would not be qualified based on EIS recoveries in the associated QC samples.

EIS area counts were within the QAPP-specified limits of 50 to 150% of areas measured in the ICAL midpoint standard or 50 to 150% of the areas measured in the initial CCV on days when ICAL is not performed, with the following exceptions:

- Recovery of EIS d₃-N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA) was low at 48% in sample AOI01-04-SB-109-110. Wood UJ qualified the non-detected NMeFOSAA result from this sample because of the low EIS recovery. (Qualifier and reason code: UJ, ISL)
- Recoveries of the EISs d₃-NMeFOSAA and d₅-N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA) were low in sample AOI01-09-SB-111-112 (43%, 47%), SFAASF-03-SB-0-2 (43%, 47%), and SFAASF-05-SB-6-8 (23%, 32%). Wood UJ qualified the non-detected NMeFOSAA and NEtFOSAA results from these samples because of the low EIS recoveries. (Qualifier and reason code: UJ, ISL)
- Recoveries of the EISs d₃-NMeFOSAA and d₅-NEtFOSAA were low at 43 and 47%, respectively, in sample AOI-01-09-SB-0-2. Data limitations are summarized below.
 - In accordance with the DoD data validation guidelines, Wood UJ qualified the non-detected NMeFOSAA result from this sample because of the low EIS recovery. (Qualifier and reason code: UJ, ISL)
 - In accordance with the DoD data validation guidelines, Wood J+ qualified the detected NEtFOSAA result from this sample because of the low EIS recovery. (Qualifier and reason code: J+, ISL)

- Recovery of the EIS $^{13}\text{C}_2$ -PFTeDA was low at 45% in sample AOI01-04-GW. Wood UJ qualified the non-detected PFTeDA result from this sample because of the low EIS recovery. (Qualifier and reason code: UJ, ISL)
- Recovery of the EISs M_2 -4:2 FTS and M_2 -6:2 FTS were high at 187% and 170%, respectively, in sample SFAASF-03-GW. 4:2 FTS and 6:2 FTS were not detected in this sample and per the DoD data validation guidelines, no data were qualified based on the high EIS recoveries.
- Recovery of the EIS $^{13}\text{C}_2$ -PFTeDA was low at 46% in the MS performed on sample SFAASF-04-GW. Wood does not qualify data from field samples based on EIS recoveries in MSs and no data were qualified based on the low EIS recovery.
- Recovery of the EIS M_2 -4:2 FTS was high at 192% in equipment blank SFAASF-EB-20. Wood does not qualify data from QC samples that are being used to assess data from field samples and no data were qualified based on the high EIS recovery

7.1.12 Data Reporting and Analytical Procedures

Eurofins I qualified results when ion transition ratios were outside of expected limits. Wood J qualified Eurofins' I qualified results. (Qualifier and reason code: J, EMPC)

Eurofins J qualified results with detected concentrations less than the LOQ. Wood agrees these results are quantitatively uncertain and has maintained the laboratory's J qualifiers. (Qualifier and reason code: J, TR)

8.0 Field Duplicate Precision

Wood collected field duplicates with samples:

- AOI01-02-GW (AOI01-02-GW-DUP);
- AOI01-02-SB-113-115 (AOI01-02-SB-113-115-DUP); and
- AOI01-04-SB-109-110 (AOI01-04-SB-109-110-DUP).

Target analyte detections are summarized in Table 2. Precision values were less than the QAPP-specified maximum of 50% or differences between analyte concentrations were less than the LOQ, with the following exceptions:

- PFHxS and PFOS were detected at concentrations of 1.1 ng/g and 2.2 ng/g, respectively, in sample AOI01-04-SB-109-110, but neither analyte was detected in field duplicate AOI01-04-SB-109-110-DUP. The difference between the detected results and the LODs were greater than the average LOQ of 0.60 ng/L. Data limitations are summarized below.
 - Wood previously J+ qualified the PFOS result from sample AOI01-04-SB-109-110 due to a blank detection. Wood added the FDD reason code to this result because of sampling and/or analytical imprecision. (Reason code: FDD)
 - Wood J qualified the detected PFHxS result from sample AOI01-04-SB-109-110 and UJ qualified the non-detected PFOS and PFHxS results from sample AOI01-04-SB-109-110-DUP because of sampling and/or analytical imprecision. (Qualifiers and reason code: J/UJ, FDD)

9.0 Summary and Conclusions

Wood reviewed a total of 768 records from field samples during the validation and applied the following qualifiers to the data:

- J+: Wood J+ qualified three records (0.4%) as having potential high analytical bias due to detections in the associated equipment blanks or low EIS recoveries;
- J: Wood J qualified 44 records (5.7%) due detected concentrations that were less than the LOQ, ion transition ratios outside of expected limits, and/or imprecision between primary and field duplicate results;
- U: Wood U qualified two records (0.3%) because of detections in the associated laboratory, equipment, and field blanks; and
- UJ: Wood UJ qualified 11 records (1.4%) because of low EIS recoveries or imprecision between primary and field duplicate results.

Data qualified during validation are summarized in Table 3.

10.0 References

- EA, 2020. Final Programmatic UFP-QAPP, Site Inspection for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide, December.
- DoD, 2019a. DoD QSM, Version 5.3. May.
- DoD, 2019b. General Data Validation Guidelines, Revision 1. November.
- DoD, 2020. Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15.

11.0 Limitations

This report was prepared for EA by Wood Environment & Infrastructure Solutions, Inc. The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Wood services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This Data Validation report is intended to be used by EA for the Nationwide ARNG Installations Site Inspections for Per- and Polyfluoroalkyl Substances project only, subject to the terms and conditions of its contract with Wood. Any other use of, or reliance on, this report by any third party is at that party's sole risk.



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Tables



Table 1
Field Samples Submitted to Eurofins Environment Testing America
Army Aviation Support Facility
Santa Fe, New Mexico

Field Sample Identification	Matrix	Collection Date and Time	Laboratory Sample Identification	Notes
SFAASF-EB-03	Water	4/25/2022 11:45	410-81788-1	Equipment blank
SFAASF-FB-03	Water	4/25/2022 11:50	410-81788-2	Field blank
AOI01-01-SB-13-15	Solid	4/25/2022 12:05	410-81788-3	
SFAASF-EB-04	Water	4/26/2022 8:35	410-81788-4	Equipment blank
SFAASF-FB-04	Water	4/26/2022 8:40	410-81788-5	Field blank
SFAASF-EB-05	Water	4/26/2022 9:00	410-81788-6	Equipment blank
AOI01-01-SB-181-182	Solid	4/26/2022 13:20	410-81788-7	
SFAASF-EB-06	Water	4/27/2022 11:40	410-82129-1	Equipment blank
SFAASF-FB-05	Water	4/27/2022 11:45	410-82129-2	Field blank
AOI01-02-SB-13-15	Solid	4/27/2022 12:00	410-82129-3	
SFAASF-EB-07	Water	4/28/2022 7:45	410-82129-4	Equipment blank
SFAASF-FB-06	Water	4/28/2022 8:05	410-82129-5	Field blank
AOI01-02-SB-113-115	Solid	4/28/2022 11:05	410-82129-6	
AOI01-02-SB-113-115-DUP	Solid	4/28/2022 11:05	410-82129-7	Field duplicate
SFAASF-EB-11	Water	5/1/2022 7:40	410-82454-1	Equipment blank
SFAASF-FB-09	Water	5/1/2022 8:00	410-82454-2	Field blank
SFAASF-03-PA-SB-13-15	Solid	5/1/2022 8:20	410-82454-3	
SFAASF-EB-12	Water	5/2/2022 8:00	410-82454-4	Equipment blank
SFAASF-FB-10	Water	5/2/2022 7:50	410-82454-5	Field blank
SFAASF-03-PA-SB-183-184	Solid	5/2/2022 11:13	410-82454-6	
SFAASF-04-SB-13-15	Solid	4/28/2022 17:15	410-82468-1	
SFAASF-EB-08	Water	4/28/2022 16:35	410-82468-2	Equipment blank
SFAASF-FB-07	Water	4/29/2022 7:35	410-82468-4	Field blank
SFAASF-EB-10	Water	4/30/2022 7:20	410-82468-5	Equipment blank
SFAASF-FB-08	Water	4/30/2022 7:45	410-82468-6	Field blank
SFAASF-04-SB-180-181	Solid	4/30/2022 9:40	410-82468-7	
SFAASF-FB-11	Water	5/3/2022 8:20	410-83020-1	Field blank
SFAASF-EB-13	Water	5/3/2022 14:20	410-83020-2	Equipment blank
AOI01-04-SB-13-15	Solid	5/3/2022 15:15	410-83020-3	
SFAASF-EB-14	Water	5/4/2022 8:20	410-83020-4	Equipment blank
SFAASF-FB-12	Water	5/4/2022 8:40	410-83020-5	Field blank
AOI01-04-SB-109-110	Solid	5/4/2022 11:48	410-83020-6	
AOI01-04-SB-109-110-DUP	Solid	5/4/2022 11:48	410-83020-7	Field duplicate
AOI01-03-SB-6-8	Solid	5/4/2022 15:05	410-83061-1	
AOI01-03-SB-13-15	Solid	5/4/2022 15:30	410-83061-2	
AOI01-05-SB-6-8	Solid	5/4/2022 9:45	410-83061-3	
AOI01-05-SB-13-15	Solid	5/4/2022 10:10	410-83061-4	
AOI01-06B-SB-0-2	Solid	5/4/2022 10:45	410-83061-5	
AOI01-06B-SB-6-8	Solid	5/4/2022 11:20	410-83061-6	
AOI01-06B-SB-13-15	Solid	5/4/2022 11:45	410-83061-7	
SFAASF-05-SB-6-8	Solid	5/4/2022 13:45	410-83061-8	

Table 1
Field Samples Submitted to Eurofins Environment Testing America
Army Aviation Support Facility
Santa Fe, New Mexico

Field Sample Identification	Matrix	Collection Date and Time	Laboratory Sample Identification	Notes
SFAASF-05-SB-13-15	Solid	5/4/2022 14:10	410-83061-9	
SFAASF-05-SB-13-15-DUP	Solid	5/4/2022 14:10	410-83061-10	Field duplicate
SFAASF-EB-15	Water	5/4/2022 15:00	410-83061-11	Equipment blank
SFAASF-EB-16	Water	5/5/2022 12:50	410-83313-1	Equipment blank
SFAASF-FB-13	Water	5/5/2022 12:54	410-83313-2	Field blank
AOI01-09-SB-13-15	Solid	5/5/2022 15:35	410-83313-3	
SFAASF-EB-17	Water	5/6/2022 8:20	410-83313-4	Equipment blank
SFAASF-FB-14	Water	5/6/2022 8:32	410-83313-5	Field blank
AOI01-09-SB-111-112	Solid	5/6/2022 14:15	410-83313-6	
SFAASF-EB-18	Water	5/7/2022 11:50	410-83313-7	Equipment blank
SFAASF-FB-15	Water	5/7/2022 11:55	410-83313-8	Field blank
SFAASF-03-SB-0-2	Solid	5/7/2022 12:05	410-83313-9	
SFAASF-FB-16	Water	5/8/2022 7:40	410-83313-10	Field blank
SFAASF-FB-17	Water	5/9/2022 7:15	410-83313-11	Field blank
AOI-01-09-SB-0-2	Solid	5/9/2022 11:45	410-83313-12	
SFAASF-EB-19	Water	5/9/2022 16:00	410-83313-13	Equipment blank
AOI01-02-GW	Water	5/20/2022 15:20	410-84932-1	
AOI01-02-GW-DUP	Water	5/20/2022 15:20	410-84932-2	Field duplicate
AOI01-01-GW	Water	5/20/2022 10:28	410-84932-3	
AOI01-04-GW	Water	5/20/2022 13:10	410-84932-4	
SFAASF-03-GW	Water	5/19/2022 17:15	410-84932-5	
SFAASF-04-GW	Water	5/19/2022 13:35	410-84932-6	
SFAASF-FB-18	Water	5/19/2022 9:15	410-84932-7	Field blank
SFAASF-EB-20	Water	5/19/2022 15:30	410-84932-8	Equipment blank
SFAASF-FB-19	Water	5/20/2022 8:00	410-84932-9	Field blank
SFAASF-EB-21	Water	5/20/2022 8:15	410-84932-10	Equipment blank

Table 2
Target Analyte Detections in Primary and Field Duplicate Samples
Army Aviation Support Facility
Santa Fe, New Mexico

Analyte	Average Limit of Quantitation	Primary Result	Field Duplicate Result	Relative Percent Difference	Notes
Samples AOI01-02-SB-113-115 and AOI01-02-SB-113-115-DUP					
Perfluorohexanesulfonic acid	0.67 ng/g	0.32 J	0.46 U	NC	± LOQ
Samples AOI01-04-SB-109-110 and AOI01-04-SB-109-110-DUP					
Perfluorohexanoic acid	0.60 ng/g	0.70 J	0.39 U	NC	± LOQ
Perfluoroheptanoic acid	0.60 ng/g	0.44 J	0.39 U	NC	± LOQ
Perfluorooctanoic acid	0.60 ng/g	0.48 J	0.39 U	NC	± LOQ
Perfluorononanoic acid	0.60 ng/g	0.32 J	0.39 U	NC	± LOQ
Perfluorodecanoic acid	0.60 ng/g	0.30 J	0.39 U	NC	± LOQ
Perfluorotridecanoic acid	0.60 ng/g	0.31 J	0.39 U	NC	± LOQ
Perfluorotetradecanoic acid	0.60 ng/g	0.33 J	0.39 U	NC	± LOQ
Perfluorohexanesulfonic acid	0.60 ng/g	1.1	0.39 U	NC	J/UJ, FD
Perfluorooctanesulfonic acid	0.60 ng/g	2.2	0.39 U	NC	J/UJ, FD
NEtFOSAA	2.0 ng/g	0.28 J	0.39 U	NC	± LOQ
Perfluoropentanesulfonic acid	3.00 ng/g	0.38 J	0.39 U	NC	± LOQ
Perfluoroheptanesulfonic acid	0.60 ng/g	0.34 J	0.39 U	NC	± LOQ
Perfluorononanesulfonic acid	0.60 ng/g	0.28 J	0.39 U	NC	± LOQ
Perfluorodecanesulfonic acid	0.60 ng/g	0.30 J	0.39 U	NC	± LOQ
Perfluorooctanesulfonamide	0.60 ng/g	0.34 J	0.39 U	NC	± LOQ
Perfluoropentanoic acid	0.60 ng/g	0.37 J	0.39 U	NC	± LOQ
Perfluoroundecanoic acid	0.60 ng/g	0.30 J	0.39 U	NC	± LOQ
Perfluorododecanoic acid	0.60 ng/g	0.32 J	0.39 U	NC	± LOQ
Samples AOI01-02-GW and AOI01-02-GW-DUP					
Perfluorohexanoic acid	1.7 ng/L	130	120	8.0%	
Perfluoroheptanoic acid	1.7 ng/L	15	14	6.9%	
Perfluorooctanoic acid	1.7 ng/L	2.5	2.3 J+	8.3%	
Perfluorobutanesulfonic acid	1.7 ng/L	120	130	8.0%	
Perfluorohexanesulfonic acid	1.7 ng/L	72	74	2.7%	
Perfluoropentanesulfonic acid	1.7 ng/L	60	61	1.7%	
Perfluorooctanesulfonamide	1.7 ng/L	0.98 J	0.85 U	NC	± LOQ
Perfluorobutanoic acid	4.2 ng/L	40	40	0.0%	
Perfluoropentanoic acid	1.7 ng/L	87	90	3.4%	

Notes:

NC = not calculable

ng/g = nanograms per gram

ng/L = nanograms per liter

Qualifier Definitions:

J = The reported result is an estimated quantity with an unknown bias.

J+ = The result is an estimated quantity, but the result may be biased high.

U = The analyte was not detected and was reported as less than the limit of detection.

Table 2
Target Analyte Detections in Primary and Field Duplicate Samples
Army Aviation Support Facility
Santa Fe, New Mexico

Reason Codes:

± LOQ = the difference between analyte concentrations is less than the limit of quantitation, indicating acceptable sampling and analytical precision.

FDD = Imprecision between primary and field duplicate results.

Table 3
Qualifiers Applied During Validation
Army Aviation Support Facility
Santa Fe, New Mexico

Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI01-01-GW	Perfluorooctanesulfonamide	0.48 ng/L	J TR
AOI01-02-GW	Perfluorooctanesulfonamide	0.98 ng/L	J TR
AOI01-02-GW-DUP	Perfluorooctanoic acid	2.3 ng/L	J+ EBG
AOI01-02-SB-113-115	Perfluorohexanesulfonic acid	0.32 ng/g	J TR
AOI01-02-SB-13-15	Perfluoroheptanesulfonic acid	0.48 ng/g	J TR
AOI01-02-SB-13-15	Perfluorooctanoic acid	0.59 ng/g	J TR
AOI01-03-SB-13-15	Perfluorohexanesulfonic acid	0.27 ng/g	J TR
AOI01-03-SB-6-8	Perfluorohexanesulfonic acid	0.23 ng/g	J TR
AOI01-04-GW	Perfluorooctanesulfonic acid	1.8 ng/L	U LBL, FBL, EBL
AOI01-04-GW	Perfluorotetradecanoic acid	0.89 ng/L	UJ ISL
AOI01-04-SB-109-110	NEtFOSAA	0.28 ng/g	J TR
AOI01-04-SB-109-110	NMeFOSAA	0.41 ng/g	UJ ISL
AOI01-04-SB-109-110	Perfluorodecanesulfonic acid	0.30 ng/g	J TR
AOI01-04-SB-109-110	Perfluorodecanoic acid	0.30 ng/g	J TR
AOI01-04-SB-109-110	Perfluorododecanoic acid	0.32 ng/g	J TR
AOI01-04-SB-109-110	Perfluoroheptanesulfonic acid	0.34 ng/g	J TR
AOI01-04-SB-109-110	Perfluoroheptanoic acid	0.44 ng/g	J TR
AOI01-04-SB-109-110	Perfluorohexanesulfonic acid	1.1 ng/g	J FDD
AOI01-04-SB-109-110	Perfluorononanesulfonic acid	0.28 ng/g	J TR
AOI01-04-SB-109-110	Perfluorononanoic acid	0.32 ng/g	J TR
AOI01-04-SB-109-110	Perfluorooctanesulfonamide	0.34 ng/g	J TR
AOI01-04-SB-109-110	Perfluorooctanesulfonic acid	2.2 ng/g	J+ EBG, FDD
AOI01-04-SB-109-110	Perfluorooctanoic acid	0.48 ng/g	J TR
AOI01-04-SB-109-110	Perfluoropentanesulfonic acid	0.38 ng/g	J TR
AOI01-04-SB-109-110	Perfluoropentanoic acid	0.37 ng/g	J TR
AOI01-04-SB-109-110	Perfluorotetradecanoic acid	0.33 ng/g	J TR
AOI01-04-SB-109-110	Perfluorotridecanoic acid	0.31 ng/g	J TR
AOI01-04-SB-109-110	Perfluoroundecanoic acid	0.30 ng/g	J TR
AOI01-04-SB-109-110-DUP	Perfluorohexanesulfonic acid	0.39 ng/g	UJ FDD
AOI01-04-SB-109-110-DUP	Perfluorooctanesulfonic acid	0.39 ng/g	UJ FDD
AOI01-04-SB-13-15	Perfluorodecanesulfonic acid	0.29 ng/g	J TR
AOI01-04-SB-13-15	Perfluorodecanoic acid	0.30 ng/g	J TR
AOI01-04-SB-13-15	Perfluorododecanoic acid	0.34 ng/g	J TR
AOI01-04-SB-13-15	Perfluoroheptanesulfonic acid	0.33 ng/g	J TR
AOI01-04-SB-13-15	Perfluoroheptanoic acid	0.40 ng/g	J TR
AOI01-04-SB-13-15	Perfluorohexanoic acid	0.63 ng/g	J TR
AOI01-04-SB-13-15	Perfluorononanesulfonic acid	0.28 ng/g	J TR
AOI01-04-SB-13-15	Perfluorononanoic acid	0.37 ng/g	J TR
AOI01-04-SB-13-15	Perfluorooctanesulfonamide	0.35 ng/g	J TR
AOI01-04-SB-13-15	Perfluorooctanoic acid	0.52 ng/g	J TR
AOI01-04-SB-13-15	Perfluoropentanesulfonic acid	0.34 ng/g	J TR
AOI01-04-SB-13-15	Perfluoropentanoic acid	0.33 ng/g	J TR

Table 3
Qualifiers Applied During Validation
Army Aviation Support Facility
Santa Fe, New Mexico

Sample Identification	Analyte	Concentration	Qualifier and Reason Code
AOI01-04-SB-13-15	Perfluorotetradecanoic acid	0.33 ng/g	J TR
AOI01-04-SB-13-15	Perfluorotridecanoic acid	0.30 ng/g	J TR
AOI01-04-SB-13-15	Perfluoroundecanoic acid	0.31 ng/g	J TR
AOI-01-09-SB-0-2	NEtFOSAA	0.55 ng/g	J+ ISL, TR
AOI-01-09-SB-0-2	NMeFOSAA	0.38 ng/g	UJ ISL
AOI-01-09-SB-0-2	Perfluorodecanesulfonic acid	0.37 ng/g	J TR
AOI-01-09-SB-0-2	Perfluorododecanoic acid	0.54 ng/g	J TR
AOI-01-09-SB-0-2	Perfluorononanoic acid	0.40 ng/g	J TR
AOI-01-09-SB-0-2	Perfluoroundecanoic acid	0.27 ng/g	J TR
AOI01-09-SB-111-112	NEtFOSAA	0.52 ng/g	UJ ISL
AOI01-09-SB-111-112	NMeFOSAA	0.52 ng/g	UJ ISL
SFAASF-03-GW	Perfluorohexanoic acid	0.84 ng/L	J TR, EMPC
SFAASF-03-GW	Perfluorooctanesulfonic acid	1.7 ng/L	U LBL, FBL, EBL
SFAASF-03-SB-0-2	NEtFOSAA	0.43 ng/g	UJ ISL
SFAASF-03-SB-0-2	NMeFOSAA	0.43 ng/g	UJ ISL
SFAASF-04-GW	Perfluorohexanoic acid	0.60 ng/L	J TR, EMPC
SFAASF-05-SB-6-8	NEtFOSAA	0.41 ng/g	UJ ISL
SFAASF-05-SB-6-8	NMeFOSAA	0.41 ng/g	UJ ISL

Notes:

NEtFOSAA = N-ethylperfluorooctanesulfonamidoacetic acid
ng/g = nanograms per gram
ng/L = nanograms per liter
NMeFOSAA = N-methylperfluorooctanesulfonamidoacetic acid

Qualifier Definitions:

J = The reported result is an estimated quantity with an unknown bias.
J+ = The result is an estimated quantity, but the result may be biased high.
U = The analyte was not detected and was reported as less than the limit of detection (LOD). The LOD has been adjusted for any dilution or concentration of the sample.
UJ = The analyte was not detected and was reported as less than the limit of detection. However, the associated numerical value is approximate.

Table 3
Qualifiers Applied During Validation
Army Aviation Support Facility
Santa Fe, New Mexico

Reason Codes:

EBG = The analyte was detected in the associated equipment blank and the concentration detected in the sample was greater than the limit of quantitation (LOQ) and less than five times the concentration detected in the blank.

EBL = The analyte was detected in the associated equipment blank and the concentration detected in the sample was greater than the LOD and less than the LOQ.

EMPC = The ion transition ratio is outside of expected limits.

FBL = The analyte was detected in the associated field blank and the concentration detected in the sample was greater than the LOD and less than the LOQ.

FDD = Imprecision between primary and field duplicate results.

ISL = Low extracted internal standard recovery.

LBL = The analyte was detected in the associated laboratory blank and the concentration detected in the sample was greater than the LOD and less than the LOQ.

TR = The detected concentration is less than the limit of quantitation.

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Appendix B
Field Documentation

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Appendix B1

Logs of Daily Notice of Field Activities

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**Log of Daily Notice of Field Activity
Santa Fe AASF
Santa Fe, NM**

Date	EA Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
Mobilization 2						
6/17/2022	Gina Mullen	Sunny, high of 76 degrees F	EA onsite at 1000 hrs. Health and safety meeting was conducted. GPS locations collected for IDW areas. EA offsite at 1215.	Today's task was to re-collect GPS locations for features that did not meet 1 meter accuracy. GPS locations were successfully collected, except for 0-2 ft soil boring AOI01-06. Neither the stake marking the location nor bentonite plug could be located. The originally collected GPS location will be included in the SI report.	GPS data collection was completed . Total progress is summarized below: 5/5 monitoring wells surveyed - COMPLETE 5/5 monitoring wells sampled - COMPLETE 5/5 monitoring wells developed - COMPLETE 5/6* monitoring wells installed - COMPLETE 5/5 well pads completed - COMPLETE 4/4 DPT soil borings installed - COMPLETE *6th well abandoned on 5/7/2022 as previously noted.	Jeff Bogart (NMARNG)
6/3/2022	Sindy Lauricella	Sunny, high of 76 degrees F	EA onsite at 0800 hrs. High Mesa arrived at 0930 and health and safety meeting was conducted. Monitoring wells were surveyed and gauged. EA materials were removed from storage. High Mesa offsite at 1230. EA offsite at 1300.	N/A	Total progress is summarized below: 5/5 monitoring wells surveyed - COMPLETE 5/5 monitoring wells sampled - COMPLETE 5/5 monitoring wells developed - COMPLETE 5/6* monitoring wells installed - COMPLETE 5/5 well pads completed - COMPLETE 4/4 DPT soil borings installed - COMPLETE *6th well abandoned on 5/7/2022 as previously noted.	Kiara Takacs (NMARNG), Mark VanZuider and David Reines (High Mesa)
5/20/2022	Joseph Glover and Gina Mullen	Windy, gusts to 25 mph, high of 77 degrees F	Met onsite at 0730 hrs. Completed health and safety tailgate meeting. Collected groundwater samples at AOI01-01, AOI01-02, and AOI01-02. Completed groundwater sampling. Finished collecting GPS locations of soil borings and soil cutting land application areas. Offsite at 1630.	N/A	Groundwater sampling and GPS location collection were completed. Samples Collected: AOI01-01-GW, AOI01-02-GW, AOI01-02-GW-DUP, and AOI01-04 Blanks Collected: SFAASF-EB-21 and SFAASF-FB-19 Total progress is summarized below: 5/5 monitoring wells sampled - COMPLETE 5/5 monitoring wells developed - COMPLETE 5/6* monitoring wells installed - COMPLETE 5/5 well pads completed - COMPLETE 4/4 DPT soil borings installed - COMPLETE *6th well abandoned on 5/7/2022 as previously noted.	Kiara Takacs (NMARNG)

**Log of Daily Notice of Field Activity
Santa Fe AASF
Santa Fe, NM**

Date	EA Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
5/19/2022	Joseph Glover, Stella Finch, and Gina Mullen	Windy, gusts to 25 mph, high of 80 degrees F	Met onsite at 0730 hrs. Completed health and safety tailgate meeting. Sampled groundwater at SFAASF-03 and SFAASF-04. Collected GPS locations of soil borings and soil cutting land application areas. Offsite at 1805.	N/A	<p>Samples Collected: SFAASF-03-GW, SFAASF-04-GW</p> <p>Blanks Collected: SFAASF-EB-20 and SFAASF-FB-18</p> <p>Total progress is summarized below: 2/5 monitoring wells sampled 5/5 monitoring wells developed - COMPLETE 5/6* monitoring wells installed - COMPLETE 5/5 well pads completed - COMPLETE 4/4 DPT soil borings installed - COMPLETE</p> <p>*6th well abandoned on 5/7/2022 as previously noted.</p>	Kiara Takacs (NMARNG)
5/11/2022 Wednesday	Gary Desselle; Sindy Lauricella was on site for ~ 45 minutes	Windy, gusts to 25 mph, high of 80 degrees F	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Completed well development at SFAASF-04 and -03. Offsite at 1400.	N/A	<p>Well installation and development complete. Construction of well pads is complete.</p> <p>Groundwater sampling will be conducted next week. Well survey is being scheduled.</p> <p>Samples Collected: None.</p> <p>Total progress is summarized below: 5/5 monitoring wells developed - COMPLETE 5/6* monitoring wells installed - COMPLETE 5/5 well pads completed - COMPLETE 4/4 DPT soil borings installed - COMPLETE</p> <p>*6th well abandoned on 5/7/2022 as previously noted.</p>	Kiara Takacs (NMARNG), Alex Chapin (Environmental Works).
5/10/2022 Tuesday	Stella Finch and Gary Desselle	Windy, gusts to 30 mph, high of 80 degrees F	Met onsite at 0645 hrs. Completed health and safety tailgate meeting. Completed well development at AOI01-01, -02, and -04. Completed all well pads. Offsite at 1645.	N/A	<p>Well installations are complete. Construction of well pads is complete.</p> <p>Samples Collected: None.</p> <p>Total progress is summarized below: 3/5 monitoring wells developed 5/6 monitoring wells installed - COMPLETE 5/5 well pads completed - COMPLETE 4/4 DPT soil borings installed - COMPLETE</p>	Crystal Montoya (NMARNG), Justen Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works), Alex Chapin (Environmental Works).

**Log of Daily Notice of Field Activity
Santa Fe AASF
Santa Fe, NM**

Date	EA Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
5/9/2022 Monday	Sindy Lauricella and Gary Desselle	Windy, gusts to 50 mph, high of 80 degrees F	Met onsite at 0645 hrs. Completed health and safety tailgate meeting. Completed well construction at SFAASF-03 and completed the P&A of the first SFAASF-03 well. Completed the well pads at AOI-01-02 and AOI-01-04. Offsite at 1718.	The soil sample from 0-2 ft bgs at AOI01-09 was collected to replace the compromised sample.	Well installations are complete. Construction of well pads has begun. Samples Collected: SFAASF-FB-17 (Field Blank). SFAASF-EB-19 (Equipment Blank) AOI-01-09-SB-0-2 (Soil Sample) Total progress is summarized below: 5/6 monitoring wells installed - COMPLETE 2/5 well pads completed 4/4 DPT soil borings installed - COMPLETE	Crystal Montoya (NMARNG), Justen Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works), Alex Chapin (Environmental Works well development - arrived at 1605).
5/8/2022 Sunday	Sindy Lauricella and Gary Desselle	Windy, gusts to 45 mph, high of 81 degrees F	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Continued drilling and began well construction at replacement well SFAASF-03; grout tagged at 90 ft bgs. Began plugging original well SFAASF-03; placed bentonite chips to a depth of 136.8 ft bgs. Offsite at 1805.	High winds and blowing dust. The soil sample from 0-2 ft bgs at AOI01-09 was compromised. The interval will be re-sampled.	SFAASF-03 replacement drilled to a total depth of 197 ft bgs and screened at 175-195 ft bgs. Grouting was completed to a depth of 90 ft bgs at the replacement for well SFAASF-03. Samples Collected: SFAASF-FB-16 (Field Blank). Total progress is summarized below: 5/6 monitoring wells installed* 4/4 DPT soil borings installed * Well monument and pad construction will be constructed at a later date.	Chris Fritzsche (NMARNG), Justen Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works)
5/7/2022	Sindy Lauricella and Robert Marley	clear, high of 80 degrees	Met onsite at 0700 hrs. Plugged and abandoned AOI01-09. Drilled to 107 ft bgs at SFAASF-03 replacement. Offsite at 1810.	Boring AOI01-09 did not accumulate water overnight. Due to the lack of a viable water-bearing zone, the boring was plugged and abandoned.	Boring AOI01-09 was plugged and abandoned. SFAASF-03 replacement drilling commenced. Drilled to 107 ft bgs. Soil Samples Collected: SFAASF-03-SB-0-2 Blanks Collected: SFAASF-EB-18 and SFAASF-FB-15 Total progress is summarized below: 4/6 monitoring wells installed* 4/4 DPT soil borings installed * Well monument and pad construction will be constructed at a later date.	Chris Fritzsche (NMARNG), Justen Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works).

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Date	EA Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
5/6/2022	Sindy Lauricella and Robert Marley	clear, high of 77 degrees	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Well construction materials picked by driller's helper while drilling continued. Drilled to 115 ft bgs at AOI01-09. Began well installation. Offsite at 1630.	<p>Water has not accumulated in the potential perched zone in boring/monitoring well AOI01-09. The lack of water in the borehole and presence of sand has caused the PVC and casing to become sand locked. The hole will sit open to see if water accumulates overnight.</p> <p>Construction materials for remaining wells are now onsite. Driller is equipped to complete well installations, abandonment, and monuments.</p> <p>On 5/5/22 EA field staff left the site without notifying NMARNG and without ensuring that the bulk fuels area was secured. Steps taken to improve communication include designation of SSHO as the person responsible (1) for notifying the NMARNG POC that EA staff and subcontractors are offsite, (2) ensuring that the bulk fuels area is locked, and (3) notifying the EA task manager at the end of the day that those actions have been taken.</p>	<p>Boring AOI01-09 was drilled to a depth of 115 ft bgs. A monitoring well is being installed with screen from 105 to 115 ft bgs. Well construction is stalled due to sand locking. The situation is described under 'Issues' and will be reevaluated in the morning after we see if water has accumulated.</p> <p>Soil Samples Collected: AOI01-09-SB-111-112</p> <p>Blanks Collected: SFAASF-EB-17 and SFAASF-FB-14</p> <p>Total progress is summarized below: 4/6 monitoring wells installed* 4/4 DPT soil borings installed</p> <p>* Well monument and pad construction will be constructed at a later date.</p>	Chris Fritzsche (NMARNG), Crystal Montoya (NMARNG), Kiara Takacs (NMARNG), Justen Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works).
5/5/2022	Sindy Lauricella and Robert Marley	clear, high of 67 degrees	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Installed well at AOI01-04. Began drilling at AOI01-09. Offsite at 1700.	Well construction materials for monitoring well AOI01-09 were supposed to be delivered today, but did not arrive. They are expected to arrive tomorrow.	<p>Monitoring well AOI01-04 was installed with the screen at 105 to 115 ft bgs. Boring AOI01-09 was installed to a depth of 36 ft bgs. Drilling will continue tomorrow.</p> <p>Soil Samples Collected: AOI01-09-SB-0-2, AOI01-09-SB-13-15</p> <p>Blanks Collected: SFAASF-EB-16 and SFAASF-FB-13</p> <p>Total progress is summarized below: 4/6 monitoring wells installed* 4/4 DPT soil borings installed</p> <p>* Well monument and pad construction will be constructed at a later date.</p>	Chris Fritzsche (NMARNG), Kiara Takacs (NMARNG), Justen Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works).

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Date	EA Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
5/4/2022	Sindy Lauricella and David Werth	clear, high of 57 degrees	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Installed 4 direct push soil borings to 15 ft bgs. Drilled AOI01-04 to a depth of 115 ft bgs. Offsite at 1600.	Well SFAASF-03 will be replaced due to the presence of grout in the well. During direct push drilling all boreholes were hand augered to 5 ft bgs, except for borehole AOI01-05, which could only be advanced to 4 ft bgs by hand.	Boring AOI01-04 was drilled to a depth of 115 ft bgs. Well will be built when supplies are delivered or can be procured locally, which will likely be tomorrow. A direct push rig was used to install all four 15-ft soil borings. Soil Samples Collected: AOI01-03-SB-6-8, AOI01-03-SB-13-15, AOI01-04-SB-109, AOI01-04-SB-109-Dup, AOI01-05-SB-6-8, AOI01-05-SB-13-15, AOI01-05-SB-13-15-Dup, AOI01-06-SB-0-2, AOI01-06-SB-6-8, AOI01-06-SB-13-15, SFAASF-05-SB-6-8, SFAASF-05-SB-13-15 Blanks Collected: SFAASF-EB-14, SFAASF-EB-15. amd SFAASF-FB-12 Total progress is summarized below: 3/6 monitoring wells installed* 4/4 DPT soil borings installed * Well monument and pad construction will be constructed at a later date.	Byron Kesner (NMARNG), Justen Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works), Rob Helton (JR Drilling).
5/3/2022	Sindy Lauricella and Joseph Glover	clear, high of 73	Met onsite at 0600 hrs. Completed health and safety tailgate meeting. Completed well construction at SFAASF-03 but observed grout in the well. Started drilling AOI01-04 and stopped at 86 ft bgs for the day. Offsite at 1810.	Grout was observed in well SFAASF-03. Observations will be made tomorrow morning to determine how to proceed. Installation of an additional well to characterize the perched aquifer upgradient of AOI01-02 has been proposed. A field change request has been submitted.	Grouting was completed at well SFAASF-03. Boring AOI01-04 was drilled to a depth of 86 ft bgs. Samples Collected: AOI01-04-SB-13-15 (Soil Sample), SFAASF-EB-13 (Equipment Blank) and SFAASF-FB-11 (Field Blank). Total progress is summarized below: 4/6 monitoring wells installed* 0/4 DPT soil borings installed * Well monument and pad construction will be constructed at a later date.	Byron Kesner (NMARNG), Justin Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works)

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Date	EA Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
5/2/2022	Sindy Lauricella and Joseph Glover	clear, high of 69	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Continued drilling SFAASF-03 and started well construction. Put sand pack around well screen and then put in bentonite plug and hydrated. Offsite at 1800.	N/A	<p>Boring SFAASF-03 was drilled to depth 197 ft bgs and the screen was installed at 175 - 195 ft bgs. Started well construction putting in sand and bentonite plug. Will grout well in the morning.</p> <p>Samples Collected: SFAASF-03-SB-183 (Soil Sample), SFAASF-EB-12 (Equipment Blank) and SFAASF-FB-10 (Field Blank).</p> <p>Total progress is summarized below: 4/5 monitoring wells installed* 0/4 DPT soil borings installed</p> <p>* Well monument and pad construction will be constructed at a later date.</p>	Byron Kesner (NMARNG), Justin Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works)
5/1/2022	Teri McMillian and Joseph Glover	clear, windy, high of 74	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Started drilling SFAASF-03 and stopped at 166' bgs for the day. Offsite at 1800.	N/A	<p>Boring SFAASF-03 was drilled to depth 166'.</p> <p>Samples Collected**: SFAASF-03-SB-13-15 (Soil Sample), SFAASF-EB-11 (Equipment Blank), and SFAASF-FB-09 (Field Blank).</p> <p>Total progress is summarized below: 3/5 monitoring wells* 0/4 DPT soil borings installed</p> <p>* Well monument and pad construction will be constructed at a later date. ** 5/1/22 update contained an incorrect list of samples collected. This list represents the correct samples (5/2/22).</p>	Chris Fritzsche (NMARNG), Justin Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works)
4/30/2022	David Werth and Joseph Glover	clear, high of 70	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Continued and finished drilling SFAASF-04 and completed well construction. Hand augered SFAASF-03 and set up to start drilling. Offsite at 1800.	N/A	<p>Boring SFAASF-04 was drilled to depth 193 ft bgs and well constructed with screen at 171-191 ft bgs.</p> <p>Samples Collected: SFAASF-04-SB-180 (Soil Sample), SFAASF-EB-10 (Equipment Blank) and SFAASF-FB-008 (Field Blank).</p> <p>Total progress is summarized below: 3/5 monitoring wells* 0/4 DPT soil borings installed</p> <p>* Well monument and pad construction will be constructed at a later date.</p>	Chris Fritzsche (NMARNG), Justin Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works)

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4/29/2022	Sindy Lauricella and Joseph Glover	clear and then smokey, windy, high of 69	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Continued drilling SFAASF-04. Drilled down to 178 ft bgs. Offsite at 1800.	N/A	<p>Boring SFAASF-04 was drilled from 39 ft bgs to 178 ft bgs.</p> <p>Samples Collected: SFAASF-FB-007 (Field Blank)</p> <p>Total progress is summarized below: 2/5 monitoring wells* 0/4 DPT soil borings installed</p> <p>* Well monument and pad construction will be constructed at a later date.</p>	Byron Kesner (NMARNG), Justin Maples (Environmental Works), Victor Taylor (Environmental Works), Robert Romines (Environmental Works)
4/28/2022	Sindy Lauricella, and Joseph Glover	clear, high of 71	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Finished completion of AOI01-02 well. Spread AOI01-02 dry drill cutting around the well. Decontaminated drill tooling in designated area. Shipped samples from AOI01-02 to lab. Hand augered down to 5 ft bgs at SFAASF-04 and began drilling operations. Drilled down to 39' bgs. Offsite at 1800.	N/A	<p>Boring AOI01-02 was constructed in a perched water table with the screen set at 107-117 ft bgs. Well monument and pad will be constructed at a later date. Boring SFAASF-04 was advanced to 39 ft bgs.</p> <p>Samples Collected: AOI01-02-119-120 (grain size), AOI01-02-113-115 (soil sample), SFAASF-04-13-15 (soil sample), SFAASF-EB-07 (equipment blank), SFAASF-EB-08 (equipment blank), and SFAASF-FB-006 (field blank).</p> <p>Total progress is summarized below: 2/5 monitoring wells 0/4 DPT soil borings installed</p>	Byron Kesner (NMARNG), Crystal Montoya (NMARNG), Justin Maples (Environmental Works), Victor Taylor (Environmental Works), and Robert Romines (Environmental Works).
4/27/2022	Regina Mullen, Sindy Lauricella, and Joseph Glover	Partly cloudy, high of 73 degrees	Met onsite at 0700 hrs. Completed health and safety tailgate meeting. Finished completion of AOI01-01 well by toping off the well with grout to a few feet below ground surface. Spread AOI01-01 dry drill cutting around the well. completed for AOI01-02 and AOI01-06. AOI01-05 was also re-cleared since the stake was no longer in place. Decontaminated drill tooling in designated area. After utility clearance confirmed hand augered down to 5' bgs at AOI01-02 and began drilling operations. Drilled down to 126' bgs. Offsite at 1640.	Two separate spills occurred onsite today. One spill occurred when a leak/failure occurred in the hydraulic system of the United Rental Skid Steer. Approximately one gallon of hydraulic oil is estimated to have spilled onto uncracked asphalt. Oil pads were deployed to absorb oil. Used oil pads were collected into a black trash bag to await proper disposal. A spill incident was filled out by EA and provided to the AASF facility. A second spill occurred when the power washer fuel system failed/leaked during decontamination activities. Leak was found after decon was performed leaking under the truck onto gravel and soil. It is estimated a maximum of 1 gallon of diesel fuel leaked onto the ground. Impacted soil was hand dug and containerized into a steel drum. All impacted soil was captured and EA completed another spill report incident form and provided that to the AASF Facility.	<p>Boring AOI01-01 was completed with grout to just below ground surface. Boring AOI01-02 was advanced to 126 ft bgs.</p> <p>All utility locates completed.</p> <p>Samples Collected: AOI01-02-13-15 (soil sample), SFAASF-EB-06 (equipment blank), and SFAASF-FB-005 (field blank).</p> <p>Total progress is summarized below: 1/5 monitoring wells* 0/4 DPT soil borings installed</p> <p>* Well monument and pad construction will be constructed at a later date.</p>	Chris Fritzsche (NMARNG), Byron Kesner (NMARNG), Crystal Montoya (NMARNG), Justin Maples (Environmental Works), Victor Taylor (Environmental Works), and Robert Romines (Environmental Works), Abraham Ortiz (MT), Max Chavez (MT).

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Date	EA Personnel	Weather	Summary Daily Activities	Issues	Progress to Date	Subcontractor(s)/ Visitors
4/26/2022	Sindy Lauricella, and Joseph Glover	Partly cloudy, windy, high of 65 degrees	Met onsite at 0700 hrs. SSHO conducted health and safety meeting. Completed borehole at AOI01-01. Monitoring well installed and grouted to 18' below ground surface. Samples for AOI01-01 shipped to lab. Offsite at 1820.	Equipment blank was collected from hose used to fill water tank, as discussed on 4/25/2022.	<p>Boring AOI01-01 was completed and monitoring well installed with the screen set at 170 to 190 ft bgs. Well was grouted to 18 ft bgs. Grouting will be completed tomorrow. Capillary fringe sample was collected based on observations in core samples.</p> <p>Samples Collected: AOI01-01-181-182 (soil sample), SFAASF-EB-04 (equipment blank), SFAASF-EB-05 (equipment blank), and SFAASF-FB-04 (field blank).</p> <p>Total progress is summarized below: 1/5 monitoring wells installed 0/4 DPT soil borings installed</p>	Byron Kesner (NMARNG), Justin Maples (Environmental Works), Victor Taylor (Environmental Works), and Robert Romines (Environmental Works).
4/25/2022	Regina Mullen, Sindy Lauricella, and Joseph Glover	Sunny, windy, high of 60 degrees	Met onsite at 0700 hrs. Visited all sonic drilling locations, laydown/IDW area, and approved water source. SSHO conducted health and safety meeting. Drilling began at location AOI01-01. Borehole was advanced to 155 feet below ground surface. Offsite at 1815 hrs.	The driller was not equipped with a hose known to be PFAS-free. They were instructed to remove the rubber gasket and flush the hose before filling the tank. An equipment blank will be collected from the hose.	<p>Boring AOI01-01 was advanced to 155 feet below ground surface. Drilling will continue tomorrow.</p> <p>Samples Collected: AOI01-01-13-15 (soil sample with MS/MSD), AOI01-01-135-136 (grain size sample), SFAASF-EB-03 (Equipment Blank), and SFAASF-FB-03 (Field Blank).</p> <p>Total progress is summarized below: 0/5 monitoring wells installed 0/4 DPT soil borings installed</p>	Byron Kesner (NMARNG), Justin Maples (Environmental Works), Victor Taylor (Environmental Works), and Robert Romines (Environmental Works).
Mobilization 1						
2/8/2022	Regina Mullen, and David Werth	Sunny, breezy, high of 45 degrees	Met onsite at 0950 hrs. Regina Mullen presented safety brief to all on-site personnel, including NMARNG representative. Following the brief, the EA team installed 6 soil borings to 2 ft bgs using a hand auger, collected associated samples, and used bentonite to fill all soil borings. A labeled stake marks all locations where deeper (greater than 2 ft bgs) soil borings will be installed during the Phase 2 Mobilization. IDW is labeled and stored on-site.	<p>Six (6) soil borings were installed to 2 ft bgs. These borings include AOI01-02, which was re-installed after being installed in the wrong location on 2/7/2022. The intended location for this boring is just over 20 feet from location surveyed for utilities and sampled yesterday. As a result, the current and correct location is outside the area that was surveyed for utilities.</p> <p>Ms. Montoya was informed of the situation. She allowed installation of the 0-2 ft boring with the condition that the private utility locator will survey the current and correct location before a drilling rig installs the well at location AOI01-02.</p>	<p>Six (6) 2 ft soil borings were installed at the locations indicated in the UFP-QAPP: AOI01-01, AOI01-02, AOI01-07, AOI01-08, SFAASF-01 and SFAASF-02. Associated samples were collected. Sampling of surface soil at 0-2 ft bgs is complete.</p> <p>A private utility locator will survey location AOI01-02 for the presence of utilities before drilling with a drill rig occurs at that location. EA will mobilize to the site a second time in April 2022 and install remaining soil borings (those with a depth greater than 2 ft bgs using a drill rig). PFAS samples will analyzed with an expedited turn-around time so that results can be discussed with NMED to determine IDW disposal.</p> <p>Total progress is summarized below: Soil borings (0-2 ft) 13 of 13 completed.</p>	Crystal Montoya (NMARNG)

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2/7/2022	Regina Mullen, and David Werth	Sunny, windy, high of 40 degrees	Met onsite at 0830 hrs. David Werth (SSHO) presented a safety brief to all on-site personnel, including MT Private Utility Locating (MT) team. Following the brief, the EA team marked locations and MT Locating marked utilities for all 13 soil boring and/or monitoring well locations. EA team installed eight (8) soil borings to 2 ft bgs using a hand auger and collected associated samples.	Eight (8) soil borings were installed to 2' at the discussed locations. Snow cover was present, but did not prevent installation of soil borings.	<p>The purpose of this mobilization (Phase 1 Mobilization) is to mark locations, conduct utility locates, and collect surface soil samples (0-2 ft bgs) at 13 locations.</p> <p>Eight (8) 2 ft soil borings were installed at the locations indicated in the UFP-QAPP: AOI01-02, AOI01-03, AOI01-04, AOI01-05, AOI01-06, SFAASF-03, SFAASF-04, and SFAASF-05. Associated samples were collected. Installation of the remaining soil borings is planned for tomorrow. Tomorrow's field work is scheduled to begin at 1000 hrs.</p> <p>Total progress is summarized below: Soil borings (0-2 ft) 8 of 13 completed.</p>	Chris Fritzsche (NMARNG), Manuel Ortiz, (MT) and Max Chavez (MT).

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Appendix B2

Field Forms

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WELL PURGING AND SAMPLING RECORD

WELL ID AO101-01 SAMPLE NO. AO101-01-GW
 WELL/SITE DESCRIPTION SFAASF

DATE 5/20/22 TIME 1028 AIR TEMP. 62°

WELL DEPTH 192 ft CASING HEIGHT 0 ft
 WATER DEPTH 176.05 ft WELL DIAMETER 2 in
 WATER COL. HEIGHT 14 ft SANDPACK DIAM. 6 in
 EQUIVALENT VOLUME OF STANDING WATER 24.75 (gal) (L)
 PUMP RATE 400 (gpm) (LPM)
 PUMP TIME 60 min min
 WELL WENT DRY? () Yes () No PUMP TIME 60 min
 VOL. REMOVED _____ (gal) (L) RECOVERY TIME 0 min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED _____ (gal) (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	NTU Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit: L								mL/min
5/20/22	0925	3	7.26	263	17.2	-28	507	60.2	176.08	600
	0930	1.5	7.28	263.8	17.9	-40.8	493	62.5	176.08	300
	0935	1.75	7.30	262.1	17.7	-81.7	313	60.8	176.08	350
	0940	1.5	7.31	261.5	18.2	-97.9	187	60.9	176.08	300
	0945	1.5	7.32	261.5	18.5	-112	175	60.4	176.08	300
	0950	1.5	7.33	261.9	19.5	-122.9	172	60.2	176.08	300
	0955	2.0	7.38	264.1	19.3	-166.4	501	56.7	176.09	400
	1000	2.0	7.38	264.2	19.5	-177.5	355	55.9	176.09	400
	1005	2.0	7.37	264.0	20.1	-180.7	230.1	56.1	176.09	400
	1010	2.0	7.37	263.5	20.3	-183.8	180	57.0	176.09	400
	1015	2.0	7.36	262.9	20.0	-189.5	160	56.9	176.09	400
	1020	2.0	7.36	262.7	20.0	-194.4	139	56.9	176.09	400
	1025	2.0	7.36	262.3	20.0	-195.1	129	57.2	176.09	400

COMMENTS PID = 2.4 ppm
Shaker test conducted. No foam observed
Sample time 10:28

SIGNATURE [Signature]



WELL PURGING AND SAMPLING RECORD

WELL ID A0101-02 SAMPLE NO. A0101-02-GW
 WELL/SITE DESCRIPTION SFAASF

DATE 5/20/22 TIME 1520 AIR TEMP. 76°

WELL DEPTH 119 (107-117) ^{Screen} ft CASING HEIGHT 0 ft
 WATER DEPTH 110.72 ft WELL DIAMETER 2" in
 WATER COL. HEIGHT 6.28 ft SANDPACK DIAM. 6" in
 EQUIVALENT VOLUME OF STANDING WATER 32.25 (gal) (L)
 PUMP RATE ~500 mL/min (gpm) (LPM)
 PUMP TIME 65 min min
 WELL WENT DRY? () Yes (X) No PUMP TIME _____ min
 VOL. REMOVED _____ (gal) (L) RECOVERY TIME _____ min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED _____ (gal) (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit:								mL/min
5/20/22	1415	2.5	7.27	1321	18.7	229	1170	68.8	111.62	500
	1420	3.0	7.22	1324	19.4	240.4	252	74.9	111.66	600
	1425	2.0	7.21	1334	20.3	243.6	106.9	76.1	111.38	400
	1430	2.5	7.20	1333	19.2	248.3	52.2	76.3	111.38	500
	1435	2.5	7.19	1334	20.2	247.5	39.2	77.5	111.19	500
	1440	2.0	7.21	1333	21.1	217.7	110.6	79.1	111.50	400
	1445	1.75	7.22	1330	20.6	198.6	164.1	78.1	111.50	350
	1450	4.0	7.21	1330	21.0	233.9	67.8	76.5	111.68	800
	1455	2.0	7.23	1326	21.0	225.8	91.4	77.4	111.70	400
	1500	1.75	7.23	1329	21.2	233.6	91.4	78.4	111.54	350
	1505	2.5	7.21	1341	19.4	247.3	92.6	76.8	111.45	500
	1510	4.0	7.17	1336	19.3	249	191	78	112.46	800
	1515	1.75	7.18	1334	19.2	221	257	77	112.11	350

COMMENTS 1520 PID 1.1 ppv
Shaker test - no foam
Samples collected 1520

Final WL 111.07 SIGNATURE [Signature]
 TD: 118.95



WELL PURGING AND SAMPLING RECORD

WELL ID AOI01-04 SAMPLE NO. AOI01-04-GW
 WELL/SITE DESCRIPTION SFAASF

DATE 5/20/22 TIME 1310 AIR TEMP. 70°

WELL DEPTH 115 ^{screen} (105-115) ft CASING HEIGHT 0 ft
 WATER DEPTH 110 109.88 ft WELL DIAMETER 2 in
 WATER COL. HEIGHT 5 ft SANDPACK DIAM. 6 in
 EQUIVALENT VOLUME OF STANDING WATER 27.25 (gal) (L)
 PUMP RATE 400 mL/min (gpm) (LPM)
 PUMP TIME 53 min min
 WELL WENT DRY? () Yes () No PUMP TIME _____ min
 VOL. REMOVED _____ (gal) (L) RECOVERY TIME _____ min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED _____ (gal) (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit: L								mL/min
5/20/22	1215	2.5	7.30	1125	17.5	-118.5	1601	31.2	110.12	500
	1220	2.25	7.27	1137	18.0	-143.8	1206	35.5	110.0	450
	1225	1.0	7.25	1167	19.0	-157.3	453	44.9	110.0	200
	1230	2.0	7.24	1176	18.8	-159.9	61	46.8	110.04	400
	1235	2.0	7.25	1173	19.7	-163.9	59.2	48.2	110.05	400
	1240	2.0	7.25	1174	19.5	-164.5	39.2	49.7	110.03	400
	1245	2.0	7.24	1171	19.4	-160.3	27.5	51.2	110.03	400
	1250	2.0	7.24	1172	19.5	-150.2	16.86	52.7	110.03	400
	1253	2.0	7.24	1169	19.3	-145.8	15.2	53.3	110.03	400
	1256	2.0	7.24	1168	19.6	-138.1	12.5	54.6	110.03	400
	1259	2.0	7.24	1169	19.4	-134.4	11.0	54.6	110.03	400
	1302	2.0	7.24	1168	19.8	-129.1	9.8	55.4	110.03	400
	1305	2.0	7.24	1167	19.8	-127.5	10.0	55.6	110.03	400

COMMENTS See pg 2

SIGNATURE [Signature]



WELL PURGING AND SAMPLING RECORD

WELL ID A0I01-04 SAMPLE NO. A0I01-04-GW
 WELL/SITE DESCRIPTION SFAASF

DATE 5/20/22 TIME 1310 AIR TEMP. 70°

WELL DEPTH 115 ft CASING HEIGHT 0 ft
 WATER DEPTH 109.88 ft WELL DIAMETER 2 in
 WATER COL. HEIGHT 5 ft SANDPACK DIAM. 6 in
 EQUIVALENT VOLUME OF STANDING WATER 27.75 (gal) (L) L
 PUMP RATE 400 mL/min (gpm) (LPM)
 PUMP TIME 53 min min
 WELL WENT DRY? () Yes () No PUMP TIME _____ min
 VOL. REMOVED _____ (gal) (L) RECOVERY TIME _____ min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED _____ (gal) (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water	Pump Rate
		Unit: L		µS/cm	°C	mV	NTU	%	from TOC	mL/min
	1308	2.0	7.24	1164	19.6	-125.1	9.2	56.1	110.02	400

COMMENTS Measure TD 114.9
Shaker test - No foam
Sample collected at 1310

SIGNATURE



WELL PURGING AND SAMPLING RECORD

WELL ID SFAASF-03 SAMPLE NO. SFAASF-03-6W
 WELL/SITE DESCRIPTION SFAASF

DATE 6/19/2022 TIME 1500 AIR TEMP. 83°F

WELL DEPTH ~~197~~^{SF} 195 ft CASING HEIGHT 0 ft
 WATER DEPTH 184.54 ft WELL DIAMETER 2 in
 WATER COL. HEIGHT 12.42^{SF} 10.42 ft SANDPACK DIAM. 6 in
 EQUIVALENT VOLUME OF STANDING WATER 31.25 (gal) (L)
 PUMP RATE 400 mL/min (gpm) (LPM)
 PUMP TIME 60 min min
 WELL WENT DRY? () Yes No PUMP TIME _____ min
 VOL. REMOVED _____ (gal) (L) RECOVERY TIME _____ min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED _____ (gal) (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit:								
	1615	3.0	7.86	598.5	19.1	6.2	46	24	184.58	600
	1620	2.5	7.85	598.6	19.1	-454.3	1180	14.5	184.9	500
	1625	2.0	7.81	598.2 598.5	19.0	-423	503	17.3	185.01	400
	1630	2.0	7.79	250.5	23.0	-377.2	266	23.0	185.01	400
	1635	2.5	7.78	242.1	20.5	-338.7	200.8	29.6	184.98	500
	1640	2.5	7.78	237.7	20.5	-326.4	198.5	33.9	184.97	500
	1645	2.0	7.78	234.7	20.5	-320.2	220.2	35.3	184.95	400
	1650	4.0	7.78	231.3	19.9	-315.1	286.4	40.4	185.07	800
	1655	2.0	7.78	230.5	20.5	-316.6	284	41.2	185.02	400
	1700	1.75	7.78	228.3	20.5	-308.2	304	42.2	184.90	350
	1705	2.0	7.78	229.5	20.3	-313.2	319.05	41.6	184.88	400
	1710	2.0	7.78	229.7	20.7	-315.9	334.3	42.1	184.97	400
	1715	3.0	7.78	229.1	20.8	-315.8	358	42.7	184.88	600

COMMENTS Initial PID: 1.9 PPM
Shaken test - No foam

SIGNATURE D. Mull



WELL PURGING AND SAMPLING RECORD

WELL ID SFAASF-04 SAMPLE NO. SFAASF-04-GW
 WELL/SITE DESCRIPTION SFAASF

DATE 5/19/2022 TIME 0915 AIR TEMP. 80°F

WELL DEPTH 193 ft CASING HEIGHT 193-5F 0 ft
 WATER DEPTH 180.38 ft WELL DIAMETER 2 in
 WATER COL. HEIGHT 12.62 ft SANDPACK DIAM. 6 in
 EQUIVALENT VOLUME OF STANDING WATER 2.15 (gal) (L)
 PUMP RATE 400 ml/min (gpm) (LPM)
 PUMP TIME 1220 min
 WELL WENT DRY? () Yes No PUMP TIME _____ min
 VOL. REMOVED _____ (gal) (L) RECOVERY TIME _____ min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED _____ (gal) (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit:	pH units	µS/cm	°C	mV	NTU	%		ml/min
	1233	2.0	8.07	232.4	19.9	-463.0	205.70	16.2	180.38	400
	1238	1.0	8.05	231.7	22.9	-450.6	146	13.0	180.36	200
	1243	1.0	8.05	227.8	22.6	-429.2	119	14.6	180.36	200 200
	1248	4.0	8.04	223.6	18.9	-415.4	71.6	19.3	180.1	800
	1253	2.5	8.01	224.1	20.9	-410.0	60.98	21.3	180.38	500
	1258	2.0	7.99	222.4	20.8	-403.	62.5	22.8	180.37	400
	1303	1.5	7.97	221.6	20.8	-398.2	64.8	24.6	180.37	300
	1308	1.5	7.97	220.9	21.2	-396.7	79.4	25.2	180.35	300
	1313	1.25	7.95	218.8	22.6	-393.3	85.6	26.0	180.35	250 250
	1318	1.0	7.95	221.4	22.9	-392.2	86.10	26.7	180.32	200
	1323		NO PARAMETERS COLLECTED - PURGE STOPPED/HAD TO RESTART PUMP -5F							
	1328	2.5	7.95	214.3	18.5	-396.4	17.4	31.5	180.43	500
	1333	2.5	7.93	214.9	21.7	-399.0	187	28.1	180.42	500

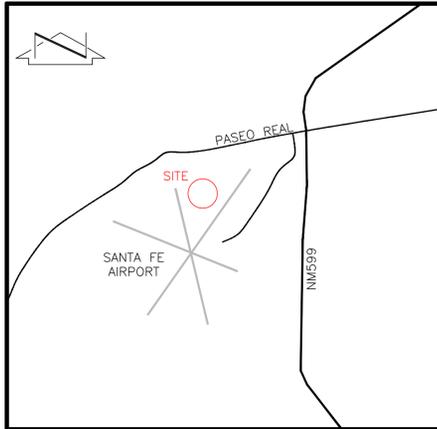
COMMENTS PID initial reading: 14.3 PPM
Pump stopped purging water @ 1320 - water level did not differ much from before & pump was still submerged(?) restarted and pumping worked
SAMPLED AT 1335

SIGNATURE D. Muller

Appendix B3

Survey Data

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VICINITY MAP
NOT TO SCALE

COORDINATE TABLE

POINT NO.	NORTHING GRID	EASTING GRID	ELEVATION	DESCRIPTION	LATITUDE NORTH	LONGITUDE WEST	UTM 13N NORTH (m)	UTM 13N EAST (m)
1	1682309.82	1687757.09	6318.00	BRASS CAP "SANTA FE WEST BASE"	35°37'25.08866"	106°05'26.52728"	3942753.08	401230.73
10101	1682747.81	1688653.59	6328.84	AOI01-01 WELL CASING	35°37'29.40619"	106°05'15.65862"	3942883.07	401505.60
10102	1682748.27	1688653.55	6329.36	AOI01-01 WELL LID	35°37'29.41077"	106°05'15.65909"	3942883.21	401505.59
10103	1682749.74	1688653.27	6329.35	AOI01-01 CONCRETE	35°37'29.42526"	106°05'15.66116"	3942883.66	401505.54
10104	1682750.26	1688653.27	6328.95	AOI01-01 GROUND	35°37'29.43041"	106°05'15.66243"	3942883.82	401505.51
10201	1682499.59	1688365.64	6324.96	AOI01-02 WELL CASING	35°37'26.95581"	106°05'19.15169"	3942808.55	401416.90
10202	1682500.05	1688365.59	6325.43	AOI01-02 WELL LID	35°37'26.96031"	106°05'19.15237"	3942808.69	401416.88
10203	1682501.59	1688365.40	6325.41	AOI01-02 CONCRETE	35°37'26.97558"	106°05'19.15464"	3942809.16	401416.83
10204	1682501.93	1688365.31	6325.13	AOI01-02 GROUND	35°37'26.97899"	106°05'19.15572"	3942809.26	401416.80
10401	1682156.56	1688364.77	6323.20	AOI01-04 WELL CASING	35°37'23.56303"	106°05'19.16907"	3942704.02	401415.30
10402	1682157.00	1688364.95	6323.77	AOI01-04 WELL LID	35°37'23.56739"	106°05'19.16693"	3942704.16	401415.36
10403	1682158.52	1688365.41	6323.71	AOI01-04 CONCRETE	35°37'23.58238"	106°05'19.16135"	3942704.62	401415.51
10404	1682158.88	1688365.63	6323.35	AOI01-04 GROUND	35°37'23.58594"	106°05'19.15856"	3942704.72	401415.58
10301	1683006.23	1689575.33	6337.69	SFAASF-03 WELL CASING	35°37'31.94694"	106°05'04.48741"	3942958.24	401787.48
10302	1683006.71	1689575.27	6338.29	SFAASF-03 WELL LID	35°37'31.95166"	106°05'04.48810"	3942958.39	401787.46
10303	1683008.66	1689575.32	6338.21	SFAASF-03 CONCRETE	35°37'31.97093"	106°05'04.48750"	3942958.98	401787.48
10304	1683009.10	1689575.29	6337.86	SFAASF-03 GROUND	35°37'31.97534"	106°05'04.48787"	3942959.12	401787.47
110401	1682458.52	1689221.12	6332.85	SFAASF-04 WELL CASING	35°37'26.53557"	106°05'08.78940"	3942792.72	401677.42
110402	1682458.95	1689221.16	6333.36	SFAASF-04 WELL LID	35°37'26.53985"	106°05'08.78894"	3942792.85	401677.43
110403	1682460.81	1689221.05	6333.33	SFAASF-04 CONCRETE	35°37'26.55823"	106°05'08.79020"	3942793.42	401677.41
110404	1682461.48	1689221.10	6333.06	SFAASF-04 GROUND	35°37'26.56490"	106°05'08.78965"	3942793.62	401677.42



MONITORING WELL LOCATIONS WITH AERIAL IMAGERY

GENERAL NOTES

1. AN UNCLASSIFIED SURVEY FOR WELL LOCATIONS WAS PERFORMED ON JUNE 3, 2022. THIS IS NOT A BOUNDARY SURVEY OR RIGHT-OF-WAY SURVEY.
2. WELL LOCATIONS ARE NAD 83 GRID COORDINATES (NEW MEXICO CENTRAL ZONE).
3. SITE LOCATED WITHIN THE SANTA FE MUNICIPAL AIRPORT, SANTA FE COUNTY, NEW MEXICO.
4. THE PHOTOBASE IMAGE, DEPICTED ON THIS SURVEY, WAS IMPORTED FROM GOOGLE EARTH WEB SITE. THIS PHOTOBASE IMAGE IS SHOWN TO PROVIDE A GENERAL SITE ORIENTATION AND MAY NOT REFLECT THE CURRENT SITE CONDITIONS.
5. THE PURPOSE OF THIS SURVEY IS TO ESTABLISH NEW MEXICO STATE PLANE GRID COORDINATES AND ELEVATIONS FOR THE LOCATIONS OF THE NEWLY INSTALLED AND EXISTING GROUNDWATER MONITORING WELLS.

CONTROL SURVEY NOTE

A CONTROL SURVEY WAS CONDUCTED AT THE SITE ON JUNE 3, 2022. BEARINGS ARE STATE PLANE GRID (NM CENTRAL ZONE). CONTROL WAS PROJECTED ONTO THE SUBJECT SITE UTILIZING RTK OBSERVATIONS TO ESTABLISH HORIZONTAL AND VERTICAL POSITIONS BASED UPON NAD 83/NAVD 88.

THIS SURVEY HAS BEEN PREPARED BASED UPON NAVD 88 DATUM USING GEOID 18. PREVIOUSLY PUBLISHED ORTHOMETRIC ELEVATIONS MAY HAVE USED OLDER GEOIDS. SPECIAL CARE SHOULD BE EXERCISED WHEN COMPARING ELEVATIONS FROM THIS SURVEY TO CURRENT AND PREVIOUS SURVEYS, PLANS AND AS-BUILT DOCUMENTS.

THE POINTS OBSERVED HAVE BEEN QUALITY CONTROLLED FOR RELATIVE ACCURACY. AN NGS MONUMENT "SANTA FE WEST BASE" IN THE VICINITY OF THE PROJECT WAS OBSERVED IN ORDER TO PROVIDE REFERENCE TIES TO THE SITE.

PROJECT BENCHMARK: A STANDARD SURVEY DISK STAMPED "SANTA FE WEST BASE 1945", SET INTO THE TOP OF A CONCRETE MONUMENT THAT IS FLUSH WITH THE GROUND. IT IS LOCATED 377 FT SOUTHEAST OF THE CENTERLINE END OF RUNWAY 15, 180 FT NORTH OF A WINDSOCK, AS SHOWN ON THIS SHEET.

SEE TABLE FOR COORDINATES

PROJECT BENCHMARK #1

A STANDARD SURVEY DISK STAMPED "SANTA FE WEST BASE 1945", SET INTO THE TOP OF A CONCRETE MONUMENT THAT IS FLUSH WITH THE GROUND. IT IS LOCATED 377 FT SOUTHEAST OF THE CENTERLINE END OF RUNWAY 15, 180 FT NORTH OF A WINDSOCK, AS SHOWN ON THIS SHEET.

ELEVATION = 6318.00 FEET (NAVD 1988/GEOID18)

LEGEND

- WELL LOCATION

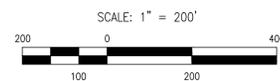
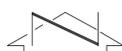
SURVEYORS CERTIFICATION

I, JOSEPH M. SOLOMON, JR., NEW MEXICO PROFESSIONAL SURVEYOR NO. 15075, DO HEREBY CERTIFY; THAT THIS UNCLASSIFIED SURVEY AND THE ACTUAL SURVEY ON THE GROUND UPON WHICH IT IS BASED WERE PERFORMED BY ME OR UNDER MY DIRECT SUPERVISION; THAT THIS SURVEY MEETS THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO, AND THAT IT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

Joseph M. Solomon, Jr.
JOSEPH M. SOLOMON, JR., NMPS 15075

June 13, 2022
DATE

File Name: P:\data\2022\2022.033.1\SUR\20220331_GRID.dwg - 1 Plot Date: 6/13/22 Plot Time: 08:08



SURVEYED BY	NO.	DATE	BY	REVISIONS		JOB NO.
				DESCRIPTION	DATE	
M.V.Z.						2022.033.1
P.J.S.						06-2022
J.M.S.						SHEET 1 OF 1

POINT NO.	NM SP Central NORTH (US Survey Feet)	NM SP Central EAST (US Survey Feet)	ELEVATION (Feet)	DESCRIPTION	LATITUDE - NORTH	LATITUDE - WEST	UTM13N - NORTH (Meters)	UTM13N - EAST (Meters)
1	1682309.82	1687757.09	6318.00	BRASS CAP "SANTA FE WEST BASE"	35°37'25.08866"	106°05'26.52728"	3942753.08	401230.73
10101	1682747.81	1688653.59	6328.84	AOI01-01 WELL CASING	35°37'29.40619"	106°05'15.65862"	3942883.07	401505.60
10102	1682748.27	1688653.55	6329.36	AOI01-01 WELL LID	35°37'29.41077"	106°05'15.65909"	3942883.21	401505.59
10103	1682749.74	1688653.37	6329.35	AOI01-01 CONCRETE	35°37'29.42526"	106°05'15.66116"	3942883.66	401505.54
10104	1682750.26	1688653.27	6328.95	AOI01-01 GROUND	35°37'29.43041"	106°05'15.66243"	3942883.82	401505.51
10201	1682499.59	1688365.64	6324.96	AOI01-02 WELL CASING	35°37'26.95581"	106°05'19.15169"	3942808.55	401416.90
10202	1682500.05	1688365.59	6325.43	AOI01-02 WELL LID	35°37'26.96031"	106°05'19.15237"	3942808.69	401416.88
10203	1682501.59	1688365.40	6325.41	AOI01-02 CONCRETE	35°37'26.97558"	106°05'19.15464"	3942809.16	401416.83
10204	1682501.93	1688365.31	6325.13	AOI01-02 GROUND	35°37'26.97899"	106°05'19.15572"	3942809.26	401416.80
10401	1682156.56	1688364.77	6323.20	AOI01-04 WELL CASING	35°37'23.56303"	106°05'19.16907"	3942704.02	401415.30
10402	1682157.00	1688364.95	6323.77	AOI01-04 WELL LID	35°37'23.56739"	106°05'19.16693"	3942704.16	401415.36
10403	1682158.52	1688365.41	6323.71	AOI01-04 CONCRETE	35°37'23.58238"	106°05'19.16135"	3942704.62	401415.51
10404	1682158.88	1688365.63	6323.35	AOI01-04 GROUND	35°37'23.58594"	106°05'19.15856"	3942704.72	401415.58
10301	1683006.23	1689575.33	6337.69	SFAASF-03 WELL CASING	35°37'31.94694"	106°05'04.48741"	3942958.24	401787.48
10302	1683006.71	1689575.27	6338.29	SFAASF-03 WELL LID	35°37'31.95166"	106°05'04.48810"	3942958.39	401787.46
10303	1683008.66	1689575.32	6338.21	SFAASF-03 CONCRETE	35°37'31.97093"	106°05'04.48750"	3942958.98	401787.48
10304	1683009.10	1689575.29	6337.86	SFAASF-03 GROUND	35°37'31.97534"	106°05'04.48787"	3942959.12	401787.47
110401	1682458.52	1689221.12	6332.85	SFAASF-04 WELL CASING	35°37'26.53557"	106°05'08.78940"	3942792.72	401677.42
110402	1682458.95	1689221.16	6333.36	SFAASF-04 WELL LID	35°37'26.53985"	106°05'08.78894"	3942792.85	401677.43
110403	1682460.81	1689221.05	6333.33	SFAASF-04 CONCRETE	35°37'26.55823"	106°05'08.79020"	3942793.42	401677.41
110404	1682461.48	1689221.10	6333.06	SFAASF-04 GROUND	35°37'26.56490"	106°05'08.78965"	3942793.62	401677.42

Note: Horizontal datum is NAD83. Vertical datum is NAVD 1988 using Geoid 18.

Coordinates for Soil Borings at Santa Fe Army Air Support Facility

GPS Coordinates

19-20 May 2022

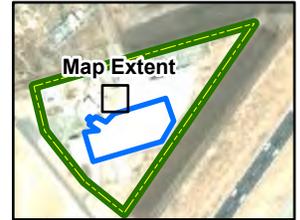
Sample Location	Northing_UTM_Zone13_meters*	Easting_UTM_Zone13_meters*	Latitude_degrees*	Longitude_degrees*
AOI01-03	3,942,749.1	401,374.2	35.623614	-106.089117
AOI01-05	3,942,699.3	401,483.8	35.623177	-106.087902
AOI01-06**	3,942,712.0	401,573.1	35.623300	-106.086917
AOI01-06b	3,942,730.7	401,560.0	35.623467	-106.087064
AOI01-07	3,942,828.7	401,432.0	35.624337	-106.088489
AOI01-08	3,942,824.3	401,427.4	35.624297	-106.088539
AOI01-09	3,942,885.2	401,507.5	35.624855	-106.087662
SFAASF-01	3,942,997.8	401,575.3	35.625877	-106.086928
SFAASF-02	3,943,031.4	401,689.5	35.626191	-106.085671
SFAASF-03-PA	3,942,954.9	401,783.7	35.625510	-106.084621
SFAASF-05	3,942,705.4	401,615.4	35.623245	-106.086449

* Horizontal Datum: World Geodetic System 1984 (WGS84)

** Location collected 08 February 2022. Coordinate accuracy is greater than 1 meter.



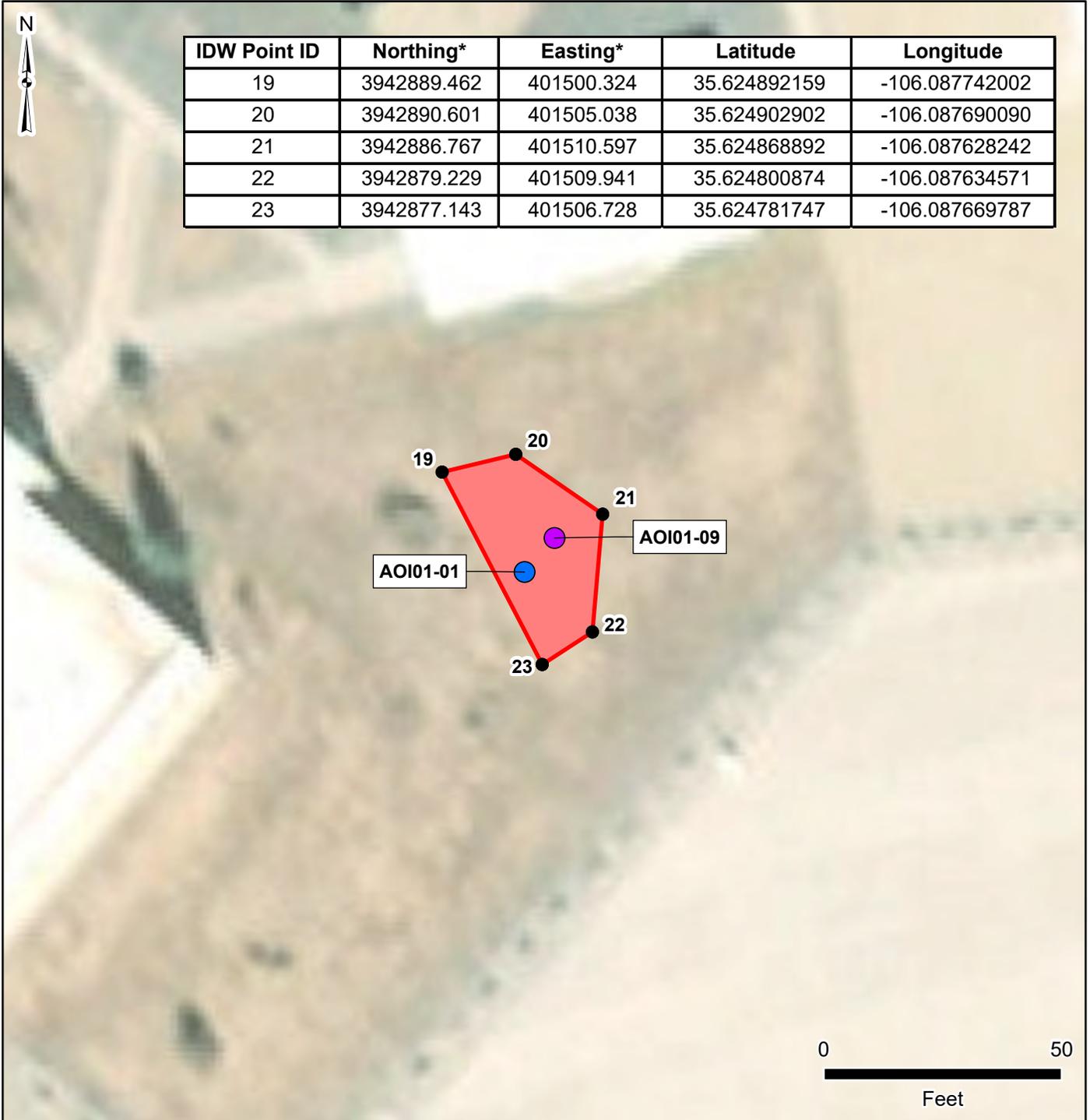
**Army National Guard Site Inspections
Site Inspection Report
Santa Fe AASF, New Mexico**



**Soil Cutting Land Application Area
for AOI01-01 and AOI01-09**



IDW Point ID	Northing*	Easting*	Latitude	Longitude
19	3942889.462	401500.324	35.624892159	-106.087742002
20	3942890.601	401505.038	35.624902902	-106.087690090
21	3942886.767	401510.597	35.624868892	-106.087628242
22	3942879.229	401509.941	35.624800874	-106.087634571
23	3942877.143	401506.728	35.624781747	-106.087669787



Path: G:\Federal\Nationwide\PPAS\MAES_634250383\PROJECTS\Report\SantaFe\SantaFeSiteReport.aprx

Facility Data

- Facility Boundary
- Area of Interest
- IDW Area

Sample Locations

- Sonic Soil Boring
- Sonic Soil Boring/Monitoring Well
- IDW Point

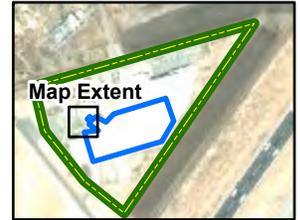
*Note: Northing and Easting Coordinates are in WGS 1984 UTM Zone 13 Meters.

Data Sources:
ESRI 2022
AECOM 2020

Date:.....July 2022
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 13N



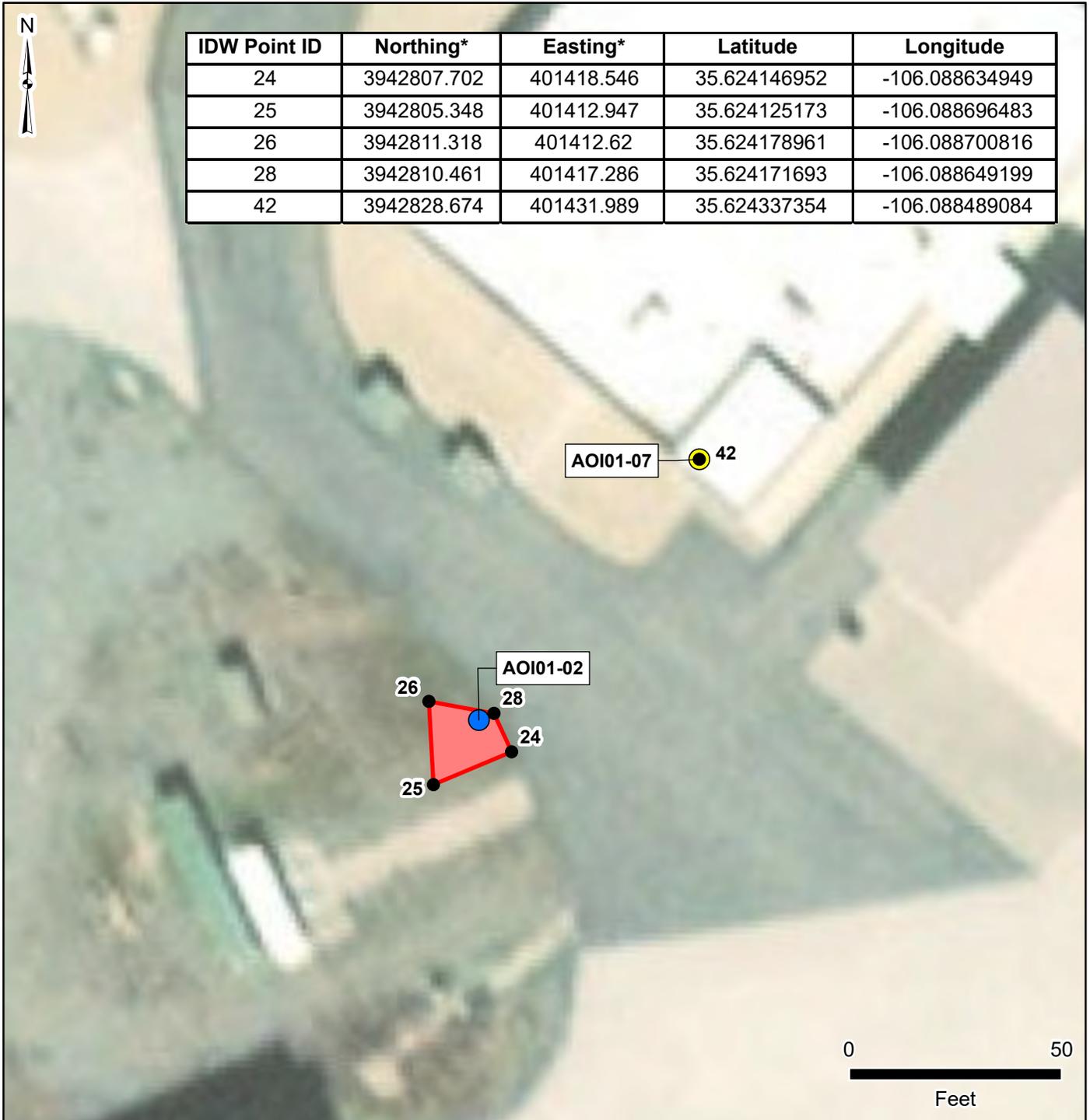
**Army National Guard Site Inspections
Site Inspection Report
Santa Fe AASF, New Mexico**



**Soil Cutting Land Application Area
for AOI01-02 and AOI01-07**



IDW Point ID	Northing*	Easting*	Latitude	Longitude
24	3942807.702	401418.546	35.624146952	-106.088634949
25	3942805.348	401412.947	35.624125173	-106.088696483
26	3942811.318	401412.62	35.624178961	-106.088700816
28	3942810.461	401417.286	35.624171693	-106.088649199
42	3942828.674	401431.989	35.624337354	-106.088489084



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Facility Data

- Facility Boundary
- Area of Interest
- IDW Area

Sample Locations

- Hand Auger Soil Boring
- Sonic Soil Boring/Monitoring Well
- IDW Point

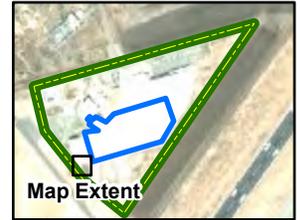
*Note: Northing and Easting Coordinates are in WGS 1984 UTM Zone 13 Meters.

Data Sources:
ESRI 2022
AECOM 2020

Date:.....July 2022
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 13N



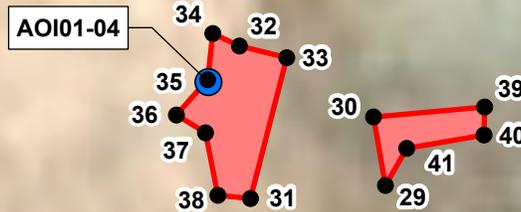
**Army National Guard Site Inspections
Site Inspection Report
Santa Fe AASF, New Mexico**



**Soil Cutting Land Application Area
for AOI01-04**



IDW Point ID	Northing*	Easting*	Latitude	Longitude
29	3942700.332	401421.615	35.623179329	-106.088587939
30	3942702.777	401421.191	35.623201325	-106.088592927
31	3942699.866	401416.803	35.623174648	-106.088641012
32	3942705.308	401416.408	35.623223663	-106.088646036
33	3942704.891	401418.098	35.623220075	-106.088627334
34	3942705.754	401415.46	35.623227597	-106.088656556
35	3942704.103	401415.277	35.623212692	-106.088658381
36	3942702.844	401414.162	35.623201234	-106.088670540
37	3942702.211	401415.199	35.623195624	-106.088659015
38	3942699.98	401415.641	35.623175560	-106.088653854
39	3942703.131	401425.152	35.623204914	-106.088549231
40	3942702.133	401425.129	35.623195917	-106.088549360
41	3942701.657	401422.376	35.623191347	-106.088579705



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Facility Data

- Facility Boundary
- Area of Interest
- IDW Area

Sample Locations

- Sonic Soil Boring/Monitoring Well
- IDW Point

*Note: Northing and Easting Coordinates are in WGS 1984 UTM Zone 13 Meters.

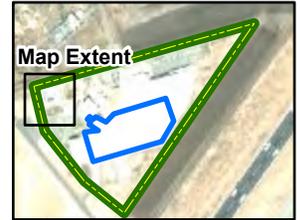
Data Sources:
ESRI 2022
AECOM 2020

Date:.....July 2022
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 13N



Army National Guard Site Inspections
 Site Inspection Report
 Santa Fe AASF, New Mexico

Soil Cutting Land Application Area
 SFAASF-01 through SFAASF-05,
 AOI01-01 through AOI01-06, and AOI01-08



IDW Point ID	Northing*	Easting*	Latitude	Longitude
43	3942875.735	401329.581	35.624751375	-106.089625550



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- Facility Data** **Sample Locations**
- Facility Boundary
 - IDW Point
 - Area of Interest

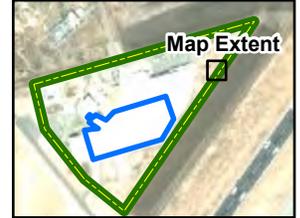
*Note: Northing and Easting Coordinates are in WGS 1984 UTM Zone 13 Meters.

Data Sources:
 ESRI 2022
 AECOM 2020

Date:.....July 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N



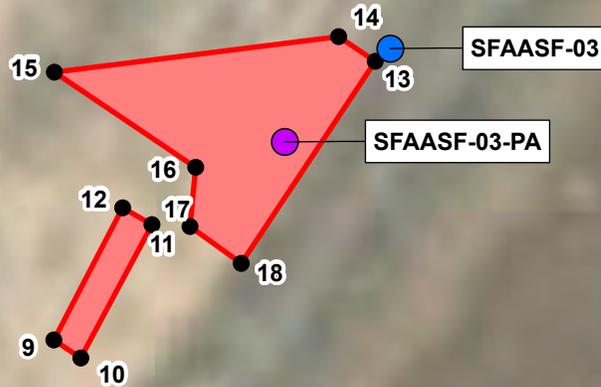
**Army National Guard Site Inspections
Site Inspection Report
Santa Fe AASF, New Mexico**



**Soil Cutting Land Application Area
for SFAASF-03 and SFAASF-03-PA**



IDW Point ID	Northing*	Easting*	Latitude	Longitude
9	3942947.851	401775.474	35.625445924	-106.084711088
10	3942947.207	401776.437	35.625440212	-106.084700380
11	3942951.966	401778.974	35.625483373	-106.084672951
12	3942952.566	401777.929	35.625488674	-106.084684561
13	3942957.794	401786.935	35.625536702	-106.084585758
14	3942958.675	401785.63	35.625544517	-106.084600271
15	3942957.406	401775.495	35.625532064	-106.084712022
16	3942954.013	401780.534	35.625501981	-106.084655972
17	3942951.898	401780.33	35.625482897	-106.084657968
18	3942950.581	401782.157	35.625471206	-106.084637632



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Facility Data

- Facility Boundary
- Area of Interest
- IDW Area

Sample Locations

- Sonic Soil Boring
- Sonic Soil Boring/Monitoring Well
- IDW Point

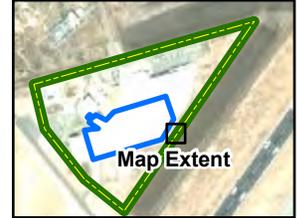
*Note: Northing and Easting Coordinates are in WGS 1984 UTM Zone 13 Meters.

Data Sources:
ESRI 2022
AECOM 2020

Date:.....July 2022
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 13N



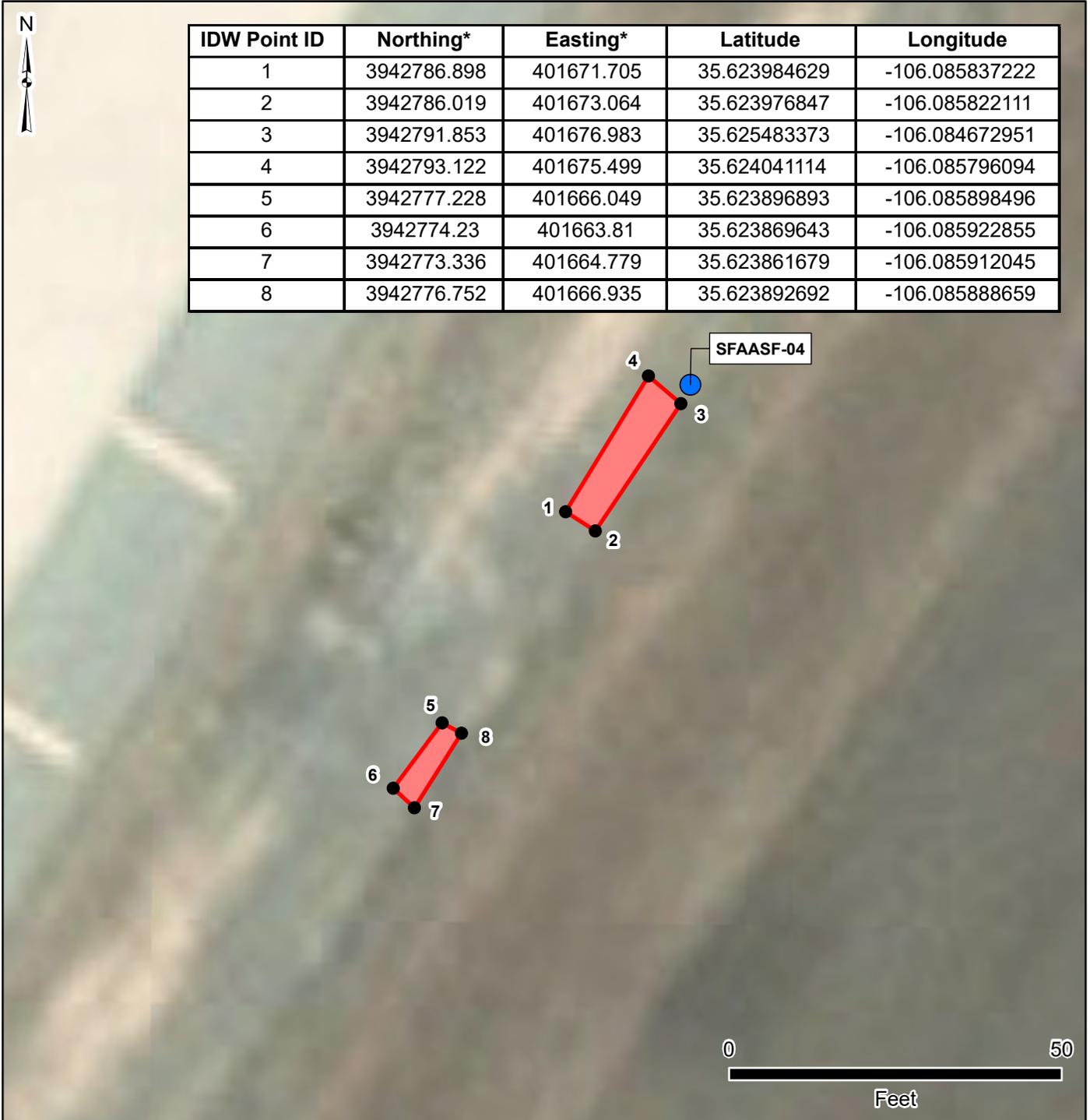
**Army National Guard Site Inspections
Site Inspection Report
Santa Fe AASF, New Mexico**



**Soil Cutting Land Application Area
for AOI01-01 and AOI01-09**



IDW Point ID	Northing*	Easting*	Latitude	Longitude
1	3942786.898	401671.705	35.623984629	-106.085837222
2	3942786.019	401673.064	35.623976847	-106.085822111
3	3942791.853	401676.983	35.625483373	-106.084672951
4	3942793.122	401675.499	35.624041114	-106.085796094
5	3942777.228	401666.049	35.623896893	-106.085898496
6	3942774.23	401663.81	35.623869643	-106.085922855
7	3942773.336	401664.779	35.623861679	-106.085912045
8	3942776.752	401666.935	35.623892692	-106.085888659



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Facility Data

- Facility Boundary
- Area of Interest
- IDW Area

Sample Locations

- Sonic Soil Boring/Monitoring Well
- IDW Point

*Note: Northing and Easting Coordinates are in WGS 1984 UTM Zone 13 Meters.

Data Sources:
ESRI 2022
AECOM 2020

Date:.....July 2022
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 13N

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Appendix B4

Field Change Request Forms

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FIELD CHANGE REQUEST FORM
ARNG PFAS SITE INSPECTION PROGRAM

Contract: W912DR-19-D-005

Installation: Santa Fe Army Aviation Support Facility (AASF)

Project No. 634250383.0004.0023A

Requested By: Gina Mullen, Task Manager

Field Change Request Number: 01

Description of Modification: Modification is related to a change in the mobilization plan and the plan to handle solid (soil) investigation derived waste (IDW). The Final Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) for Santa Fe AASF (EA 2021) indicates that non-hazardous waste generated during Site Inspection activities will be containerized in 55-gallon drums. Based on recent discussions with ARNG and with the New Mexico Environment Department (NMED), a modification to the UFP-QAPP is being proposed. The change includes two mobilization phases to complete field work in an attempt to minimize IDW generation. Surface soil samples collected during the first mobilization will be analyzed for PFAS and TOC, pH and grain size if appropriate. Samples will be validated, and validated soil analytical results from sampling during this initial mobilization will determine how solid IDW from drilling during a second mobilization will be managed. The new sampling plan will be as follows:

Phase 1 Mobilization: EA will mobilize to the site on 7 February 2022 and perform utility clearance and collect surface soils samples (0-2 ft below ground surface [bgs]) in 13 locations using a hand auger. EA will collect 13 samples from 0-2 ft bgs along with the appropriate QC sampling. Any additional soils generated during this process will be containerized in individual storage bags (trash bags or zip lock baggies) which will be placed in a 5-gallon bucket with a lid and stored at the facility. Samples will be analyzed via QSM 5.3 per the UFP-QAPP, and validated results will be compared to New Mexico (NM) industrial standards (See Table 1). If the sample results are below the screening levels (SLs) in Table 1, then all the soil/boring cuttings from surface to the top of the capillary fringe would be land applied at the point of generation. If above NM SLs, then

the entirety of the soil/boring cuttings would be containerized and disposed of offsite. EA will conduct a conference call with ARNG, USACE and NMED to present Phase 1 Mobilization results prior to Phase 2 Mobilization, and to confirm IDW handling decisions. Decisions will be memorialized in meeting minutes generated by EA.

Table 1. Preliminary screening Levels for Select PFAS. Source: New Mexico Environment Department. 2021. Risk Assessment Guidance for Investigations and Remediation, Volume 1. November.

Constituent	Residential (mg/kg) Noncancer	Industrial (mg/kg) Noncancer	Construction Worker (mg/kg) Noncancer	Tap Water (µg/L)
PFBS	1.56E+04	2.60E+05	7.08E+04	7.00E-02
PFHxS	1.56E+00	2.60E+01	7.08E+00	7.00E-02 ^a
PFNA	2.35E-01	3.89E+00	1.06E+00	7.00E-02
PFOA	1.56E+00	2.60E+01	7.08E+00	7.00E-02 ^a
PFOS	1.56E+00	2.60E+01	7.08E+00	7.00E-02 ^a

^a When evaluating groundwater data for ingestion as drinking water, and only PFHxS is detected, PFHxS should be evaluated against the health advisory concentration of 0.07 µg/L. When PFHxS and other longer-chain PFAs are detected in drinking water, the sum of the concentrations of all longer-chain PFAs should be compared to 0.07 µg/L. For example, if PFOS, PFOA, and PFHxS are all detected in the drinking water/groundwater sample, their concentrations should be summed, and the sum compared to 0.07 µg/L.

NA – not available

Phase 2 Mobilization: EA will mobilize to the site a second time in early April 2022 and install remaining soil borings (those with a depth greater than 2 ft bgs) using a drill rig. IDW will be handled as documented in the meeting minutes from the Phase 1 Mobilization. Deep soil borings (to 200 ft bgs) will be installed using a sonic rig, as specified in the UFP-QAPP. Soil borings installed to 15 ft bgs, however, may be installed using sonic or direct push technology either during a separate sampling event or simultaneously. Both methods of drilling are approved, and the determination will be based on driller availability and cost.

Reason for Modification: Ms. Pamela Hess (Army National Guard [ARNG]) had ongoing communications with NMED regarding IDW disposal. As a result, Mr. John Rhoderick (NMED) agreed to the above modification, which may result in a cost savings for ARNG while remaining protective of the environment and human health.

Approval

Representing: EA

By: *Lina Mullen*

Title: Task Manager

Date: 1/26/2022

Representing: EA

By: *Michael O'Neil*

Title: Project Manager

Date: 1/26/2022

Representing: ARNG

By: _____

Title: ARNG PFAS Project Manager

Date: 2/4/2022

Representing: USACE

By: *Jim Tubert*

Title: USACE PM

Date: 2/04/22

FIELD CHANGE REQUEST FORM
ARNG PFAS SITE INSPECTION PROGRAM

Contract: W912DR-19-D-005

Installation: Santa Fe Army Aviation Support Facility (AASF)

Project No. 634250383.0004.0023A

Requested By: Gina Mullen, Task Manager

Field Change Request Number: 02

Description of Modification: Soil boring AOI01-03 was identified as a monitoring well location in the UFP-QAPP but this location will be changed to a 15-foot soil boring. Soil boring

AOI01-01 was identified as a 15-foot soil boring in the UFP-QAPP but this location will continue past 15 feet to the water table and the location will become a monitoring well.

Additionally, soil boring AOI01-06 will be reinstalled. In February, the 0-2 ft surface soil sample was collected from the lowest point in the area rather than at the edge of the pavement, as depicted in the UFP-QAPP Figure 17-1. The boring will be installed in the planned location and the 0-2 ft surface soil will be re-sampled. IDW will be containerized until surface soil results can be used to determine the method of disposal.

Reason for Modification: Surface soil analytical results from the northern boundary of the facility indicates the possibility of groundwater contamination from off-site land application of biosolids. Conversion of location AOI1-01 from a 15-foot soil boring to a monitoring well can identify off-site groundwater contamination, thereby aiding in the delineation and characterization of groundwater contamination from the former fire truck bay.

Conversion of sample location AOI01-03 from a monitoring well to a 15-foot soil boring can preserve the budget of the project while achieving project objectives due to the close proximity of monitoring wells at AOI01-02 and AOI01-04. Ms. Pamela Hess (Army National Guard [ARNG]), Mr. Chris Fritzsche (New Mexico ARNG), and Mr. John Rhoderick (New Mexico Environment Department) concurred with the above modification.

Soil boring AOI01-06 will be reinstalled in the original planned location so that it is in closer proximity to the former parking apron, which is a possible PFAS source.

Approval

Representing: EA

By: *Lina Muller*

Title: Task Manager

Date: 03/09/2022

Representing: EA

By: *Michael O'Neil*

Title: Project Manager

Date: 03/09/2022

Representing: ARNG

By: HESS.PAMELA.SUE.11 46563313
Digitally signed by HESS.PAMELA.SUE.1146563313
Date: 2022.03.10 05:56:56 -07'00'

Title: Project Manager

Date: 3/10/2022

Representing: USACE

By: LUKASKO.JAMES.JOHN.1247033 161
Digitally signed by LUKASKO.JAMES.JOHN.1247033161
Date: 2022.03.13 19:32:49 -07'00'

Title: _____

Date: _____

FIELD CHANGE REQUEST FORM
ARNG PFAS SITE INSPECTION PROGRAM

Contract: W912DR-19-D-005

Installation: Santa Fe Army Aviation Support Facility (AASF)

Project No. 634250383.0004.0023A

Requested By: Gina Mullen, Task Manager

Field Change Request Number: 03

Description of Modification: An additional soil boring/monitoring well (AOI01-09) will be installed 7 feet northeast of monitoring well AOI01-01, which is screened in the regional aquifer. The proposed monitoring well will be installed in the perched aquifer. Soil samples will be collected at 0-2 ft bgs, 13-15 ft bgs, and in the foot above the perched aquifer.

Reason for Modification: AOI01-09 is proposed to characterize groundwater upgradient of monitoring well AOI01-02, which is in close proximity to the former fire truck bay. An upgradient sample is required to determine if potential PFAS contamination at AOI01-02 is sourced from ARNG or offsite activities.

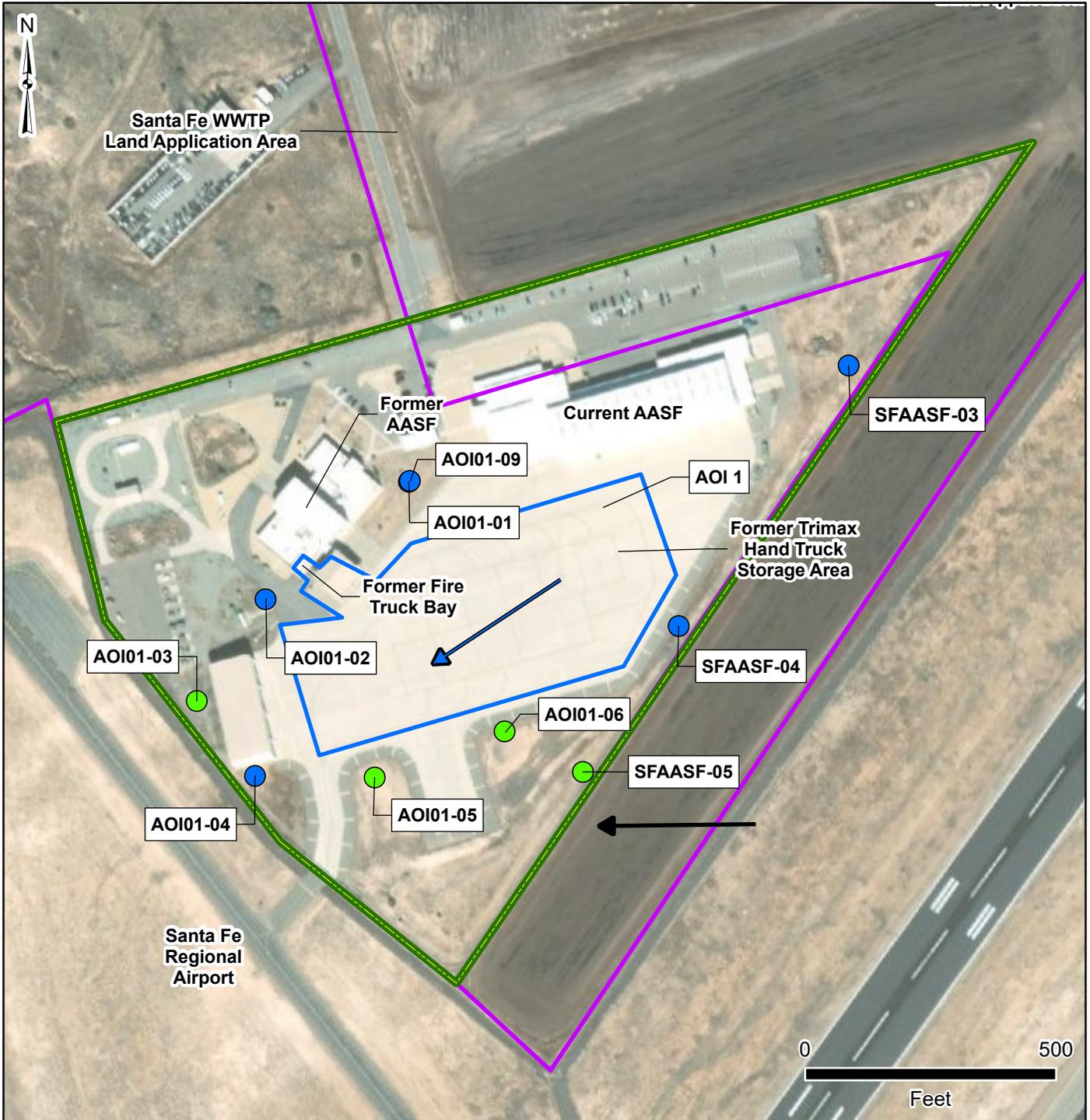
AOI01-01 is in a directionally appropriate location but is screened in the regional aquifer rather than the perched aquifer. The well was not completed in the perched aquifer due to low confidence that it is a viable water bearing unit. However, an attempt will be made to complete a well in the perched aquifer due to the importance of characterizing groundwater upgradient of AOI01-02.



Army National Guard Site Inspections
 Site-Specific Quality Assurance Project Plan
 Santa Fe AASF, New Mexico



Site Inspection Drilling Locations



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Facility Data

- Facility Boundary
- Area of Interest
- Adjacent Source Areas

Sample Locations

- Well Boring/Monitoring Well (Sonic)
- Soil Boring (Direct Push)

Hydrology/Hydrogeology

- Surface Water Flow Direction
- Inferred Groundwater Flow Direction

Data Sources:
 ESRI 2020
 AECOM 2020

Date:.....May 2022
 Prepared By:.....EA
 Prepared For:.....USACE
 Projection:.....WGS 84 UTM 13N

Approval

Representing: EA

By: *Pina Muller*

Title: Task Manager

Date: 5/2/2022

Representing: EA

By: _____

Title: Project Manager

Date: 5/2/2022

Representing: ARNG

By: 1146563313
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Date: 2022.05.04 04:41:19 -06'00'

Title: Project Manager

Date: 5/4/2022

Representing: USACE

By: 52325553
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Date: 2022.05.04 15:12:23 -04'00'

Title: _____

Date: _____

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Appendix C

Photographic Log

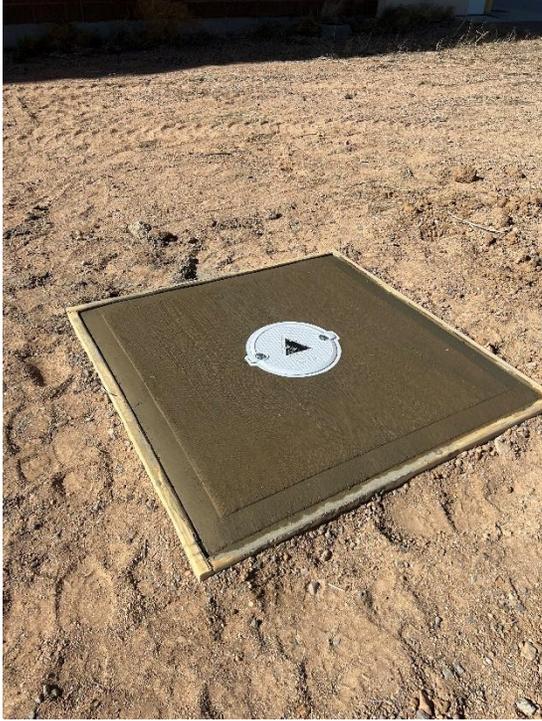
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Appendix C - Photographic Log		
Site Inspection for PFAS	Santa Fe Army Air Support Facility	Santa Fe, NM
<p>Photograph No. 01</p> <p>Date 10/14/2021 Time 1050</p> <p>Description: Source water from the yard hydrant to the right was tested for PFAS to determine if it could be used for decontamination of field equipment. Yard hydrant is located northwest of the wash rack and southeast of the Readiness Center.</p>		
<p>Orientation: northwest</p>		
<p>Photograph No. 02</p> <p>Date 02/07/2022 Time 1200</p> <p>Description: EA Engineering advancing boring at SFAASF-04 with hand auger.</p>		
<p>Orientation: south</p>		

Appendix C - Photographic Log		
Site Inspection for PFAS	Santa Fe Army Air Support Facility	Santa Fe, NM
<p>Photograph No. 03</p> <p>Date 02/08/2022 Time 1100</p> <p>Description: EA Engineering decontaminating the hand auger between locations</p>		
<p>Orientation: east</p>		
<p>Photograph No. 04</p> <p>Date 04/25/2022 Time 1350</p> <p>Description: Drill rig setup at AOI01-01 to complete soil boring</p>		
<p>Orientation: northwest</p>		

Appendix C - Photographic Log		
Site Inspection for PFAS	Santa Fe Army Air Support Facility	Santa Fe, NM
<p>Photograph No. 05</p> <p>Date 04/25/2022 Time 1325</p> <p>Description: EA Engineering screening soil with a Photo-Ionization Detector before logging soil during AOI01-01 drilling activities.</p>		
<p>Orientation: south</p>		
<p>Photograph No. 06</p> <p>Date 04/29/2022 Time 0850</p> <p>Description: EA Engineering logging soil cuttings during the drilling of SFAASF-04.</p>		
<p>Orientation: northwest</p>		

Appendix C - Photographic Log		
Site Inspection for PFAS	Santa Fe Army Air Support Facility	Santa Fe, NM
<p>Photograph No. 07</p> <p>Date 05/04/2022 Time 1000</p> <p>Description: Direct push drill rig advancing soil boring AOI01-06B.</p>		
<p>Orientation: southwest</p>		
<p>Photograph No. 08</p> <p>Date 05/09/2022 Time 1550</p> <p>Description: Concrete form created over well AOI01-04 in preparation of pouring the concrete pad.</p>		
<p>Orientation: east</p>		

Appendix C - Photographic Log		
Site Inspection for PFAS	Santa Fe Army Air Support Facility	Santa Fe, NM
<p>Photograph No. 09</p> <p>Date 05/09/2022 Time 1650</p> <p>Description: Completed pad for well AOI01-04</p>		
<p>Orientation: north</p>		
<p>Photograph No. 10</p> <p>Date 05/10/2022 Time 0830</p> <p>Description: Bailing well AOI01-01 during well development.</p>		
<p>Orientation: north</p>		

Appendix C - Photographic Log		
Site Inspection for PFAS	Santa Fe Army Air Support Facility	Santa Fe, NM
<p>Photograph No. 11</p> <p>Date 05/10/2022 Time 1440</p> <p>Description: Developing well AOI01-02. Initially groundwater was turbid with sediment.</p>		
<p>Orientation: north</p>		
<p>Photograph No. 12</p> <p>Date 05/10/2022 Time 1530</p> <p>Description: Developing well AOI01-02. As developing continues sediment is removed from the well resulting in clear groundwater.</p>		
<p>Orientation: north</p>		

Appendix C - Photographic Log		
Site Inspection for PFAS	Santa Fe Army Air Support Facility	Santa Fe, NM
<p>Photograph No. 13</p> <p>Date 05/20/2022 Time 0830</p> <p>Description: EA groundwater sampling setup at well AOI01-01.</p>		
<p>Orientation: southwest</p>		
<p>Photograph No. 14</p> <p>Date 05/20/2022 Time 1530</p> <p>Description: EA completing groundwater sampling activities at well AOI01-02.</p>		
<p>Orientation: northeast</p>		

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Appendix D

Technical Project Planning Meeting Minutes

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Meeting Minutes
Santa Fe Army Aviation Support Facility (AASF) – Site Inspection (SI)
Technical Project Planning (TPP) – Meeting 1/Meeting 2
SI for Per- and Polyfluoroalkyl Substances Impacted Sites, Army National Guard (ARNG)
Installations, Nationwide
Contract Number (No.) W912DR-19-D-0005, Task Order No. W912DR20F0383
Friday, 1 October 2021
1230 to 1330 hrs

Participants			
Name	Affiliation*	Phone	E-Mail
John Rhoderick	NMED	505-819-8284	John.rhoderick@state.nm.us
Justin Ball	NMED	505-670-1428	Justin.ball@state.nm.us
Paul Chamberlain	NMED	--	Paul.chamberlain@state.nm.us
Byron Kesner	NMARNG	505-365-4406	Byron.t.kesner.nfg@army.mil
Christopher Fritzsche	NMARNG	505-365-4404	Christopher.e.fritzsche.nfg@army.mil
Aaron Roybal	NMARNG	--	Aaron.d.roybal.nfg@army.mil
Pam Hess	ARNG G9	208-880-9734	Pamela.s.hess.mil@army.mil
Jim Lukasko	USACE - Sacramento	916-557-5392	James.j.lukasko@usace.army.mil
Mike O'Neill	EA	410-329-5142	moneill@eaest.com
Regina Mullen	EA	505-715-4279	rmullen@eaest.com
Caitlin Helms	EA	410-329-5174	chelms@eaest.com

*ARNG G9 – Army National Guard; NMARNG – New Mexico Army National Guard; NMED – New Mexico Environment Department; USACE – United States Army Corps of Engineers; and EA – EA Engineering, Sciences, and Technology, Inc., PBC

Ms. Regina Mullen (EA SI Task Manager/Site Lead) welcomed participants and began the meeting with an overview of the agenda and a roll call with introductions. She noted the purpose of the meeting is to discuss the SI sampling for per- and polyfluoroalkyl substance (PFAS) to determine presence/absence of releases at the Santa Fe AASF. The meeting was held virtually so there is no sign in sheet for attendees. The TPP briefing slides are included as **Attachment A** to these meeting minutes.

Ms. Mullen began the presentation with a safety reminder, noting that the SI will conform to requirements in United States Army Corps of Engineers (USACE) Engineering Manual (EM) 385-1-1. Site-specific safety procedures will be planned for and followed during SI field work, including establishing controlled work zones during field activities. Key points discussed during the presentation are provided below.

Programmatic Discussion:

- The TPP process is a USACE-established process with the main goal of engaging stakeholders in project planning and reporting. The ARNG has embraced a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) model for the SIs being completed nationwide that will incorporate state-specific guidance, as necessary. The TPP #1 meeting (which serves as an introduction to the ARNG program/SI process and Preliminary Assessment [PA] findings) and the TPP #2

meeting (which focuses on a discussion of Data Quality Objectives (DQOs), sampling locations, etc.) have been combined in an effort to streamline the process.

- This TPP #1/TPP #2 meeting provides an overview of the results of the PA, and an opportunity for stakeholders to discuss the SI Work Plan (Unified Federal Policy-Quality Assurance Project plan [UFP-QAPP]), sampling locations, and rationale for the SI project. Regulatory stakeholders are also afforded the opportunity to formally review and comment on the SI Work Plan.
- Another TPP meeting will occur (TPP #3) to present the SI Report findings to all stakeholders; identified stakeholders will be afforded the opportunity to review and comment on the SI Report.
- The ARNG PFAS program is centrally contracted through USACE and managed by ARNG. Every ARNG facility nationwide responded to a questionnaire on potential PFAS releases. Facilities were prioritized by the likelihood of release and proximity to drinking water sources. The facility-wide PA for Santa Fe AASF was completed in August 2020.
- There are nearly 200 facilities on the ARNG's nationwide PA list.

Santa Fe AASF PA Findings:

- Ms. Mullen provided a brief overview of the PA findings. During the PA, two potential source areas were identified and combined into one Area of Interest (AOI 1) for the Santa Fe AASF. This location is described in the briefing slides, and more detail was provided during the SI overview. The potential PFAS releases were attributed to potential aqueous film forming foam (AFFF) release and storage.
- Potential adjacent sources of PFAS that are not attributable to ARNG activities, were also discussed during the overview.

Santa Fe AASF SI Overview:

- During the SI planning phase, DQOs were established to collect the appropriate data to feed into the conceptual site model (CSM).
- The primary goal of the SI is to determine the presence/absence of a release of PFOS/PFOA/PFBS above DoD screening levels from potential source areas.
- Ms. Mullen reviewed the one AOI:
 - o AOI 1: Former Firetruck Bay and Tri-MaxTM Hand Truck Storage Area
- Geologic and hydrogeological data will inform the CSM, specifically with respect to the direction and rate of groundwater flow.
- The ARNG PFAS program includes consideration of enhanced DQOs that assess PFAS at the point of exposure and at the Santa Fe AASF boundary.

Santa Fe AASF SI Proposed Activities:

- Proposed sampling methods, locations and rationale were discussed. Sampling is planned as follows:
 - o Hand auger samples will be collected from 0-2 ft below ground surface (bgs) at select locations

- Continuous soil cores to target depths (several at 15 bgs and some up to 200 ft bgs) will be collected during the field work in and around the potential source areas. Continuous logging of borings will support understanding lithologic controls of preferential pathways.
- Three soil samples will be collected from each boring. Soil samples will include one surface soil sample (0-2 ft) and two subsurface soil samples. Depths of the subsurface soil samples will be dependent on the total depth of the boring:
 - 15 ft borings: Subsurface samples will be collected at 6-8 ft and bottom of the boring (15 ft).
 - Up to 200 ft borings: Subsurface samples will be collected at 6-8 ft and in the capillary fringe above the water table.
- Permanent monitoring wells will be installed in the boreholes up to a depth of 200 ft bgs (depending on groundwater elevation) and groundwater will be purged/sampled using low flow techniques.
- The group discussed Investigation Derived Waste (IDW) and it was determined that NMED would require additional time to determine a preferred IDW disposal procedure.
- Document Review and Distribution was discussed as follows:
 - EA asked about the current distribution process which include delivering documents electronically.
 - NMED concurred that SI documents can be sent electronically.

Questions and Open Discussion:

- Ms. Pam Hess (ARNG G9, Project Manager) informed the group that she performed a site walk with NMARNG and NMED personnel immediately before the TPP # 1 and 2 meeting, but they had not yet visited the Former Firetruck Bay. Ms. Hess indicated, based on photographs, there was no evidence that a drain existed within the Former Firetruck Bay, but that she would visit and verify later in the day.
- Based on input from NMED, Ms. Hess suggested an additional two hand auger sample locations in the grassy area adjacent to the paved ramp associated with the Former Firetruck Bay. In addition, Ms. Hess suggested monitoring well location AOI01-02 be relocated into the grass to the southwest of the Former Firetruck Bay, towards a low-lying area presumably downgradient relative to groundwater and surface water flow leaving the truck bay. NMED, USACE, and EA concurred on these suggestions.
- Ms. Hess discussed the potential to sample an existing facility well but indicated that due to the unknown depth of the well, it was unclear if sampling the well would be beneficial to address the SI DQOs. Ms. Hess indicated that Mr. Byron Kesner (NMARNG, Project Lead) or Mr. Christopher Fritzsche (NMARNG, Environmental Department Supervisor) should try to gather information on the well screening/aquifer to see if corresponds to what is being sampled in the proposed sampling plan. Ms. Mullen inquired about the status of the facility well. Mr. Fritzsche explained that the well in question was a former production well that provided drinking water to the former AASF prior to the

renovations. Mr. Fritzsche indicated the well has been capped and NMARNG are in the process of acquiring funding to permanently abandon the well. Ms. Hess indicated she would provide a photograph of the well to Ms. Mullen. Mr. Paul Chamberlain (NMED, Geoscientist for the Ground Water Quality Bureau) informed the group that the existing facility well is screened from 376-469 ft bgs. Ms. Hess confirmed that the well is screened too deep to be sampled as part of the SI. NMED concurred.

- Ms. Mullen indicated that Santa Fe municipal water had previously been sampled for PFAS and asked the group if EA should collect a sample from the facility tap to determine if it could be used for decontamination water. Ms. Hess indicated that the previously collected sample was analyzed by EPA 537 rather than Quality Systems Manual Version 5.3, and as a result a new sample would need to be collected.
- Ms. Mullen indicated that a private utility locator would be contracted to support utility clearance at the facility. Mr. Mike O'Neill (EA, Project Manager) requested facility utility maps from the NMARNG to support the utility clearance.
- Ms. Hess asked Mr. Justin Ball (NMED, Acting Bureau Chief of the Groundwater Quality Bureau) if NMED allows for land application if the PFAS concentrations detected fall below applicable screening levels. Mr. Ball indicated that would be a possibility. Ms. Hess explained the PFAS liquid IDW disposal treatment utilizing granulated activated carbon filters to remove contamination prior to the release of the IDW back into the environment. Mr. Ball requested the available Standard Operating Procedure for the treatment of PFAS liquid IDW.
- Ms. Mullen asked NMED if they would be able to provide comments on the SI Uniform Federal Policy for Quality Assurance Project Plan (UFP-QAPP) Addendum by 6 November 2021. Mr. John Rhoderick (NMED, Acting Director for the Water Protection Division) indicated NMED comments would be provided by that date.
- Mr. O'Neill asked the group if any additional permits would be required prior to conducting the field work at the Santa Fe AASF. Ms. Hess indicated she would complete the Federal Aviation Administration notification for the airport and that the NMARNG would verify that no additional permits are required for working onsite. NMARNG will contact the Construction Facilities Management to confirm any permit requirements.
- Ms. Mullen asked NMED when EA could expect to receive comments on the Rio Rancho SI UFP-QAPP Addendum. Mr. Rhoderick indicated that NMED had provided comments on the Rio Rancho PA and SI UFP-QAPP Addendum; he and Ms. Hess had discussed modifications to the QAPP regarding the discovery of a Tri-MaxTM extinguisher found to be stored on site. NMED is currently waiting to receive and review edits to the QAPP text. Ms. Hess indicated she would follow-up with the remaining action items owed to NMED. No date was provided for UFP-QAPP comments.
- Mr. Ball requested clarification on the nature of the interviews conducted as part of the PA, and the informational gaps existing between the facility opening in 1979 and the use of the Tri-MaxTM fire extinguishers in the 2000s. Ms. Hess explained the interview process, and that it is typical for ARNG installations to not have a full documented history of AFFF use. As such, the ARNG PFAS Program is operated using a conservative approach. Ms. Hess indicated that the PAs have been finalized and will not be revised;

however, text may be added to the UFP-QAPP Addendum if deemed necessary. Mr. Ball indicated it would be beneficial to add text regarding the typical historical operations conducted by the ARNG with regards to AFFF and Tri-Max™ fire extinguishers. Ms. Hess explained that site specific history would be beneficial to add to the UFP-QAPP Addendum, but generalized training and use conducted by the ARNG across all states and territories may not be as helpful. Ms. Hess indicated she would work with NMARNG to ensure that available information on the history of the Tri-Max and AFFF use at Santa Fe AASF is included.

- Mr. Rhoderick asked about the SI being conducted in Roswell and Ms. Hess indicated that NMED should receive a Draft Final SI UFP-QAPP Addendum for Roswell within the next couple of months.

Visual Reconnaissance:

- Proposed sample locations were visually inspected during a site walk conducted by Ms. Hess, NMED, and the NMARNG on 1 October 2021.

Action Items:

- EA will issue the Final Uniform Federal Policy for Quality Assurance Project Plan (UFP-QAPP) Addendum upon issuance of NMED comments on the Draft Final UFP-QAPP Addendum and concurrence with responses to NMED comments.
- Obtain facility utility maps from NMARNG.
- Provide the Standard Operating Procedure for PFAS liquid IDW disposal to NMED.

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Attachment A

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**Santa Fe Army Aviation Support Facility (AASF),
New Mexico
Site Inspection
New Mexico Army National Guard (NMARNG)**

Technical Project Planning (TPP) Meeting 1 & 2

**Preliminary Assessments and Site Inspections
(PA/SI) for Perfluorooctanesulfonic Acid (PFOS) and
Perfluorooctanoic Acid (PFOA) Impacted Sites**

September 2021

Prepared for:



Prepared by:



**EA Engineering,
Science, and
Technology, Inc., PBC**



AGENDA

- Introductions
- Safety Moment
- TPP Meeting Goals
- Army National Guard (ARNG) PA/SI Overview
- Santa Fe AASF PA Results
- Santa Fe AASF SI Overview
- Stakeholder Involvement
- Questions and Open Discussion



INTRODUCTIONS

- ARNG G9
 - Pamela Hess, SI Project Manager
 - David Connolly, Nationwide Program Manager
- United States Army Corps of Engineers (USACE)
 - Tim Peck, Nationwide Program Manager/SI Project Manager
 - Jim Lukasko, SI Project Manager
- New Mexico Army National Guard (NMARNG)
 - Byron Kesner, Environmental Specialist
 - Christopher Fritzsche, Environmental Specialist
 - Cecelia Abeyta, Environmental Specialist
- New Mexico Environment Department (NMED)
 - John Rhoderick, Acting Director for the Water Protection Division
- EA Engineering
 - Regina Mullen, SI Task Manager
 - Mike O'Neill, SI Project Manager



SAFETY MOMENT

Site Safety Procedures

- SI will follow USACE Engineering Manual (EM) 385-1-1 requirements:
 - Accident Prevention Plan addresses all component plans for EM 385-1-1, including Construction Support during drilling operations
 - Site Specific Safety and Health Plan addresses project participants, training, and hazard identification and mitigation
- Health and safety documents prepared during SI planning phase
- Pre-field kickoff meeting and daily safety briefings



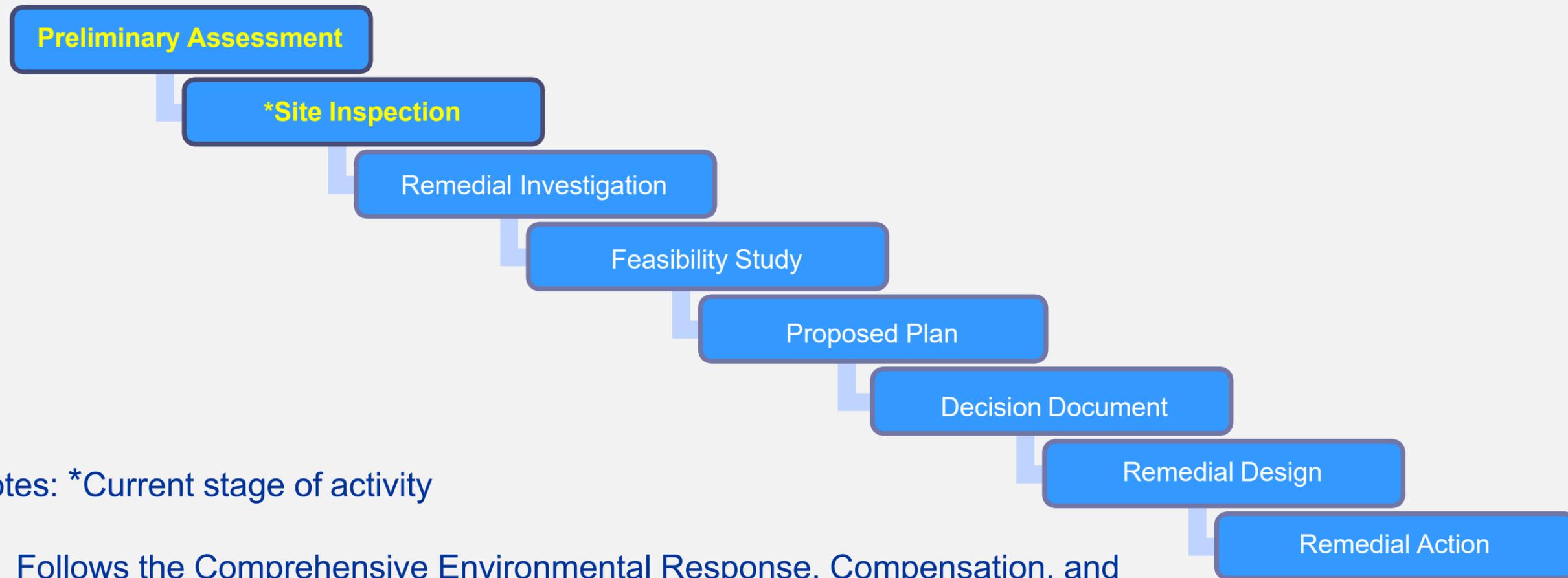
TPP MEETING GOALS

- TPP1:
 - Provide an overview of the ARNG PA/SI Program
 - Regulatory framework
 - Discuss PA Findings
- TPP2: Discuss proposed SI approach
 - Define objectives for SI data collection
 - Encourage stakeholder involvement
 - Review project schedule
 - Capture action items
- TPP3: Discuss SI findings
- Participants:
 - TPP1 and 2: ARNG, USACE, NMED
 - TPP3: ARNG, USACE, NMED, other local stakeholders



ARNG PA/SI OVERVIEW

WORK PHASES



Notes: *Current stage of activity

- Follows the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Process
- An interim removal action can be conducted or a No Further Action determination can be made at any phase



ARNG PA/SI OVERVIEW

- Activities centrally contracted through USACE and managed by ARNG G9
 - USACE Baltimore manages the contract, with technical project support from other Districts (Louisville, Omaha, Alaska, Sacramento, Jacksonville, and Seattle Districts)
 - Project support: chemistry, geology, risk screening
- PA ranking (~200 facilities) - state ARNG input
 - Likelihood of release
 - Complete pathway to drinking water receptor
 - Priority assigned to facilities with highest likelihood of release near drinking water intake
- PA – facility-wide; SI – areas of interest (AOIs)



ARNG PA/SI OVERVIEW

- ARNG / NMARNG
 - Identify potential per- and polyfluoroalkyl substances (PFAS) release locations
 - Provide facility access and points of contact
 - Gather and provide appropriate documents
 - Identify/schedule personnel to interview
 - Supply final PA to the regulatory agencies
- SI Regulatory Involvement
 - CERCLA SI conducted in conjunction with the appropriate regulatory agencies



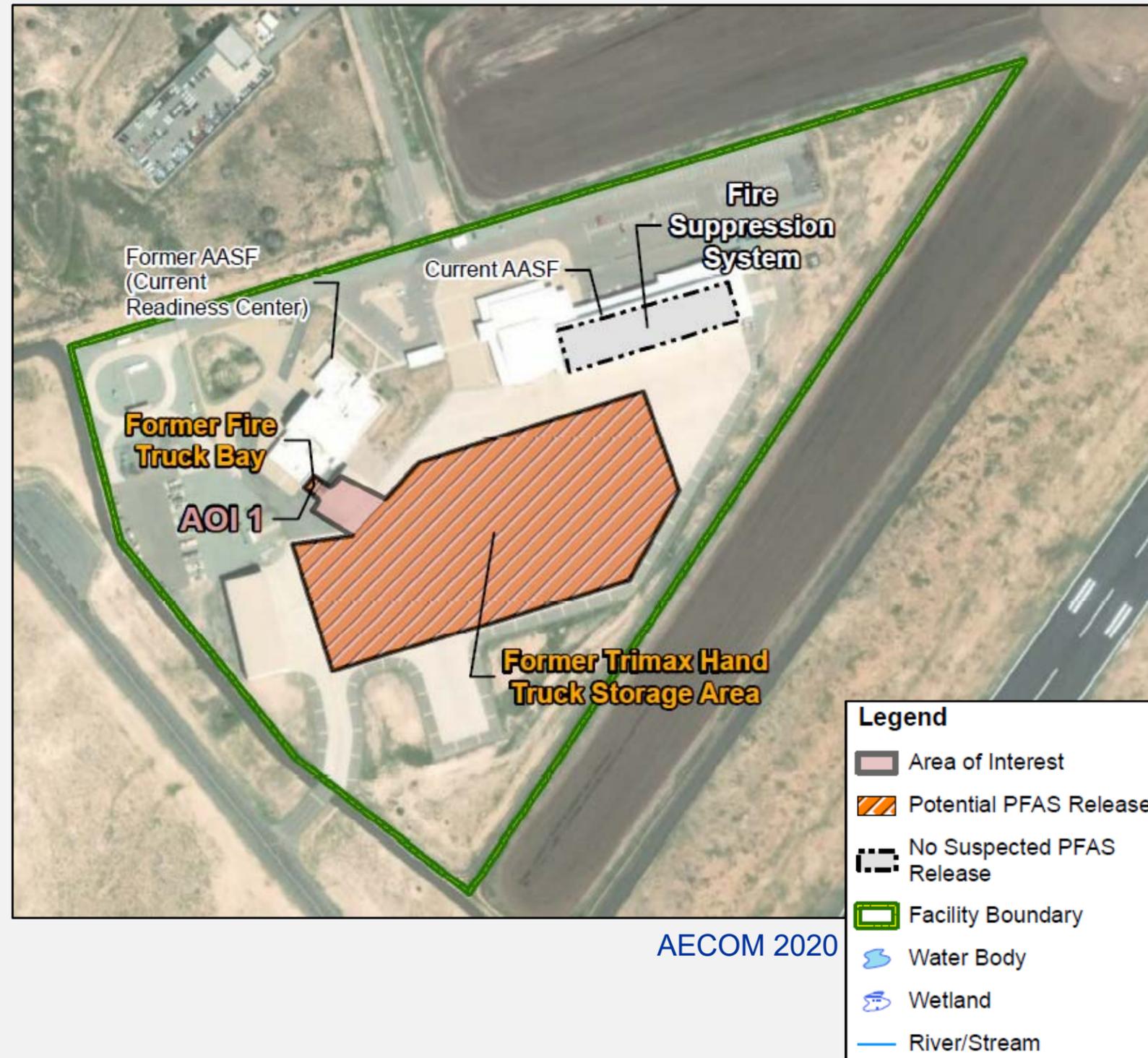
SANTA FE AASF ARNG PA RESULTS

- Potential PFAS release areas: 2 areas identified during the PA grouped into 1 AOI
- AOI 1: Former Firetruck Bay and Tri-Max™ Hand Truck Storage Area
 - The former AASF building, now the current NMARNG Readiness Center, formerly housed a single firetruck. Additionally, Tri-Max™ 70/30 hand trucks were stored in various places around the flight line and parking apron prior to the renovations that took place in 2012.



SANTA FE AASF ARNG

SUMMARY OF FINDINGS AND AOIs





SANTA FE AASF ARNG PA RESULTS

AOI 1: FORMER FIRETRUCK BAY AND TRI-MAX™ HAND TRUCK STORAGE AREA

- **Former AASF Building (current Readiness Center):**
 - Formerly housed a single firetruck.
 - The building was renovated in 2012.
 - The firetruck was sold in 2005 to the Santa Fe Fire Department and it is unknown how long the truck was stored in the bay.
 - Personnel interviews confirmed the truck stored AFFF foam, but there are no records or recollection of use or spills.
 - It is possible that the truck leaked AFFF or had its AFFF tank flushed out during maintenance.
 - It is unknown if the former firetruck bay contained floor drains.



SANTA FE AASF ARNG PA RESULTS

AOI 1: FORMER FIRETRUCK BAY AND TRI-MAX™ HAND TRUCK STORAGE AREA

- Former Tri-Max™ Hand Truck Storage Area:
 - The flight line and paved parking apron at the facility currently stretch across the majority of the facility. The area was expanded and repaved in 2012 during renovations.
 - Prior to the renovation, hand trucks were stored in various places and were regularly serviced.
 - Hand trucks were used for 4 to 5 years in the mid-2000s and eventually were turned in and replaced with non-PFAS extinguishers.
 - There are no records of training or nozzle testing.



The installation prior to renovations in 2009 (top) and the current footprint (bottom)





SANTA FE AASF

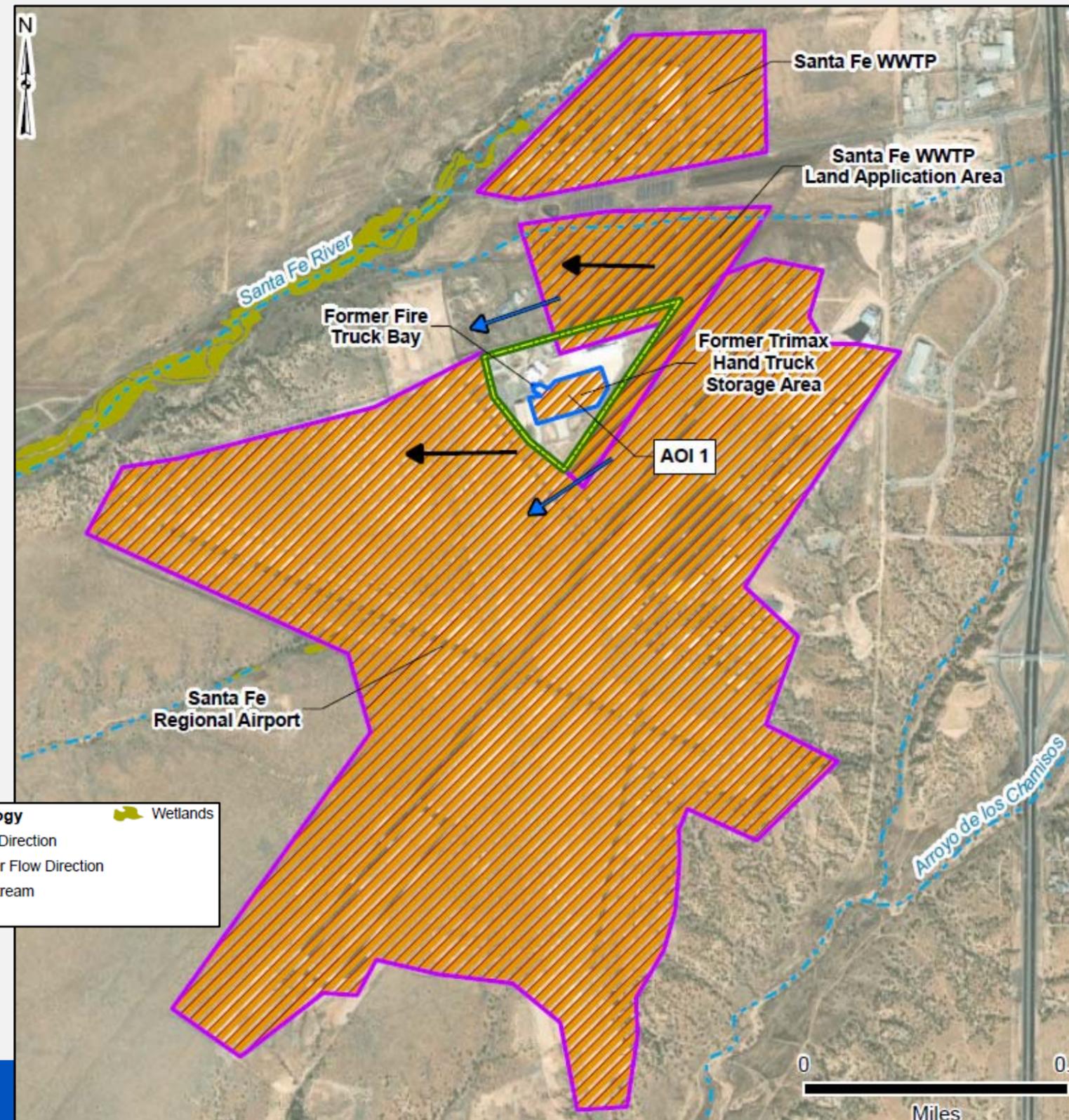
PA FINDINGS - ADJACENT SOURCES

- Santa Fe Regional Airport (SAF)
 - Interviews with NMARNG facility staff and a historical records search provided little information regarding use of AFFF at SAF; however, the records search detailed two emergency incidents that happened on or near the runway. It is unknown if AFFF was used as part of the emergency response to either incident. The crash sites are potentially located upgradient of the AOI as well as upstream of surface water flow, and they may impact PFAS concentrations in the groundwater underlying the facility.
- Santa Fe wastewater treatment plant (WWTP) and Associated Land Application Areas
 - The Santa Fe WWTP is located north of the Santa Fe AASF. Areas to the north and east of the Santa Fe AASF are currently used for land application of biosolids. Based on historical aerial photographs, application of biosolids may have extended to the north end of the current AASF building prior to the 2012 renovations of the facility. The biosolids are located upgradient of the AOI as well as upstream of surface water flow, and they may impact PFAS concentrations in the groundwater underlying the facility.



SANTA FE AASF PA FINDINGS

Adjacent Sources





SANTA FE AASF SI OVERVIEW

DATA QUALITY OBJECTIVES (DQOs)

- Primary SI DQOs
 - Confirm the presence/absence of a release
 - Gather data for conceptual site model (CSM):
Understanding of Source-Pathway-Receptor relationships
required for establishing sampling strategy
- Extended SI DQOs
 - Determine the presence/absence at facility boundary
 - Check for alternate sources, up- or downgradient
 - Measure PFAS at/near receptor, if warranted



SANTA FE AASF SI OVERVIEW

SCREENING LEVELS

- Results compared to Office of the Secretary of Defense (OSD) Screening Levels (SLs) for soil and groundwater for PFOA, PFOS, and PFBS.
 - Memorandum from the OSD dated 15 September 2021
 - SLs for groundwater based on direct ingestion
 - SLs for soil based on incidental ingestion; 0-2 ft compared to Residential SL, 2-15 ft compared to Industrial SL, > 15 ft is not compared to either SL
- AOIs exceeding OSD SLs will proceed to the next phase under CERCLA (i.e., Remedial Investigation)

Analyte	Residential (Soil) (µg/kg) ¹	Industrial / Commercial Composite Worker (Soil) (µg/kg) ¹	Tap Water (Groundwater) (ng/L) ¹
PFOA	130	1,600	40
PFOS	130	1,600	40
PFBS	1,900	25,000	600

Notes:

1. Deputy Assistant Secretary of Defense. 2021. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. 15 September 2021.

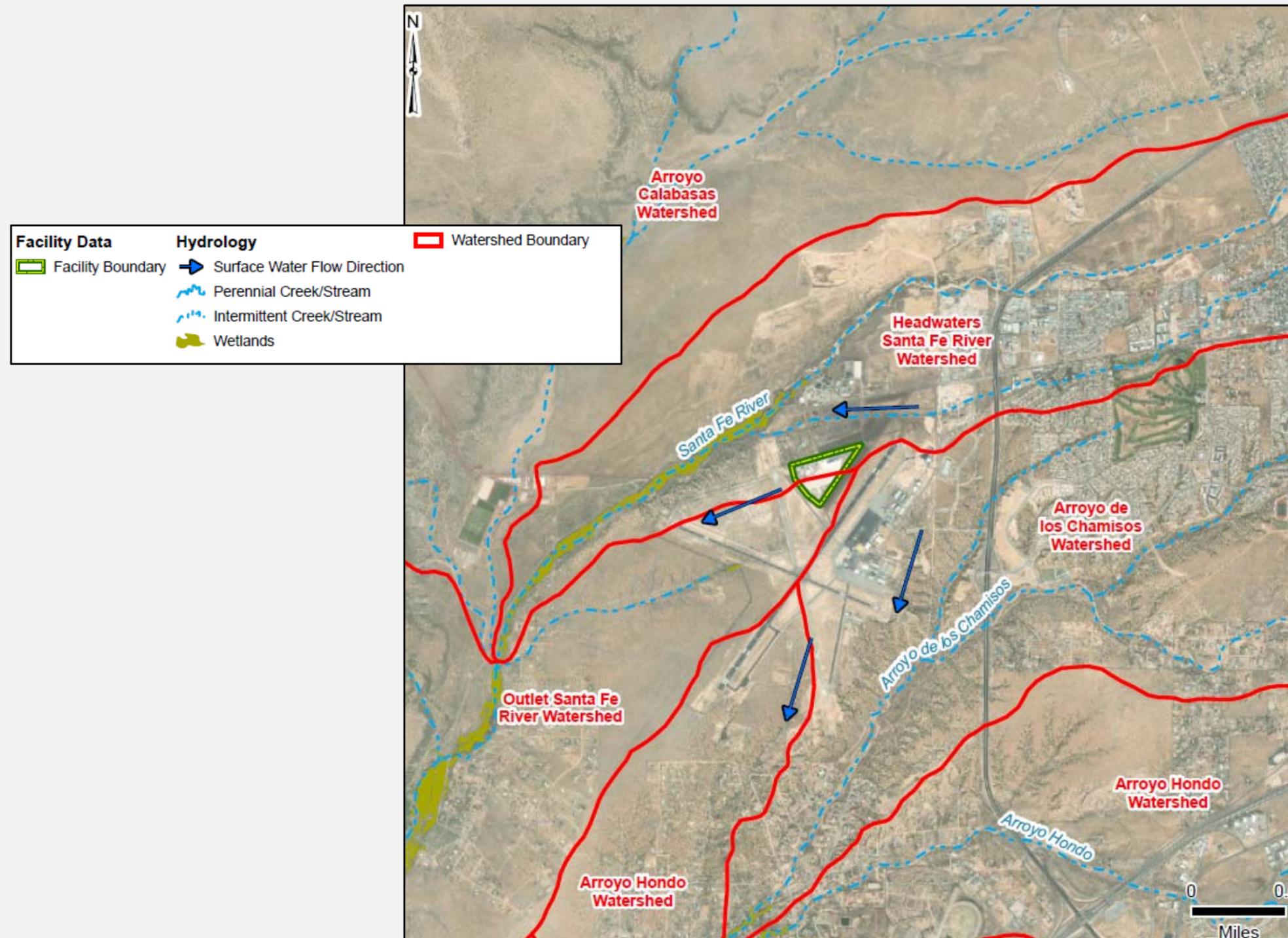
µg/kg = Microgram(s) per kilogram.

ng/L = Microgram(s) per liter.



SANTA FE AASF SI OVERVIEW

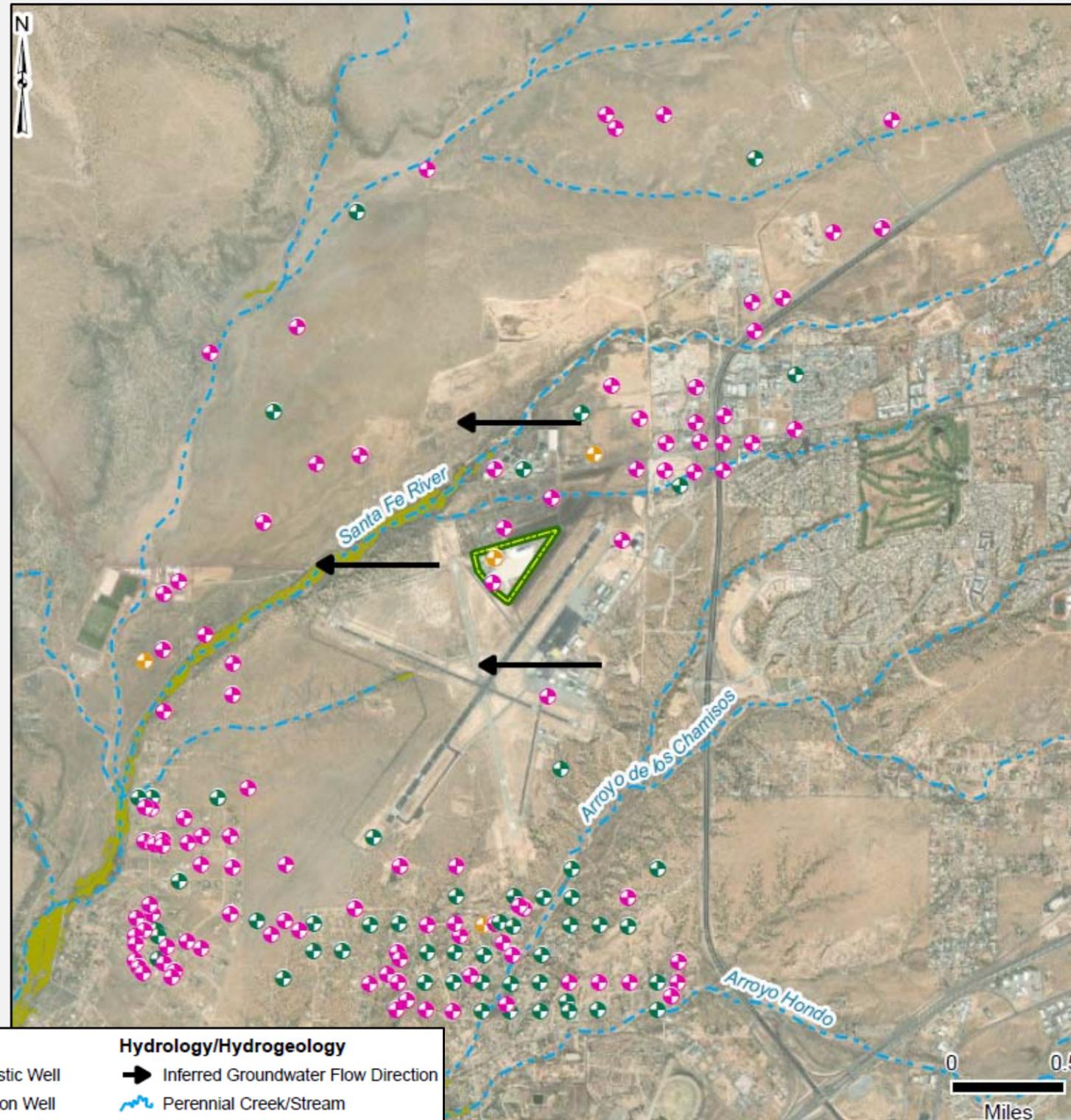
CSM – SURFACE WATER FEATURES





SANTA FE AASF SI OVERVIEW

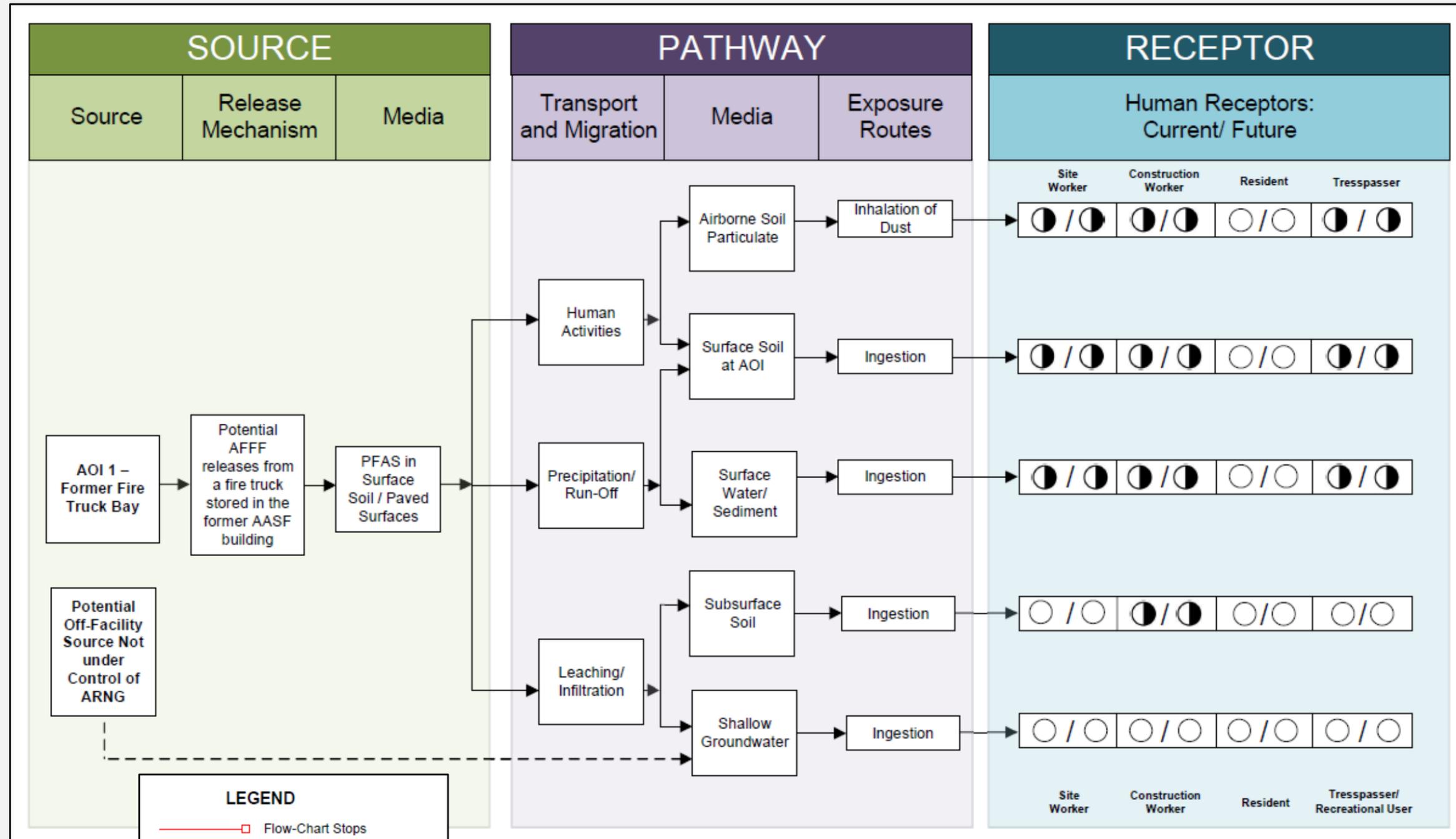
CSM – GROUNDWATER FEATURES



Facility Data	Well Type	Hydrology/Hydrogeology
Facility Boundary	Domestic Well	Inferred Groundwater Flow Direction
	Irrigation Well	Perennial Creek/Stream
	Unknown/Other Well	Intermittent Creek/Stream
		Wetlands



SANTA FE AASF SI OVERVIEW CSM





SANTA FE AASF SI OVERVIEW

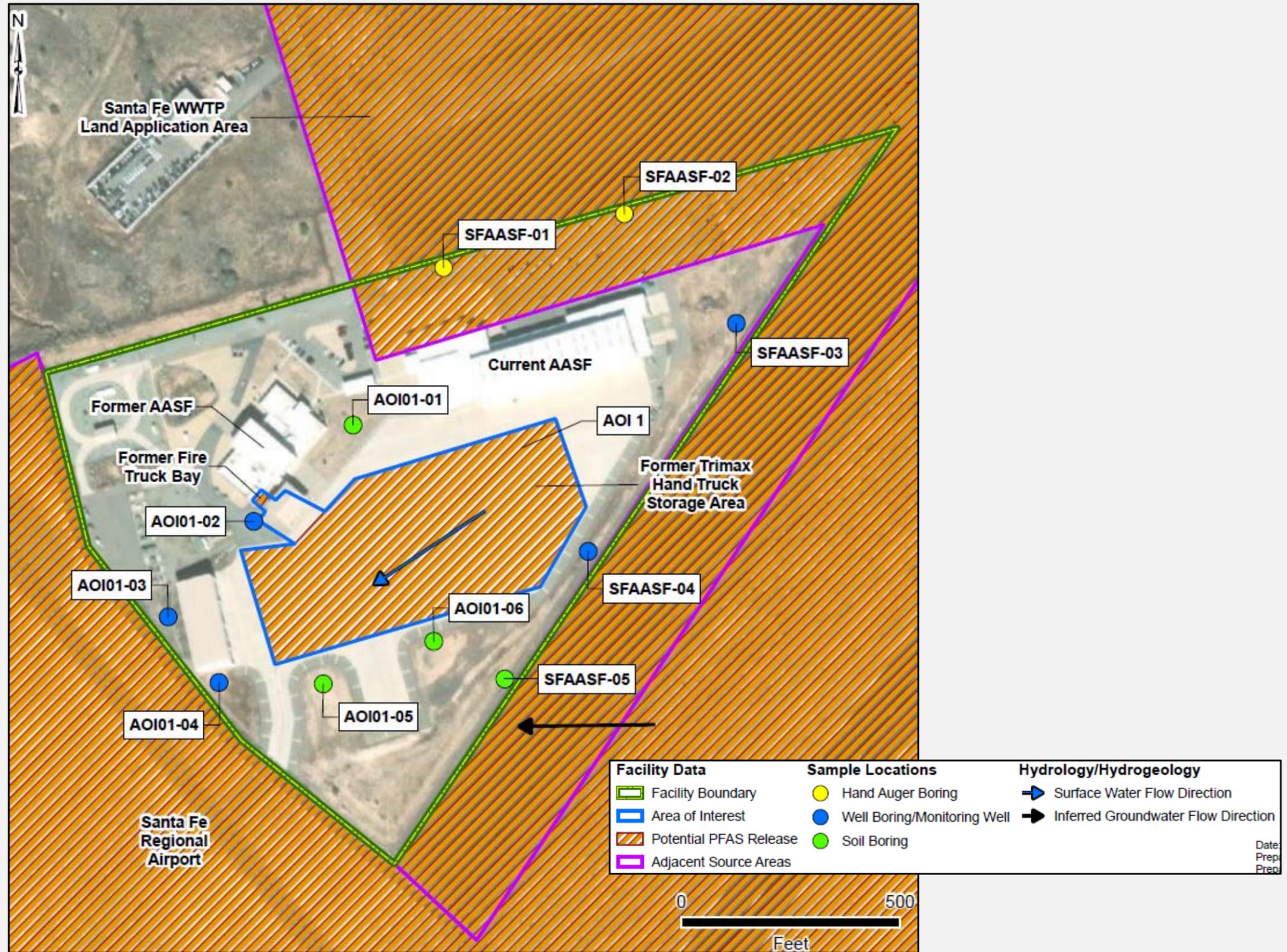
PLANNING AND SAMPLING

- Finalize Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) Addendum
 - Draft Final submitted on 7 September 2021
 - Final to be submitted following the TPP 1&2 meeting after addressing NMED comments
- Continuous soil cores to target depth
 - Well Locations: Target depth up to 200 ft bgs. Soil samples collected at surface (0-2 ft bgs with hand auger), mid point (not to exceed 15 ft bgs), and 1 ft above water table.
 - Soil Borings: Target depth of 15 ft bgs. Soil samples collected at surface (0-2 ft bgs with hand auger), mid point (6-8 ft bgs), and at 15 ft bgs for soil borings drilled to 15 ft bgs.
- Collect hand auger samples (0-2 ft bgs) at select locations along the northern facility boundary
- Collect a groundwater sample from each well (up to 200-ft borings)
- Wells will be surveyed and depth to the water table will be recorded



SANTA FE AASF SI OVERVIEW

PROPOSED SAMPLING LOCATIONS





SANTA FE AASF SI OVERVIEW

Location	# of Soil Borings (to 15 ft bgs)	# of Hand Auger Borings (to 2 ft bgs)	# of Monitoring Wells (to 200 ft bgs)	Soil Samples	Target Interval for GW samples	Groundwater Samples	Decontamination Water Samples
AOI 1	3	0	3	18	Mid-screen	3	-
Facility Boundary	1	2	2	11	Mid-screen	2	-
Total	4	2	5	29	---	5	1

- Sample locations will be refined in the field
 - Confirm placement is accessible and will meet DQOs prior to the utility mark-out and locate



SANTA FE AASF SI OVERVIEW

ANALYTICAL PARAMETERS

Perfluorooctanesulfonic acid (PFOS)	Perfluoroheptanoic acid (PFHpA)
Perfluorohexanesulfonic acid (PFHxS)	Perfluorononanoic acid (PFNA)
Perfluorooctanoic acid (PFOA)	Perfluorobutanesulfonic acid (PFBS)
Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)
Perfluorodecanoic acid (PFDA)	Perfluorotetradecanoic acid (PFTA)
Perfluorododecanoic acid (PFDoA)	Perfluorohexanoic acid (PFHxA)
Perfluorotridecanoic acid (PFTrDA)	Perfluoroundecanoic acid (PFUnA)
6:2 Fluorotelomer sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonate (8:2 FTS)
4:2 Fluorotelomer sulfonate (4:2 FTS)	Perfluorodecane sulfonate PFDS (PFDS)
Perfluoroheptane sulfonate (PFHpS)	Perfluorononane sulfonate (PFNS)
Perfluoropentane sulfonate (PFPS)	Perfluorotetradecanoic acid (PFTeDA)

- Analysis completed by an Environmental Laboratory Accreditation Program/National Environmental Laboratory Accreditation Program-certified laboratory
- Requirement for state-certified laboratory?
- Data will undergo stage 2B (soil and non-drinking water) and stage 4 (drinking water) validation as defined in Department of Defense (DoD) Federal Data Validation Guidelines



STAKEHOLDER INVOLVEMENT

- Use TPPs and open communication to encourage stakeholder involvement
- Key involvement topics
 - Proposed approaches
 - Document review time for NMED and other stakeholders
- Schedule:
 - Address remaining comments and issue Final UFP-QAPP Addendum: November 2021
 - Field Investigation: December 2021
 - Reporting including regulator review: March (Draft) / May (Draft Final) / June 2022 (Final)



QUESTIONS AND OPEN DISCUSSION

- Coordination
 - Data transfer
 - Access
 - Decontamination Water
 - Utility mark-out and utility clearance procedures
 - Report distribution (paper, electronic, portable document format)
 - IDW Handling
 - Site Walk
 - Stakeholder relations
- Schedule



ACRONYMS

- AASF – Army Aviation Support Facility
- AFFF – Aqueous Film Forming Foam
- AOI – Area of Interest
- ARNG – Army National Guard
- CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
- COVID-19 – Coronavirus Disease 2019
- CSM – Conceptual Site Model
- DQO – Data Quality Objective
- ELAP – Environmental Laboratory Accreditation Program
- EM – Engineering Manual
- NELAP – National Environmental Laboratory Accreditation Program
- NMARNG – New Mexico Army National Guard
- NMED – New Mexico Environment Department
- PA – Preliminary Assessment
- PFAS – Per- and Polyfluorinated Alkyl Substances
- PFOS – Perfluorooctanesulfonic Acid
- PFOA – Perfluorooctanoic Acid
- SAF – Santa Fe Regional Airport
- SI – Site Inspection
- SSHP – Site Safety and Health Plan
- TPP – Technical Project Planning
- UFP-QAPP – Uniform Federal Policy- Quality Assurance Project Plan
- USACE – United States Army Corps of Engineers
- WWTP – Wastewater Treatment Plant

Appendix E

Boring Logs and Well Construction Diagrams

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EA Engineering, Science,
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LOG OF SOIL/ROCK BORING

Coordinates: 35.625876, -106.086927
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Hand Auger		Boring No. SFAASF-01	
Sampling Method: Hand Auger (Grab)		Sheet 1 of 1	
		Drilling	
Water Level		Start	Finish
Time	-		
Date	-	2/8/2022	2/8/2022

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Snow, gravel
Composite / SFAASF-01-SB-0-2	2/2		1	GP	0-0.5': gravel, poorly graded (decorative), gray (10 YR 5/1), loose, dry to moist, little sand fine to coarse
			2	ML	0.5'-2': silt, brown (10 YR 5/3), loose, dry
			3		
			4		
			5		
			6		
			7		
			8		
			9		
			10		
			11		
			12		
			13		
			14		
			15		
			16		
			17		
			18		
			19		
			20		
			21		

TD' = 2'

Logged by: D. Werth

Date: 02/08/2022

Drilling Contractor: EA

Driller: D. Werth



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.626190, -106.085671
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Hand Auger		Boring No. SFAASF-02	
Sampling Method: Hand Auger (Grab)		Sheet 1 of 1	
Drilling			
Water Level		Start	Finish
Time	-		
Date	-	2/8/2022	2/8/2022

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
					Snow, gravel
Composite / SAAASF-02-SB-0-2	2/2		1	GP	0-0.5': gravel (decorative), gray (10 YR 5/1), loose, dry to moist, little sand fine to coarse
			2	ML	0.5'-2': silt, brown (10 YR 5/3), loose, dry
			3		
			4		
			5		
			6		
			7		
			8		
			9		
			10		
			11		
			12		
			13		
			14		
			15		
			16		
			17		
			18		
			19		
			20		
			21		
					TD' = 2'

Logged by: D. Werth

Date: 02/08/2022

Drilling Contractor: EA

Driller: D. Werth



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.62551044 -106.0845898
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: SF AASF	
Drilling Method: Sonic		Boring No. SFAASF-03-PA	
Sampling Method:		Sheet 1 of 10	
Soil Sample (Grab)		Drilling	
Water Level		Start	Finish
Time	-	5/1/2022	5/9/2022
Date		0727	1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
Composite / SFAASF 03-SB-0-2	N/A		1	SM	Slough
			2		2'-5': Silty sand, very pale brown (10 YR 7/3), very fine gravel, coarse, dry
			3		
			4		
			5		5'-6': Silty sand, very pale brown (10 YR 7/3), trace clay, medium dense, minor gravel, round, dry
			6		6'-8.5': Silty sand, reddish brown (7.5 YR 6/6), loose, dry to slightly moist, very fine grained, minor clay
			7		
			8		
			9		
			10		
			11		
			12		
			Composite / SFAASF 03-SB-13-15		
14					
15					
16	16'-18.5': Well-graded sand, pink (7.5 YR 7/3), very fine grained to coarse grained, 10% gravel (subangular to subround), 0.5-3.0 inch diameter, loose, dry				
17					
18					
19	18.5'-21': Silty sand with minor gravel, very pale brown (10 YR 7/2), dry, loose, gravel 3/4-1 inch, minor coarse grained				
20					
21					

Logged by: T. McMillan

Date: 05/01/2022

Drilling Contractor: Environmental Works

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.62551044 -106.0845898
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: SF AASF
Drilling Method: Sonic		Boring No. SFAASF-03-PA
Sampling Method:		Sheet 2 of 10
Soil Sample (Grab)		Drilling
Water Level		Start 5/1/2022
Time	-	Finish 5/9/2022
Date		0727 1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
Sonic Core	N/A		21	SM	21'-23.5': Silty sand with minor clay, very pale brown (10 YR 7/4), medium dense, dry, very fine grained
		2.0	22		
			23	GM	23'-26.5': Silty gravel, very pale brown (10 YR 7/2), loose, dry, gravel subround 1/2 inch to 2 inch
		2.2	24		
			25		
			26		
		2.3	27	SM	26.5'-28.5': Silty sand with gravel, very pale brown (10 YR 7/2), loose, very fine grained with gravel 5% 1/2 inch-1 inch, dry
			28		
			29		28.5'-33.5': Silty sand with trace clay, very pale brown (10 YR 7/4), loose, dry, very fine grained
		5.3	30		
			31		
			32		
		4.0	33		
			34		33.5'-36': Silty sand, very pale brown (10 YR 7/4), loose, dry, very fine grained, trace gravel - 1/2 inch diameter, subround
		1.2	35		
			36	ML	36'-38.5': Silt with gravel, very pale brown (10 YR 7/3), loose, dry, very fine grained, 5% gravel - 0.5 inch to 2.5 inch
		4.7	37		
			38		
			39	GM	38.5'-46': Silty gravel, very pale brown (10 YR 7/3), loose, 15-20% gravel- 1/2 inch to 3 inch subround
		1.1	40		
		41			

Logged by: T. McMillan Date: 05/01/2022
 Drilling Contractor: Environmental Works Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.62551044 -106.0845898
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: SF AASF
Drilling Method: Sonic		Boring No. SFAASF-03-PA
Sampling Method:		Sheet 3 of 10
Soil Sample (Grab)		Drilling
Water Level		Start 5/1/2022
Time	-	Finish 5/9/2022
Date		0727 1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
Sonic Core			41	GM	
		0.6	42		
			43		
		1.8	44		
			45		
	Little-to-no recovery	NM	46	ML	46'-48.5': Clayey silt, reddish brown (7.5 YR 6/6), dense, dry, very fine grained, minor fine grained sand
			47		
		6.2	48		
			49	GM	48.5'-52.5': Silty gravel, very pale brown (10 YR 7/3), 15% gravel (up to 2.5 inch diameter), very fine grained, loose, dry
			50		
		1.8	51		
			52		
		0.8	53	ML	52.5'-54': Clayey silt, reddish yellow (7.5 YR 6/8), very fine grained, dry, medium dense
			54	SW	54'-55': Well graded sand, reddish yellow (7.5 YR 6/8) very fine to coarse grained, loose, dry
		0.1	55	GM	55'-58': Silty gravel, very pale brown (10 YR 7/3), loose, dry, gravel subround, up to 2.5 inch diameter
			56		
		1.4	57		
			58	SW	58'-61': Well graded sand, reddish brown (7.5 YR 6/6), fine to coarse grained, 5% gravel subround, up to 3 inch diameter
		3.8	59		
			60		
		1.9	61		

Logged by: T. McMillan Date: 05/01/2022
 Drilling Contractor: Environmental Works Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.62551044 -106.0845898
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: SF AASF
Drilling Method: Sonic		Boring No. SFAASF-03-PA
Sampling Method:		Sheet 4 of 10
Soil Sample (Grab)		Drilling
Water Level		Start 5/1/2022
Time	-	Finish 5/9/2022
Date		0727 1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
Sonic Core	N/A		61	GW	61'-66': Well graded gravel, reddish brown (7.5 YR 7/6), fine to coarse grained sand, loose, dry, subround gravel up to 2 inch diameter
		2.2	62		
			63		
		1.3	64		
			65		
			66	SW	66'-67': Well graded sand, strong brown (7.5 YR 5/6), loose, moist, fine to coarse grained, trace gravel
		3.4	67	GW	67'-68.5': Well graded gravel, strong brown (7.5 YR 5/6), loose, fine to coarse grained, dry
			68		
			69	SW	68.5'-76': Well graded sand, strong brown (7.5 YR 5/6), fine to coarse grained sand, minor clay near 68.5', minor gravel (3-5%, up to 1 inch diameter, subround), loose, moist
		1.2	70		
			71		
		0.2	72		
			73		
		0.3	74		
			75		
			76	SW	76'-83': Well graded sand with gravel, strong brown (7.5 YR 5/6), fine to coarse grained sand, minor clay, subround gravel 3-5% up to 1 inch diameter, loose, moist
		3.3	77		
			78		
		2.9	79		
			80		
			81		

Logged by: T. McMillan Date: 05/01/2022
 Drilling Contractor: Environmental Works Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.62551044 -106.0845898
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: SF AASF	
Drilling Method: Sonic		Boring No. SFAASF-03-PA	
Sampling Method:		Sheet 5 of 10	
Soil Sample (Grab)		Drilling	
Water Level		Start	Finish
Time	-	5/1/2022	5/9/2022
Date		0727	1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
	N/A		81		
		3.9	82		
Discrete / SFAASF-03-SB-183		3.8	83	GW	83'-84': Well graded gravel, very pale brown (10 YR 7/3), minor silt, fine grained to coarse grained sand, loose, dry, subround gravel up to 2.5" diameter
			84	SW	84'-85': Well graded sand with gravel, strong brown (7.5 YR 5/6), fine to coarse grained, gravel up to 1.5" diameter, loose, moist
		2.2	85	GM	85'-89': Silty gravel, very pale brown (10 YR 7/3), very fine grained, gravel 3/4" to 4", loose, dry
			86		
			87		
		0.2	88		
			89	GW	89'-94': Sandy gravel, well-graded, strong brown (7.5 YR 5/6), fine to medium grained sand, subround gravel 0.5"-2" increasing with depth, loose, moist
		0.5	90		
			91		
			92		
		3.5	93		
			94		
	No recovery		95	GW	94'-102': Sandy gravel, well-graded, strong brown (7.5 YR 5/6), fine to medium grained sand, subround gravel 0.5"-2" increasing with depth, loose, moist
			96		
			97		
		0.9	98		
			99		
		3.1	100		
			101		

Logged by: T. McMillan

Date: 05/01/2022

Drilling Contractor: Environmental Works

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.62551044 -106.0845898
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: SF AASF
Drilling Method: Sonic		Boring No. SFAASF-03-PA
Sampling Method:		Sheet 6 of 10
Soil Sample (Grab)		Drilling
Water Level		Start 5/1/2022
Time	-	Finish 5/9/2022
Date		0727 1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
	N/A		101		
			102	GW	
		1.3	103		102'-104': Sandy gravel, very pale brown (10 YR 7/3), fine to coarse sand, at least one cobble present (4" diameter), otherwise subround, reworked, weathered gravel up to 2" diameter, friable
			104		
		1.5	105	SC	
		4.0	106		105'-108.5': Clayey sand, brown (7.5 YR 4/2), fine grained, clay is slightly plastic, moist
			107		
		25.7	108	ML	
			109		108.5'-116': Clayey silt, light brown (7.5 YR 6/4), very fine grained, clay present, clay increasing with depth, slightly plastic, moist
		8.8	110		
			111		
			112		
		4.5	113		
			114		
		0.7	115		
			116	CL/SC	
			117		116'-118': Sandy clay to clayey sand, brown (7.5 YR 4/4), fine grained sand, slightly plastic, minor gravel (2%), wet to very moist
		23.2	118	ML	
			119		118'-120': Clayey silt, light yellowish brown (10 YR 6/4), dry, medium dense, moist
		5.9	120	ML	
			121		120'-122': Clayey silt, yellow (2.5 YR 7/6), dry, medium dense, moist

Logged by: T. McMillan

Date: 05/01/2022

Drilling Contractor: Environmental Works

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.62551044 -106.0845898
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: SF AASF
Drilling Method: Sonic		Boring No. SFAASF-03-PA
Sampling Method:		Sheet 7 of 10
Soil Sample (Grab)		Drilling
Water Level		Start 5/1/2022
Time	-	Finish 5/9/2022
Date		0727 1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
	N/A		121		
		6.1	122		
			123	ML	122'-124': Clayey silt, reddish yellow (7.5 YR 6/6), medium dense, dry
		5.8	124		
			125	GM	124'-128': Silty gravel, very pale yellow (10 YR 7/4), gravel up to 2", subround, loose, dry
		1.2	126		
			127		
		1.6	128	ML	128'-134': Clayey silt, reddish yellow (7.5 YR 6/6), clay content increases with depth, medium dense, dry to slightly moist
			129		
		5.2	130		
			131		
			132		
		7.5	133		
			134	CL	134'-137': Silty clay, brown (7.5 YR 4/3), plastic to slightly plastic, moist
			135		
		4.1	136		
			137	ML	137'-139': Clayey silt, light brown (7.5 YR 6/4), medium dense, slightly moist to dry
		3.0	138		
			139	SW	139'-145.5': Well graded sand with gravel, reddish yellow (7.5 YR 6/6), fine to coarse grained with depth, loose, moist, gravel subround up to 1"
		1.3	140		
			141		

Logged by: T. McMillan Date: 05/01/2022
 Drilling Contractor: Environmental Works Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.62551044 -106.0845898
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: SF AASF
Drilling Method: Sonic		Boring No. SFAASF-03-PA
Sampling Method:		Sheet 8 of 10
Soil Sample (Grab)		Drilling
Water Level		Start 5/1/2022
Time	-	Finish 5/9/2022
Date		0727 1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
	N/A		141		
			142		
		19.4	143		
			144		
		1.0	145	SP	145.5'-146.5': Poorly graded sand with minor clay, pinkish gray (7.5 YR 7/2)
			146		
		0.4	147	ML	146.5'-148': Clayey silt, reddish yellow (7.5 YR 6/6), slightly moist, medium dense
			148	ML	148'-150': Clayey silt, reddish yellow (7.5 YR 6/6), slightly moist, medium dense
		75.2	149		
			150	SM	150'-152': Silty sand, very pale brown (10 YR 7/3), loose, dry, some medium sand and gravel (1" diameter), grades to SW
			151		
		2.1	152	SW	152'-153': Well graded sand, reddish yellow (7.5 YR 6/6), fine to coarse grained, loose, dry, 2% gravel up to 1/2"
			153		153'-158': Well graded sand, reddish yellow (7.5 YR 6/6), fine to coarse grained, loose, dry, 5% gravel up to 1", subangular to subround
			154		
		3.0	155		
			156		
			157		
		3.4	158		158'-161': Well graded sand, reddish yellow (7.5 YR 6/6), fine to coarse grained, loose, dry, 5% gravel up to 1", subangular to subround
			159		
		1.5	160		
			161		

Logged by: T. McMillan Date: 05/01/2022
 Drilling Contractor: Environmental Works Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.62551044 -106.0845898
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: SF AASF
Drilling Method: Sonic		Boring No. SFAASF-03-PA
Sampling Method:		Sheet 9 of 10
Soil Sample (Grab)		Drilling
Water Level		Start 5/1/2022
Time	-	Finish 5/9/2022
Date		0727 1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
	N/A		161	GW	161'-162': Silty gravel, very pale brown (10 YR7/4), grades to GW, very fine to fine sand, loose, dry, gravel 3" diameter
		0.8	162	ML	162'-164': Clayey silt, reddish yellow (7.5 YR 6/6), very fine grained, minor clay, moist, medium dense
			163		
		0.8	164	GW	164'-166': Well graded gravel, very pale brown (10 YR 7/4), fine to medium grained sand, one 4" cobble, mostly 2" gravel, loose, dry to slightly moist
			165		
		1.1	166	SW	166'-168.5': Well graded sand, strong brown (7.5 YR 5/6), loose, dry to slightly moist, fine to medium grained sand, trace coarse grain sand, minor clay with depth, 1% gravel up to 1/2"
			167		
		5.7	168		
			169	CL	168.5'-170': Sandy clay, dense, slightly moist, fine to medium grained sand, trace gravel up to 3" diameter
			170	SW	170'-172': Well graded sand, strong brown (7.5 YR 5/6), loose, slightly moist, fine to medium grained sand, trace gravel up to 3" diameter
			171		
		52.2	172	CL	172'-173.5': Sandy clay, dense, slightly moist, fine to medium grained sand, trace gravel up to 3" diameter
			173		
			174	GM	173.5'-178': Silty gravel, very pale brown (10 YR 7/3), very fine to fine grained sand, loose, dry, two 4" diameter cobbles, 2-3" diameter gravel, subround to subangular, trace medium to coarse grained sand, bottom 2" slightly moist
		3.5	175		
			176		
		9.7	177		
			178	CL	178'-180': Sandy clay, loose to medium dense, moist, fine to medium grained sand, no silt, non plastic, becomes stiff and minor clay at bottom 5"
			179		
		1.5	180	CL	180'-185': Sandy clay, loose to medium dense, moist, fine to medium grained sand, no silt, low to non plastic, becomes stiff and minor clay at bottom 5"
			181		

Logged by: T. McMillan/S. Lauricella

Date: 05/02/2022

Drilling Contractor: Environmental Works

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.62551044 -106.0845898
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: SF AASF	
Drilling Method: Sonic		Boring No. SFAASF-03-PA	
Sampling Method: Soil Sample (Grab)		Sheet 10 of 10	
Drilling			
Water Level	184.5'	Start	Finish
Time	-	5/1/2022	5/9/2022
Date	5/2/2022	0727	1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
	N/A		181		
			182		
Discrete / SFAASF-03-SB-183		85	183	CL	
			184		
			185		
		71.4	186	ML	185-188': Clayey silt, dark yellowish brown (10 YR 4/6), stiff, moist, low plasticity, fine grained sand, minor medium to coarse gravel up to 1/2" diameter, subrounded to rounded
			187		
			188		
			189	CL	188-190': Sandy clay, yellowish brown (10 YR 5/6), moist to wet, medium dense to loose, medium and coarse grained sand, low to non plastic, trace gravel up to 1/2" diameter, subangular to subrounded
			190		
		3.4	191		190-195': Sandy clay, yellowish brown (10 YR 5/6), medium dense to dense with depth, wet, medium grained sand, trace fine sand, trace gravel up to 2.5" diameter, subrounded to rounded
			192		
		2.6	193		
			194		
			195		
		0.6	196	SW	195-196': Sand, brownish yellow (10 YR 6/8), loose, medium dense, medium to coarse grain sand, trace very fine to fine grain sand, trace gravel up to 1" diameter, one cobble up to 3" diameter, subangular to subround, wet
		3.8	197		196'-197': Sand, brownish yellow (10 YR 6/8), loose, medium dense, medium to coarse grain sand, trace very fine to fine grain sand, trace gravel up to 2" diameter, subangular to subround, wet, no larger cobbles
			198		
			199		
			200		TD = 197' 2" PVC SCH 80: riser 0-175', 0.010" screen 175-195', sump 195-197'
			201		10/20 Silica sand: 173-197' 3/8" Hole plug bentonite chips: 167-173' Grout: 0-167'

Logged by: S. Lauricella

Date: 05/02/2022

Drilling Contractor: Environmental Works

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.625548, -106.084589
 Surface Elevation: 6,337.86 ft
 Casing Elevation: 6,337.69 ft
 GW level at time of drilling: 184.95 ft
 GW level at time of sampling: 184.54 ft

Job No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-03	
Sampling Method: Sonic/Continuous Core		Sheet 1 of 1	
Drilling			
Water Level	-	Start	Finish
Time	-	5/7/2022	5/11/2022
Date	5/7/2022	1400	1130

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Top Soil
Composite / SFAASF-03-SB-0-2			1		* Refer to SFAASF-03-PA boring log for lithology*
			2		
			3		
			4		
			5		
			6		
			7		
			8		
			9		
			10		
			11		
			12		
			13		
			14		
			15		
			16		
			17		
			18		
			19		
			20		
			21		

Logged by: NA

Date: 05/08/2022

Drilling Contractor: Environmental Works

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624041, -106.085784
 Surface Elevation: 6,333.06 ft
 Casing Elevation: 6,332.85 ft
 GW level at time of drilling: 181.00 ft
 GW level at time of sampling: 180.38 ft

Job No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-04	
Sampling Method: Sonic/Continuous Core		Sheet 1 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/28/2022	5/9/2022
Date	4/28/2022	1645	1000

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
Composite / SFAASF-04-SB-0-2	Full recovery unless noted	5.7	1	SM	0-1' silty sand, strong brown (10YR 5/6), loose, slightly moist, trace gravel up to 1/2" diameter, fine to medium grain sand
			2		1'-5', silty sand, very pale brown (10YR 7/4), loose, dry, very fine sands, poorly graded, trace gravel up to 1/2" diameter, caliche like
			3		
			4		
			5		
			6		5'-6', silty sand, very pale brown (10YR 7/4), loose, dry, very fine sands, poorly graded, trace gravel up to 2" diameter, subangular, sand, coarsens downward
		2.5	7	ML	6'-10', sandy silt, yellowish brown (10YR 5/4), loose, dry, very fine to fine sand, trace gravel up to 1" diameter, coarsens downward
			8		
			9		
			10		
		0.7	11	ML	10'-11', silty sand, very pale brown (10YR 7/4), loose, dry, very fine sands, poorly graded, trace gravel up to 1/2" diameter, caliche like
			12		11'-14', sandy silt, light yellowish brown (10YR 6/4), loose, dry, fine to coarse grain sand, coarsens downward, trace gravel downward up to 1" diameter
			13		
Composite / SFAASF-04-SB-13-15		3.3	14	SM	14'-15', clayey silt, light brownish gray (10YR 4/6), medium dense, dry, low plastic
			15		15'-16', sandy silt, light yellowish brown (10YR 6/4), loose, dry, fine to coarse grain sand, coarsens downward, trace gravel downward up to 1" diameter
	No Recovery	1.7	16	SM	16'-18.5', no recovery
			17		
			18		
		1.2	19	SM	18.5'-19.5', silty sand, light brownish gray (10YR 6/2), loose, dry, very fine to coarse grain sand
			20		19.5'-22', sand, brownish yellow (10YR 6/8), loose, dry, medium and coarse grain sand, trace fine sand, fines downward into fine to medium sand, trace coarse
			21	SW	

Logged by: S. Lauricella

Date: 04/28/2022

Drilling Contractor: Environmental Works Inc.,

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624041, -106.085784
 Surface Elevation: 6,333.06 ft
 Casing Elevation: 6,332.85 ft
 GW level at time of drilling: 181.00 ft
 GW level at time of sampling: 180.38 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-04	
Sampling Method: Sonic/Continuous Core		Sheet 2 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/28/2022	5/9/2022
Date	4/28/2022	1645	1000

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		21		
		4.8	22		
			23	SM	22'-26', silty sand, very pale brown (10YR 7/3), loose, dry, very fine to coarse grain sand, trace gravel up to 1/2" - 2" diameter going downward, caliche like, subrounded, subangular
			24		
			25		
			26		
		0.5	27	GM	26'-29', silty gravel, light yellowish brown (10YR 6/4), loose, dry, gravel up to 4" diameter, subrounded, poorly graded, trace fine to coarse grain sand
			28		
		1.7	29		
			30		29'-33', silty gravel, light yellowish brown (10YR 6/4), loose, dry, gravel cobbles up to 5" diameter, subrounded, poorly graded, trace fine to coarse grain sand, becomes more silt than gravel downwards
			31		
		16.4	32		
	23"		33		
		18.7	34	GW	33'-36', well graded gravel, light yellowish brown (10YR 6/4), loose, dry, medium to coarse sand, trace silt, gravel up to 5" diameter, subrounded
			35		
	24"	1.7	36	SW	36'-38.5', sand, yellowish brown (10YR 5/4), loose, slightly moist, fine to coarse grain sand, trace gravel up to 2" diameter, subrounded, subangular
			37		
			38		
		3.4	39	GM	38.5'-39', silty gravel, light yellowish brown (10YR 6/4), loose, dry, gravel up to 4" diameter, subrounded, poorly graded, trace fine to coarse grain sand
			40	SW	39'-41', sand, yellowish brown (10YR 5/4), loose, slightly moist, fine to coarse grain sand, trace gravel up to 2" diameter, subrounded, subangular
			41		becomes more stiff downwards

Logged by: S. Lauricella

Date: 04/28/2022

Drilling Contractor: Environmental Works Inc.,

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624041, -106.085784
 Surface Elevation: 6,333.06 ft
 Casing Elevation: 6,332.85 ft
 GW level at time of drilling: 181.00 ft
 GW level at time of sampling: 180.38 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-04	
Sampling Method: Sonic/Continuous Core		Sheet 3 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/28/2022	5/9/2022
Date	4/28/2022	1645	1000

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		41	SW	
		21.6	42	ML	41'-46', gravely silt, light brownish gray (10YR 6/2), loose, dry, trace medium to coarse grain sand
			43		
		9.1	44		
			45		
			46		
		35.7	47	GM	46'-54', silty gravel, light brownish gray (10YR 6/2), loose, dry, medium to coarse grain sand, gravel up to 3" diameter, trace 1" gravel, subrounded, subangular, well graded
			48		
		35.2	49		
			50		
		32.9	51		
			52		
			53		
		13.6	54		
			55	SW	54'-55.5', sand, dark yellowish brown (10YR 4/6), loose, dry, fine to medium grain sand, poorly graded, trace coarse, trace gravel up to 2" diameter
			56	GM	55.5'-56', silty gravel, light brownish gray (10YR 6/2), loose, dry, medium to coarse
		8.3	57	ML	coarse grain sand, , gravel up to 2" diameter subrounded, rounded, well graded
			58		56'-59', gravely silt, brownish yellow (10YR 6/6), loose, dry, trace medium to coarse grain, gravel up to 3" diameter, well graded
		15.6	59		
			60	GW	59'-66', sandy gravel, yellowish brown (10YR 5/6), loose, dry, fine to coarse grain sand, gravel up to 2" diameter, well graded
			61		

Logged by: S. Lauricella

Date: 4/28/2022-04/29/22

Drilling Contractor: Environmental Works Inc.,

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624041, -106.085784
 Surface Elevation: 6,333.06 ft
 Casing Elevation: 6,332.85 ft
 GW level at time of drilling: 181.00 ft
 GW level at time of sampling: 180.38 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-04	
Sampling Method: Sonic/Continuous Core		Sheet 4 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/28/2022	5/9/2022
Date	4/28/2022	1645	1000

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		61	GW	59'-66', sandy gravel, yellowish brown (10YR 5/6), loose, dry, fine to coarse grain sand, gravel up to 2" diameter, well graded
		10.2	62		
			63		
		5.0	64		
			65		
			66		
		7.1	67	GW	66'-68.5', sandy gravel, yellowish brown (10YR 5/6), loose, dry, fine to coarse grain sand, trace silt, trace gravel up to 3" diameter, well graded
			68		
		27.4	69	SW	68.5'-71', gravely sand, well graded, yellowish brown (10YR 5/6), loose, dry, gravel up to 2" diameter, medium to coarse, trace fine sand
			70		
			71		
		14.4	72	SW	71'-76', sand, dark yellowish brown (10YR 4/6), 75% loose, 25% dense, very fine to coarse grain sand, poorly graded, trace gravel up to 1" diameter, trace silt going downward
			73		
		12.7	74		
			75		
			76		
		1.9	77		76'-78.5', sand, dark yellowish brown (10YR 4/6), loose, trace gravel up to 3" diameter, subangular
			78		
		2.9	79		78.5'-80', sand, dark yellowish brown (10YR 4/6), loose, trace gravel up to 1/2" diameter, rounded
			80		
			81	GW	80'-82', sandy gravel, pale brown (10YR 6/3), loose, dry, fine to coarse grain sand, gravel up to 1" diameter, subrounded, subangular

Logged by: S. Lauricella

Date: 04/29/2022

Drilling Contractor: Environmental Works Inc.,

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624041, -106.085784
 Surface Elevation: 6,333.06 ft
 Casing Elevation: 6,332.85 ft
 GW level at time of drilling: 181.00 ft
 GW level at time of sampling: 180.38 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-04	
Sampling Method: Sonic/Continuous Core		Sheet 5 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/28/2022	5/9/2022
Date	4/28/2022	1645	1000

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		81	GW	
		0.1	82		
			83		82'-86', sandy gravel, pale brown (10YR 6/3), loose, dry, fine to to medium sand, gravel up to 1" diameter, subrounded, subangular, trace coarse
			84		
		12.6	85		
			86		
		10.6	87	SM	86'-91', silty sand, yellowish brown (10YR 5/6), loose, dry, fine to coarse grain sand, trace gravel up to 1" diameter, subrounded, subangular
			88		
		19.5	89		
			90		
			91		
		6.5	92	GM	91'-96', silty gravel, light gray (10YR 7/2), loose, dry, trace medium to coarse grain sand, gravel up to 2"-3" diameter, coarsens into more gravely silt downward
			93		
		20.4	94		
			95		
			96		
		9.7	97	GW	96'-100', sandy gravel, pale brown (10YR 6/3), loose, dry, very fine to coarse grain sand, trace silt, trace gravel up to 2" diameter, subrounded, trace stiff sand pieces
			98		
		48.9	99		
			100		
		23.2	101	GM	100'-102', silty gravel, light gray (10YR 7/2), loose, dry, trace medium to coarse, gravels up to 1" diameter, poorly graded

Logged by: S. Lauricella

Date: 04/29/2022

Drilling Contractor: Environmental Works Inc.,

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624041, -106.085784
 Surface Elevation: 6,333.06 ft
 Casing Elevation: 6,332.85 ft
 GW level at time of drilling: 181.00 ft
 GW level at time of sampling: 180.38 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-04	
Sampling Method: Sonic/Continuous Core		Sheet 6 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/28/2022	5/9/2022
Date	4/28/2022	1645	1000

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted	23.2	101		
			102		
		25.8	103	SM	102'-106', silty sand, poorly graded, yellowish brown (10YR 5/6), 60% loose, 40% stiff, slightly moist, fine grain sand, trace medium grain sand
			104		
		20.5	105		
		4.2	106		
			107		106'-108.5', silty sand, dark yellowish brown (10YR 4/4), loose, slightly moist, fine to medium sand, poorly graded, trace stiff silty sands downward
			108		
		14.3	109	SP	108.5'-110', sand, yellowish brown (10YR 5/6), loose, slightly moist, fine to coarse sand, trace gravel up to 1" diameter
			110		
			111	ML	110'-116', silty sand, brownish yellow (10YR 6/6), 75% loose, 25% medium dense pieces, dry, fine grain sand, trace gravel up to 5" diameter
		19.9	112		has more stiff pieces downward
			113		
		28.3	114		
			115		
			116		
		20.9	117		116'-119', silty sand, brownish yellow (10YR 6/6), 75% loose, 25% medium, dense pieces, dry, fine grain sand, trace gravel up to 1" diameter, rounded
			118		has more stiff pieces downward
		3.5	119		
			120	SM	119'-120', silty sand, dark yellowish brown (10YR 4/6), loose, dry, medium and coarse grain, poorly graded
			121		120'-121', silty sand, brownish yellow (10YR 6/6), 75% loose, 25% medium, dense pieces, dry, fine grain sand, trace gravel up to 1" diameter, rounded

Logged by: S. Lauricella

Date: 04/28/2022

Drilling Contractor: Environmental Works Inc.,

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624041, -106.085784
 Surface Elevation: 6,333.06 ft
 Casing Elevation: 6,332.85 ft
 GW level at time of drilling: 181.00 ft
 GW level at time of sampling: 180.38 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-04	
Sampling Method: Sonic/Continuous Core		Sheet 7 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/28/2022	5/9/2022
Date	4/28/2022	1645	1000

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		121	SM	
		20.3	122		121'-122', silty sand, dark yellowish brown (10YR 4/6), loose, dry, medium and dense pieces, dry, fine grain sand, trace gravel up to 1" diameter, rounded
			123		122'-123.5', silty sand, brown (10YR 4/3), loose to dense pieces, trace medium grain sand, poorly graded
		13.7	124	ML	123.5'-126', clayey silt, yellowish brown (10YR 5/6), low plastic, trace gravel up to 1" diameter, moist, dense, trace medium grain sand
			125		
			126		
		25.8	127		126'-128.5', clayey silt, yellowish brown (10YR 5/6), plastic, dense, moist, trace gravel up to 1" diameter, trace medium grain sand
			128		
		24.4	129	SW	128.5'-133.5', sand, pale brown (10YR 6/3), loose, dry, fine to coarse grain, trace gravel up to 2" diameter
			130		
	16"		131		
		15.6	132		
			133		
		19.9	134	GM	133.5'-134.5', silty gravel, very pale brown (10YR 7/3), loose, dry, coarsens downward to coarse grain sand, trace gravel up to 2" diameter
			135	SM	134.5'-136', silty sand, brown (10YR 4/3), loose to dense pieces, trace medium grain sand, poorly graded
			136		
		186.5	137	SM	136'-138', silty sand, yellowish brown (10YR 5/6), medium dense, fine to medium grain sand, poorly graded
			138		
		124.2	139	CL	138'-141', sandy clay, dark yellowish brown (10YR 4/4), dense moist, medium to coarse grain sand, low plastic
			140		
			141		

Logged by: S.Lauricella

Date: 04/29/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624041, -106.085784
 Surface Elevation: 6,333.06 ft
 Casing Elevation: 6,332.85 ft
 GW level at time of drilling: 181.00 ft
 GW level at time of sampling: 180.38 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-04	
Sampling Method: Sonic/Continuous Core		Sheet 8 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/28/2022	5/9/2022
Date	4/28/2022	1645	1000

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		141	CL	
		6.8	142	SW	141'-144', sand, pale brown (10YR 6/3), loose, dry, fine to coarse grain, trace gravel up to 2" diameter
			143		
		3.4	144		
			145	CL	144'-145', sandy clay, dark yellowish brown (10YR 4/4), dense moist, medium to coarse grain sand, low plastic
			146	GM	145'-145.5', silty gravel, very pale brown (10YR 7/3), loose, dry, coarsens downward to coarse grain sand, trace gravel up to 2" diameter
			147	CL	145.5'-146', sandy clay, dark yellowish brown (10YR 4/4), dense moist, medium to coarse grain sand, low plastic
		14.8	148	ML	146'-152', sandy silt, dark yellowish brown (10YR 4/6), loose to dense, pieces <3" fine to medium sand, trace gravel up to 1", dry
			149		
		5.2	150		
			151		
		1.6	152		
			153	SW	152'-155', sand, well graded, brownish yellow (10YR 4/4), loose, trace silt, dry, medium to coarse grain, trace gravel up to 1" diameter,
		3.5	154		
			155		
			156		155'-156', sand, yellowish brown (10YR 5/6), loose, moist at bottom 2", fine to coarse grain sand, well graded
		2.6	157		156'-158.5', gravely sand, strong brown (7.5YR 5/6), loose, dry, fine to coarse grain, gravel up to 1"-2" diameter, trace silt downward, subrounded, rounded
			158		
		4.4	159	ML	158.5'-161', silt, light gray (10YR 7/2), loose, dry, 60% silt, 40% gravely sands, medium to coarse, gravel up to 4" diameter, subrounded, subangular
			160		
			161		

Logged by: S.Lauricella

Date: 04/29/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624041, -106.085784
 Surface Elevation: 6,333.06 ft
 Casing Elevation: 6,332.85 ft
 GW level at time of drilling: 181.00 ft
 GW level at time of sampling: 180.38 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-04	
Sampling Method: Sonic/Continuous Core		Sheet 9 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/28/2022	5/9/2022
Date	4/28/2022	1645	1000

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		161		
		8.6	162	SW	161'-164', gravely sand, light yellowish brown (10YR 6/4), loose, dry, fine to coarse grain sand, well graded, gravel up to 4" diameter, subrounded, trace silt downward
			163		
		6.5	164		
			165		164'-167', sand, reddish yellow (7.5YR 6/6), loose, dry, fine to coarse grain sand, trace silt, well graded, trace gravel up to 1" diameter
			166		
		5.8	167		
			168	SM	167'-167.5', silty sand, gray (7.5YR 6/1), loose, dry, fine to coarse grain, well graded
			169	CL	167.5'-168.5', sandy clay, yellowish brown (10YR 5/6), stiff, moist, medium sand and fine sand grain, trace coarse grain sand, low plastic
		3.6	170	SW	168.5'-172', sand, yellowish brown (10YR 5/8), loose, dry, very fine to coarse sand, trace gravel up to 1" diameter, subrounded, trace silt
			171		
			172		
			173	CL	172'-175', gravely clay, strong brown (7.5YR 5/6), stiff, dry, medium to coarse grain sand
			174		
			175		
			176	SM	175'-176', silty sand, pinkish gray (7.5YR 7/2), loose, dry, trace coarse grain, fine to medium grain, well graded, trace gravel up to 2" diameter
			177	SW	176'-183.5', sand, well graded, yellowish red (5YR 4/6), loose, dry to moist, loose, fine to coarse grained, wet at 181'
		64.1	178		
			179		
Discrete / SFAASF-04 SB-180		102.6	180		
			181		

Logged by: S.Lauricella/D.Werth

Date: 04/29/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624041, -106.085784
 Surface Elevation: 6,333.06 ft
 Casing Elevation: 6,332.85 ft
 GW level at time of drilling: 181.00 ft
 GW level at time of sampling: 180.38 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. SFAASF-04	
Sampling Method: Sonic/Continuous Core		Sheet 10 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		181	SW	176'-183.5', sand, well graded, yellowish red (5YR 4/6), loose, dry to moist, fine to coarse grained, wet at 181'
		306.9	182		
			183		
		14.6	184	ML	183.5'-184.5', silt, reddish brown (5YR 5/4), loose to medium dense, wet
			185	SW	184.5'-192', sand, well graded, yellowish red (5YR 4/6), loose, dry to moist, with trace small cobbles and wet
		20.6	186		
			187		
		29.3	188		
			189		
		66.7	190		
			191		
		90.3	192		
			193	SM	192'-193', silty sand, yellowish red (5YR 4/6), loose, wet, fine to coarse sand
			194		
			195		
			196		
			197		
			198		TD' = 193'
			199		2" PVC SCH 80 0.010" screen: 171' - 191'
					2" PVC SCH 80 riser: 0 - 191'
					2" PVC SCH 80 sump: 191' - 193'
			200		10/20 silica sand: 169' - 193'
					3/8" bentonite chips hole plug: 163.5' - 169'
			201		grout: <1' - 163.5'

Logged by: D. Werth

Date: 04/30/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.623244, -106.086448
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Direct Push Geoprobe		Boring No. SFAASF-05	
Sampling Method: PVC Sleeve		Sheet 1 of 1	
Drilling			
Water Level		Start	Finish
Time	-		
Date	-	5/4/2022 1315	5/4/2022 1420

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:		
Composite / SFAASF-05-SB-0-2	60"		1	ML	0-10', sandy silt, pink (5YR 7/3), loose, dry, fine sand, trace gravel		
		0.6	2				
			3				
		0.5	4				
			5				
Composite / SFAASF-05-SB-6-8	35"	0.2	6	ML			
			7				
		0.2	8				
	40"		9	ML			
		0.3	10				
			11			SM	10'-12', silty sand, pink (5YR 7/3), loose, dry, fine to coarse sand, trace gravel
		0.4	12				
Composite / SFAASF-05-SB-13-15	30"	0.4	13	SW	12'-15', sand, well graded, pink (5YR 7/3), loose, dry, fine to coarse sand, trace fine gravel		
			14				
			15				
			16				
			17				
			18				
			19				
			20				
			21				

TD' = 15'

Logged by: D. Werth

Date: 05/04/2022

Drilling Contractor: JR Drilling

Driller: Rob Helton



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624835, -106.087693
 Surface Elevation: 6,328.95 ft
 Casing Elevation: 6,328.84 ft
 GW level at time of drilling: 176.31 ft
 GW level at time of sampling: 176.05 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-01	
Sampling Method: Sonic/Continuous Core		Sheet 1 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
Composite / AOI01-01 SB-0-2	Full recovery unless noted	9.6	1	ML	0-5', sandy silt, yellow brown (10YR 5/6), loose, dry, trace gravel up to 5", fine grain sand
			2		
			3		
			4		
			5		
			6		
			7		
			8		
			9		
			10		
			11		
			12		
			Composite / AIO01-01 SB-13-15		
14					
15					
		71.4	16	SP	15'-17.5', sand, brownish yellow (10YR 6/6), loose, dry, fine grain sand, trace silt, poorly graded
			17		
			18		
			19		
			20		
			21		
				SP	20'-22.5', sand, brownish yellow (10YR 6/6), loose, dry, fine sand, poorly graded, trace medium to coarse sand

Logged by: S.Lauricella

Date: 04/25/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624835, -106.087693
 Surface Elevation: 6,328.95 ft
 Casing Elevation: 6,328.84 ft
 GW level at time of drilling: 176.31 ft
 GW level at time of sampling: 176.05 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-01	
Sampling Method: Sonic/Continuous Core		Sheet 2 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		21		
			22		
			23	SW	22.5'-25', sand, pale brown (10YR 6/3), loose, dry, coarsens downward, trace gravel up to 1" diameter, fine to coarse grain sand
		27.8	24		
			25		
			26		25'-27.5', sand, light gray (10YR 7/1), loose, dry, coarsens downward, trace gravel up to 1" diameter, fine to coarse grain sand
			27		
			28		
		21.3	29		27.5'-30', sand, light gray (10YR 7/1), loose, dry, coarsens downward, trace silt and gravel up to 2" diameter, fine to coarse grain sand
			30		
		28.1	31	SP	30'-33', sand, light gray (10YR 7/1), loose, dry, coarsens downward, trace silt and gravel up to 2" diameter, fines downward, fine grain sand
			32		
		27.4	33		
			34	ML	33'-36.5', silt, yellowish brown (10YR 5/6), loose, moist
			35		
			36		
		74.4	37		36.5'-37.5', sandy silt, yellowish brown (10YR 5/6), loose, moist, trace gravel up to 2" diameter, fine grain sand
			38	GW	37.5'-40', gravely sand, light brownish gray (10YR 6/2), loose, dry, trace of fine to , gravel up to 2.5" diameter
		40.3	39		
			40		
			41	GW	40'-42.5', gravely sand, light brownish gray (10YR 6/2), loose, slightly moist, gravel up to 3" diameter, coarse grain sand

Logged by: S.Lauricella

Date: 04/25/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624835, -106.087693
 Surface Elevation: 6,328.95 ft
 Casing Elevation: 6,328.84 ft
 GW level at time of drilling: 176.31 ft
 GW level at time of sampling: 176.05 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-01	
Sampling Method: Sonic/Continuous Core		Sheet 3 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		41	GW	40'-42.5', gravely sand, light brownish gray (10YR 6/2), loose, slightly moist, trace of fine to coarse grain sand, gravel up to 3" diameter
			42		
		83.8	43	GW	42.5'-45', sandy gravel, light yellowish brown (10YR 6/4), loose, dry, fine grain sand, gravel up to 1.5" diameter, trace silt
			44		
			45		
			46	SP	45'-47.5', sand, reddish brown (5YR 4/4), loose, slightly moist, coarse grain sand, trace gravel up to 1" diameter
		90.3	47		
			48		
		33.9	49	CL	48.5'- 50', silty clay, brown (7.5YR 5/3), stiff, moist
			50		
		56.0	51	ML	51'-53', clayey silt, yellowish brown (10YR 5/4), very dense, plastic, moist
			52		
			53		
		114.2	54		
			55		
		133.3	56		
			57	SW	56.5'-57.5', sand, brown (7.5YR 5/4), loose, dry, medium to coarse grain sand, trace gravel up to 1" diameter
			58	GW	57.5'-62', sandy gravel, brown (10YR 4/3), loose, dry, trace cobbles up to 6" diameter, medium to coarse grain sand
			59		
			60		
		171.2	61		

Logged by: S.Lauricella

Date: 04/25/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624835, -106.087693
 Surface Elevation: 6,328.95 ft
 Casing Elevation: 6,328.84 ft
 GW level at time of drilling: 176.31 ft
 GW level at time of sampling: 176.05 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-01	
Sampling Method: Sonic/Continuous Core		Sheet 4 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted	171.2	61	SW	
			62		
		42.5	63	SW	62'-63.5', sandy gravel, yellowish brown (10yr 5/4), mostly sand, loose, dry, trace cobbles up to 6" gravel up to 1" diameter
			64		63.5'-65', sand, yellowish brown (10YR 5/6), medium dense, dry, trace gravel up to 1" diameter, medium to coarse sand
		40.2	65	SM	
			66		65'-67.5', sandy silt, dark yellowish brown (10YR 4/4), medium dense, moist, fine to medium sand, trace coarse grain
		32.8	67	SW	
			68		67.5'-70', well graded sand, dark yellowish brown (10YR 4/4), loose, dry, medium grain sand, trace coarse grain sand
		12.8	69	SW	
			70		
		1.1	71	SW	70'-74.5', sand, dark yellowish brown (10YR 4/4), medium dense, fine grain sand, trace medium, trace silt
			72		
		60.2	73	SW	
			74		
		64.8	75	SP	74.5'-75', sand well graded, loose, dry, trace coarse grain sand, medium grain sand, brown (10YR 5/3),
			76		75'-79', well graded sand, dark yellowish brown (10YR 4/4), loose, dry, fine to coarse grain sand, coarsens downward, trace gravel up to 2" diameter
		77.9	77	GW	
			78		
			79	GW	
			80		79'-82.5', sandy gravel, well graded, dark yellowish brown (10YR 4/4), loose, dry, fine to well graded gravel up to 2" diameter,
			81		

Logged by: S.Lauricella

Date: 04/25/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624835, -106.087693
 Surface Elevation: 6,328.95 ft
 Casing Elevation: 6,328.84 ft
 GW level at time of drilling: 176.31 ft
 GW level at time of sampling: 176.05 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-01	
Sampling Method: Sonic/Continuous Core		Sheet 5 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted	77.9	81	GW	
			82		
		33.5	83	GW	82.5'-85', sandy gravel, well graded, brown (10YR 5/3), loose, dry, fine to well graded gravel up to 2" diameter
			84		
			85		
			86	SP	85'-87.5', poorly graded sand, loose, dry, medium grain sand, trace cobble up to 6" diameter, subangular
		16.7	87	SW	87.5'-89', gravely sand, gray (10YR 6/1), well graded, loose, dry, gravel up to 2" diameter, subrounded
			88		
		12.4	89	SP	
			90		89'-92.5', poorly graded sand, loose, dry, medium grain sand, trace cobble up to 6" diameter, subangular
			91		
			92		
		20.4	93	SW	92.5'-93.5', gravely sand, gray (10YR 6/1), well graded, loose, dry, gravel up to 4" diameter, subrounded
			94		93.5'-95', poorly graded sand, loose, dry, medium grain sand, trace cobble up to, trace gravel up to 2" diameter, subrounded
		36.5	95	SW	
			96		95'-97.5', sand, yellowish brown (10YR 5/4), loose, dry, fine to coarse sand, well graded, trace gravel up to 5" diameter, subangular
			97		
		37.1	98	SW	
			99		97.5'-99', gravely sand, light brownish gray (10YR 6/2), loose, dry, well graded
			100		99'-102.5', sand, yellowish brown (10YR 5/4), loose, dry, fine to coarse sand, well, trace gravel up to 2" diameter, subangular
		38.6	101		

Logged by: S.Lauricella

Date: 04/25/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624835, -106.087693
 Surface Elevation: 6,328.95 ft
 Casing Elevation: 6,328.84 ft
 GW level at time of drilling: 176.31 ft
 GW level at time of sampling: 176.05 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-01	
Sampling Method: Sonic/Continuous Core		Sheet 6 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted	38.6	101	SW	
			102		
		36.2	103	SW	102.5'-105', well graded sand, yellowish brown (10YR 5/4), loose, dry, medium to coarse sand, trace gravel throughout cutting up to 3" diameter, subrounded to subangular
			104		
		47.2	105	SW	
			106		105'-108', gravely sand, light brownish gray (10YR 6/2), loose, dry, well graded
		10.8	107	SW	
			108		
			109	GW	108'-111', sandy gravel, pale brown (10YR 6/3), loose, dry, gravel up to 4" diameter, subrounded, sub angular
			110		
		64.7	111	GW	
			112		111'- 112.5', sand, dark yellowish brown (10YR 4/6), loose, slightly moist, medium to coarse grain sand, trace gravel up to 2" diameter
		66.2	113	SM	112.5'-115', silty sand, dark yellowish brown (10YR 4/6), dense, moist to wet downward, fine grain sand, trace coarse sand grain, minor trace clay, low plasticity
			114		
			115	ML	
			116		115'-120', silt, dark yellowish brown (10YR 4/6), moist, loose, trace fine sand
		20.7	117	ML	
			118		
		81.8	119	ML	
			120		
		22.8	121	GW	120'-124', sandy gravel, yellowish brown (10YR 5/4), loose, dry, one cobble up to 7" diameter, subrounded and subangular

Logged by: S.Lauricella

Date: 04/25/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624835, -106.087693
 Surface Elevation: 6,328.95 ft
 Casing Elevation: 6,328.84 ft
 GW level at time of drilling: 176.31 ft
 GW level at time of sampling: 176.05 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-01	
Sampling Method: Sonic/Continuous Core		Sheet 7 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground	
	Full recovery unless noted	22.8	121	GW	120'-124', sandy gravel, yellowish brown (10YR 5/4), loose, dry, one cobble up to 7" diameter, subrounded and subangular	
			122			
	23.5	123				
		124				
			125	SC	124'-125', Clayey sand, brown (10YR 4/3), medium dense, moist, fine to medium grain sand	
		19.2	126	GW	125'-130', sandy gravel, poorly graded, light yellowish brown (10YR 6/4), loose, dry, fine to coarse grain sand, gravel up to 3" diameter	
			127			
			128			
			129			
		7.7	130			
	16"	9.5	131	SW	130'-132.5', sand, dark yellowish brown (10YR 4/4), loose, dry, medium to coarse grain sand, trace gravel up to 1" diameter	
			132			
		10.8	133		132.5'-135', sand, dark yellowish brown (10YR 4/4), loose, dry, medium to fine grain, trace gravel up to 3" diameter	
			134			
			135			
		21.2	136	CL	135'-139', clay, brown (7.5YR 5/4), soft, slightly moist, low plasticity, trace silt, fine to medium grain sand throughout	
			137			
		71.1	138			
			139			
			140	SW	139'-142.5', sand, strong brown (7.5YR 5/6), loose, dry, medium to coarse grain sand, trace gravel up to 1.5" diameter	
		2.8	141			

Logged by: S.Lauricella

Date: 04/25/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624835, -106.087693
 Surface Elevation: 6,328.95 ft
 Casing Elevation: 6,328.84 ft
 GW level at time of drilling: 176.31 ft
 GW level at time of sampling: 176.05 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-01	
Sampling Method: Sonic/Continuous Core		Sheet 8 of 10	
		Drilling	
Water Level		Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted	2.8	141	SW	139'-142.5', sand, strong brown (7.5YR 5/6), loose, dry, medium to coarse grain sand, trace gravel up to 1.5" diameter
			142		
		6.8	143	SW	142.5'-145', sand, reddish yellow (5YR 6/6), loose, dry, medium to coarse grain sand, trace gravel up to 1" diameter, fines downward into slightly moist
			144		
			145		
		9.7	146	SW	145'-147.5', sand, reddish brown (7.5YR 5/6), loose, dry, medium to coarse grain, trace gravel up to 3" diameter, fines downward into slightly moist
			147		
			148		
		11.1	149	SW	147.5'-150', sand, strong brown (7.5YR 5/6), slightly dense, dry, medium to coarse sand, trace gravel up to 2" diameter, subrounded
			150		
			151		
		13.1	152	SW	150'-152.5', sand, strong brown (7.5YR 5/6), slightly dense, dry, medium to coarse sand, fines downward, trace gravel up to 2" diameter, subrounded
			153		
			154		
		4.9	155	SW	152.5'-155', sand, strong brown (7.5YR 5/6), slightly dense, dry, medium to coarse sand, trace gravel up to 2" diameter, subrounded
			156		
			157		
		241.5	158	ML	155'-157', sand, yellowish brown (10YR 5/6), loose, dry, fine to coarse grain sand, coarsens into gravel downward, gravel up to 1.5" diameter
			159		
			160		
		5.5	161	SW	157'-160', sandy silt, light brownish gray (10YR 6/2), loose, dry, fine grain sand, trace medium to coarse, trace gravel up to 2" diameter, subrounded, subangular
			161		
		19.7	161	SW	160'-161.5', sand, light yellowish brown (10YR 6/4), loose, dry, fine to coarse throughout cutting, trace gravel up to 1" diameter, subangular
			161		

Logged by: S.Lauricella

Date: 4/25/2022-4/26/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624835, -106.087693
 Surface Elevation: 6,328.95 ft
 Casing Elevation: 6,328.84 ft
 GW level at time of drilling: 176.31 ft
 GW level at time of sampling: 176.05 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-01	
Sampling Method: Sonic/Continuous Core		Sheet 9 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted	19.7	161	SW	160'-161.5', sand, light yellowish brown (10YR 6/4), loose, dry, fine to coarse throughout cutting, trace gravel up to 1" diameter, subangular
			162	SM	161.5'-165', sandy silt, light brownish gray (10YR 6/2), loose, dry, fine grain sand, becomes more silty downward, trace gravel up to 3" diameter, subrounded subangular
		4.5	163		
			164		
			165		
			166	SW	165'-166', sand, reddish yellow (5YR 6/6), loose, dry, medium to coarse grain sand, trace fine grain
		46.4	167	SC	166'-167.5', clayey sand, reddish brown (5YR 4/6), dense, stiff, medium to coarse grain sand, trace silt, well graded
			168	SW	167.5'-175', sand, reddish yellow (7.5YR 6/6), loose, dry, fine to coarse grain, trace silt, well graded, trace gravel up to 2" diameter, subangular
		51.6	169		
			170		
			171		
		59.5	172		
			173		
			174		
		80.4	175		
			176	SC	175'-176', clayey sand, reddish brown (5YR 4/6), dense, stiff, trace gravel up to 1" diameter, subrounded, medium to coarse grain sand, trace silt, well graded
			177	SP	176'-179', sand, light yellowish brown (10YR 6/4), loose, dry, fine to coarse throughout cutting, trace gravel up to 1" diameter, subangular
		14.8	178		
			179		
			180	SW	179'-180', gravley sand, reddish yellow (7.5YR 6/6), loose, dry, fine to coarse grain sand, well graded, trace silt, gravel up to 3" diameter, subrounded
Discrete / AOI01-01-181		51.2	181	SW	180'-181', sand, brown (7.5YR 4/4), loose, dry, medium to coarse, trace fine grain, trace gravel up to 1" diameter

Logged by: S.Lauricella

Date: 04/26/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624835, -106.087693
 Surface Elevation: 6,328.95 ft
 Casing Elevation: 6,328.84 ft
 GW level at time of drilling: 176.31 ft
 GW level at time of sampling: 176.05 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-01	
Sampling Method: Sonic/Continuous Core		Sheet 10 of 10	
Drilling			
Water Level	-	Start	Finish
Time	-	4/25/2022	5/9/2022
Date	4/25/2022	850	1647

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted	51.2	181	SW	180'-181', sand, brown (7.5YR 4/4), loose, dry, medium to coarse, trace fine grain, trace gravel up to 1" diameter
			182	SW	181'-182', gravley sand, reddish yellow (7.5YR 6/6), loose, dry, fine to coarse grain sand, well graded, trace silt, gravel up to 3" diameter, subrounded
		1.9	183	SW	182'-186', sand, yellowish brown (10YR 5/6), loose, wet, fine to coarse grain throughout, trace gravel up to 4" diameter, subround, subangular going downward
			184		
			185		
		2.7	186		
			187	SC	186'-189', clayey sand, dark yellowish brown (10YR 3/6), wet, stiff, fine to coarse grain sand, coarsens downward, trace gravel up to 2.5" diameter, plastic
		11.5	188		
			189		
		10.2	190	SW	189'-192', well graded gravely sand, brown (10YR 6/6), loose, dry, fine to medium grain size throughout, gravel up to 1"-4' in diameter size increases in size going downward, sunangular to angular, trace silt
			191		
			192		
			193		
			194		
			195		
			196		
			197		
			198		
			199		TD' = 192'
			200		2" PVC SCH 80 0.010" screen: 170' - 190'
					2" PVC SCH 80 riser: 0 - 170'
					2" PVC SCH 80 sump: 190'- 192'
					10/20 silica sand: 168' - 192'
					3/8" bentonite chips hole plug: 162' - 168'
			201		grout: <1' - 162'

Logged by: S.Lauricella

Date: 04/26/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624167, -106.088661
 Surface Elevation: 6,325.13 ft
 Casing Elevation: 6,324.96 ft
 GW level at time of drilling: 110.80 ft
 GW level at time of sampling: 110.72 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-02	
Sampling Method: Sonic/Continuous Core		Sheet 1 of 7	
Drilling			
Water Level	-	Start	Finish
Time	-	4/27/2022	5/9/2022
Date	4/27/2022	1145	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
Composite / AOI01-02 SB-0-2	Full recovery unless noted	25.2	1	SP	0-5', sand, dark brown (10YR 3/3), loose, dry, fine grain sand, trace coarse, trace gravel up to 1" diameter, poorly graded
			2		
			3		
			4		
			5		
	17"	31.6	6	SM	5'-7.5', silty sand, dark yellowish brown (10YR 4/6), loose, dry, fine grain sand, trace gravel up to 1" diameter, subangular
			7		
			8		
			9		
			10		
		16.6	11	SC	10'-13', clayey sand, dark yellowish brown (10YR4/6), stiff, dense, plastic, trace fine grain sand
			12		
			13		
Composite / AOI01-02 13-15			14	SP	13'-15', sand, dark yellowish brown (10YR4/6), poorly graded, loose, fine to medium grain
			15		
	12"	16.7	16	SC	15'-17.5', clayey sand, dark yellowish brown (10YR4/6), stiff, dense, plastic, trace fine grain sand
			17		
			18		
			19		
		21.3	18	SW	17.5'-18', sand, yellowish brown (10YR 5/4), loose, dry, fine to coarse grain coarsens downward into trace gravel up to 1.5" diameter, subrounded, subangular, well graded
			19	SW	18'-25', gravelly sand, light yellowish brown (10YR 6/4), loose, dry, fine to gravel grain, gravel up to 2" diameter, well graded
		7.2	20		
			21		

Logged by: S. Lauricella

Date: 04/27/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624167, -106.088661
 Surface Elevation: 6,325.13 ft
 Casing Elevation: 6,324.96 ft
 GW level at time of drilling: 110.80 ft
 GW level at time of sampling: 110.72 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-02	
Sampling Method: Sonic/Continuous Core		Sheet 2 of 7	
Drilling			
Water Level	-	Start	Finish
Time	-	4/27/2022	5/9/2022
Date	4/27/2022	1145	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		21	SW	
			22		
		54.7	23		
			24		
			25		
	17"	15.2	26	GW	25'-30', sandy gravel, poorly graded, dark yellowish brown (10YR 4/6), loose, dry, fine to coarse grain sand, gravel up to 1" diameter
			27		
		29.6	28		
			29		
		8.4	30		
			31	SW	30'-31.5', gravelly sand, well graded, light brown (7.5YR 6/4), loose, dry, silt to gravel up to 1.5" diameter, well graded
			32	GC	31.5'-32.5', clayey gravel, brown (7.5YR 4/4), soft, moist, plastic, trace gravel up to 5" diameter, subrounded
		36.2	33	SW	32.5'-35.5', gravelly sand, well graded, light brown (7.5YR 6/4), loose, dry, silt to gravel up to 1.5" diameter, well graded
	13"		34		
			35		
		12.6	36	GC	35.5'-36', clayey gravel, brown (7.5YR 4/4), soft, moist, plastic, trace gravel up to 5" diameter, subrounded
			37	GW	36'-42', gravelly sand, well graded, light yellowish brown (10YR 5/4), loose, dry, silt to gravel up to 4" diameter, subrounded, subangular
		43.3	38		
			39		
	11.4"	25.6	40		
			41		

Logged by: S.Lauricella Date: 04/27/2022
 Drilling Contractor: Environmental Works Inc. Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624167, -106.088661
 Surface Elevation: 6,325.13 ft
 Casing Elevation: 6,324.96 ft
 GW level at time of drilling: 110.80 ft
 GW level at time of sampling: 110.72 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-02	
Sampling Method: Sonic/Continuous Core		Sheet 3 of 7	
Drilling			
Water Level	-	Start	Finish
Time	-	4/27/2022	5/9/2022
Date	4/27/2022	1145	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted		41	SW	36'-42', gravely sand, well graded, light yellowish brown (10YR 5/4), loose, dry, silt to gravel up to 4" diameter, subrounded, subangular
			42		
		36.9	43	CL	42'-42.5', silty clay, brown (10YR 4/4), stiff, moist, plastic, trace coarse grain sand
			44	GW	42.5'-46', sandy gravel, yellowish brown (10YR 5/4), loose, dry, medium to coarse grain sand, gravel up to 5" diameter, poorly graded
			45		
			46		
		28.2	47		46'-48.5', sandy gravel, yellowish brown (10YR 5/4), loose, dry, fine to coarse grain sand, gravel up to 2" diameter, subrounded, rounded,
			48		
		25.6	49	SC	48.5'-49', clayey sand, brown (10YR 5/3), stiff, moist, plastic, fine grain to medium grain
			50	SW	49'-53.5', gravely sand, well graded, strong brown (7.5YR 5/6), loose, dry, medium to coarse grain, gravel up to 2" diameter, subrounded,
		5.7	51		
			52		
		42.4	53		
			54	SW	53.5'-54.5', sand, strong brown (10YR 5/6), loose, dry, medium to coarse grain sand, trace gravel up to 2" diameter, rounded, subrounded
			55	SW	54.5'-56', gravely sand, well graded, strong brown (7.5YR 5/6), loose, dry, medium to coarse grain, gravel up to 2" diameter, subrounded,
	26"		56		
		34.5	57	GW	56'-59', sandy gravel, dark brown (7.5YR 3/4), loose, dry, medium to coarse grain sand, gravel up to 2" diameter, subrounded, subangular, well graded
			58		
		70.2	59		
			60	SM	59'-61', silty sand, dark yellowish brown (10YR 4/2), medium dense, trace coarse grain sand, fine grain sand
			61		

Logged by: S.Lauricella

Date: 04/27/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624167, -106.088661
 Surface Elevation: 6,325.13 ft
 Casing Elevation: 6,324.96 ft
 GW level at time of drilling: 110.80 ft
 GW level at time of sampling: 110.72 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-02	
Sampling Method: Sonic/Continuous Core		Sheet 4 of 7	
Drilling			
Water Level	-	Start	Finish
Time	-	4/27/2022	5/9/2022
Date	4/27/2022	1145	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted	14.7	61	ML	
			62		61'-64', sandy silt, brown (10YR 4/3), medium dense, dry, fine to medium grain, trace gravel up to 1" diameter
			63		
		32.5	64	CL	
			65		64'-66', sand clay, brown (10YR 5/3), soft, moist, low plasticity, trace medium and coarse grain sand
		6.9	67	SW	
			68		66'-69', sand, yellowish brown (10YR 5/4), loose, moist, fine to medium coarse grain sand, trace gravel up to 2" diameter, rounded, subrounded, fines downward into fine grain sand, trace clay throughout, soft, low plasticity
			69		
		8.0	70	CL	
			71		69'-72', sandy clay, brown (10YR 4/3), medium stiff, moist, fine to coarse grain sand, trace gravel up to 1" diameter
			72		
		16.1	73	GW	
			74		72'-73', sandy gravel, dark yellowish brown (10YR 4/4), loose, dry, fine to gravel grain, gravel up to 2" diameter, subrounded, subangular
		8.8	74	CL	
			75		73'-74', sandy clay, brown (10YR 4/3), medium stiff, moist, fine to coarse grain sand, trace gravel up to 1" diameter
			76		74'-76', sandy gravel, dark yellowish brown (10YR 4/4), loose, dry, fine to gravel grain, gravel up to 2" diameter, subrounded, subangular
		15.1	77	SW	
			78		76'-78.5', sand, yellowish brown (10YR 5/4), loose, dry to moist, fine to coarse grain sand, trace gravel up to 2" diameter
		18.9	79	GW	
			80		78.5'-81', sandy gravel, yellowish brown (10YR 5/4), loose, dry, medium to coarse grain, gravel up to 3" diameter, subangular, angular
			81		

Logged by: S.Lauricella Date: 04/27/2022
 Drilling Contractor: Environmental Works Inc. Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624167, -106.088661
 Surface Elevation: 6,325.13 ft
 Casing Elevation: 6,324.96 ft
 GW level at time of drilling: 110.80 ft
 GW level at time of sampling: 110.72 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-02	
Sampling Method: Sonic/Continuous Core		Sheet 5 of 7	
Drilling			
Water Level	-	Start	Finish
Time	-	4/27/2022	5/9/2022
Date	4/27/2022	1145	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted	2.0	81	GW	78.5'-81', sandy gravel, yellowish brown (10YR 5/4), loose, dry, medium to coarse grain, gravel up to 3" diameter, subangular, angular
			82	SW	81'-83.5', gravely sand, light gray (10YR 7/2), loose, very fine to coarse grain sand, trace silt, gravel up to 3" diameter, subrounded, subangular, poorly graded
			83		
		5.3	84	GW	83.5'-85.5', sandy gravel, yellowish brown (10YR 5/4), loose, dry, medium to coarse grain, gravel up to 3" diameter, subangular, angular
	85				
	86		ML	85.5'-86', sandy silt, dark yellowish brown (10YR 4/4), medium dense, moist, fine grain sand, trace coarse grain sand	
		4.6	87	SW	86'-88', sand, dark yellowish brown (10YR 3/6), moist, medium dense, well graded, fine to coarse grain throughout, trace gravel up to 1.5" diameter, subrounded, subangular
	88				
	89				88'-92', sand, dark yellowish brown (10YR 3/6), moist, loose, dry, trace silt between 88'-88.5', well graded, fine to coarse grain throughout, trace gravel up to 4" diameter, subangular to angular
		17.6	90		
	91				
	92				
		10.4	93	GW	92'-93', sand, dark yellowish brown (10YR 3/6), moist, medium dense, well graded, fine to coarse grain throughout, trace gravel up to 1.5" diameter, subrounded, subangular
	94				93'-96', sandy gravel, yellowish brown (10YR 5/6), loose, dry, trace silt, gravel up to 4" diameter, subrounded, angular, fine to coarse grain sand throughout
	95				
		29.5	96		
	97				96'-98.5', sandy gravel, yellowish brown (10YR 5/6), loose, dry, trace silt, gravel up to 3" diameter, rounded, subangular, fine to coarse grain sand throughout
	98				
		23.0	99	CL	98.5'-99.5', sandy clay, yellowish brown (10YR 5/6), moist, dense, fine to coarse grain sand
	100		SW	99.5'-103', sand, yellowish brown (10YR 5/6), loose, dry, medium to coarse grain sand, trace silt, trace gravel up to 3" subrounded, rounded, well graded	
	101				

Logged by: S.Lauricella Date: 04/27/2022
 Drilling Contractor: Environmental Works Inc. Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624167, -106.088661
 Surface Elevation: 6,325.13 ft
 Casing Elevation: 6,324.96 ft
 GW level at time of drilling: 110.80 ft
 GW level at time of sampling: 110.72 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-02	
Sampling Method: Sonic/Continuous Core		Sheet 6 of 7	
Drilling			
Water Level	-	Start	Finish
Time	-	4/27/2022	5/9/2022
Date	4/27/2022	1145	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
Full recovery unless noted	9.3		101	SW	99.5'-103', sand, yellowish brown (10YR 5/6), loose, dry, medium to coarse grain sand, trace fine silt, trace gravel up to 3" subrounded, rounded, well graded
			102		
			103		
		53.8	104	GW	103'-106', sandy gravel, brownish yellow (10YR 6/6), loose, dry, fine to coarse grain gravel, gravel up to 2"-3" diameter, subrounded, subangular, gravel reduces
			105		
			106		
		3.8	107		106'-109', sandy gravel, yellowish brown (10YR 5/6), loose, dry, very fine to gravel, well graded, gravel fines downward, up to 3"-1" diameter, subrounded
			108		
			109		
		36.1	110	CL	109'-115', clay, dark yellowish brown (10YR 4/6), stiff, moist, plastic to low plasticity downward, trace medium and coarse grain sand, trace gravel up to 1" diameter subrounded, trace sand becomes less sand to trace silt going downward
			111		
			112		
Composite / AOI01-02 113-115			113		
			114		
			115		
		10.7	116	ML	115'-116', silt, yellowish brown (10YR 4/6), medium dense, slightly moist, trace medium to coarse grain sand, no gravel
			117		
			118		
		22.5	119	CL	116'-117', clay, dark yellowish brown (10YR 4/6), soft, moist, plastic, trace coarse grain sand
			120		
			121		
		1.6	121		
			122		

Logged by: S.Lauricella Date: 04/27/2022
 Drilling Contractor: Environmental Works Inc. Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624167, -106.088661
 Surface Elevation: 6,325.13 ft
 Casing Elevation: 6,324.96 ft
 GW level at time of drilling: 110.80 ft
 GW level at time of sampling: 110.72 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-02	
Sampling Method: Sonic/Continuous Core		Sheet 7 of 7	
		Drilling	
Water Level	-	Start	Finish
Time	-	4/27/2022	5/9/2022
Date	4/27/2022	1145	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground
	Full recovery unless noted	1.6	121	CL	117'-122', clay, dark yellowish brown (10YR 4/6), very stiff, moist, plastic, trace coarse grain sand
			122		*upper boring from 122'-126' was wet*
			123	GW	122'-126', sandy gravel, very pale brown (10YR 7/3), loose, dry, very fine to coarse grain, trace silt, one cobble up to 6" diameter, subrounded
			124		*122'-126' sloughed in by next day up to 122**
			125		
			126		
			127		
			128		
			129		
			130		
			131		
			132		
			133		
			134		
			135		
			136		
			137		
			138		TD' = 119'
			139		2" PVC SCH 80 0.010" screen: 107' - 117'
			140		2" PVC SCH 80 riser: 0 - 107'
			141		2" PVC SCH 80 sump: 117'- 119'
					slough: 122' - 126'
					tr30 bentonite pallets: 119' - 122'
					10/20 silica sand: 105' - 119'
					3/8" bentonite chips hole plug: 100' - 105'
					grout: <1' - 100'

Logged by: S.Lauricella Date: 04/28/2022
 Drilling Contractor: Environmental Works Inc. Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.6236143, -106.089117
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Direct Push - Geoprobe		Boring No. AOI01-03	
Sampling Method: PVC Sleeve		Sheet 1 of 1	
		Drilling	
Water Level		Start	Finish
Time	-		
Date	-	5/4/2022 1445	5/4/2022 1545

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
Composite / AOI01-03 SB-0-2	60"		1	ML	0-6.5', sandy silt, pink (5YR 7/3), loose, dry, fine sand
		0.3	2		
			3		
		0.3	4		
			5		
Composite / AOI01-03 SB-6-8	32"	0.4	6	SW	6.5'-15', sand, well graded, pink (5YR 7/3), loose, dry, fint to coarse sand, trace fine grained
			7		
		0.3	8		
	45"		9		
		0.1	10		
			11		
		0.2	12		
Composite / AOI01-03 SB-13-15	32"		13		
		0.2	14		
			15		
			16		
			17		
			18		
			19		
			20		
			21		
					TD' = 15'

Logged by: D. Werth

Date: 05/04/2020

Drilling Contractor: JR Drilling

Driller: Rob Helton



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.623216, -106.088671
 Surface Elevation: 6,323.35 ft
 Casing Elevation: 6,323.20 ft
 GW level at time of drilling: 110.57 ft
 GW level at time of sampling: 109.88 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-04	
Sampling Method: Sonic/Continuous Core		Sheet 1 of 6	
Drilling			
Water Level	-	Start	Finish
Time	-	5/3/2022	5/9/2022
Date	5/3/2022	1220	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground, 1" gravel
Composite / AOI01-04 SB-0-2	Full recovery unless noted		1	ML	0-2', slough
		9.6	2		
		1.3	3		2'-4', sandy silt, yellowish brown (1YR 5/6), loose, dry, very fine sand to fine sand, trace coarse and medium grain sand, coarsens downward into trace gravel up to 1" diameter, subrounded, subangular
			4		
		4.3	5		4'-6', sandy silt, brown (10YR 5/3), loose, dry, minor trace of clay, very fine to fine sand, trace coarse grain sand, trace gravel up to 1" diameter, subangular
			6		
		0.3	7		6'-8.5', sandy silt, brown (10YR 5/3), loose, dry, minor trace of clay, very fine to fine, less trace of coarse grain sand, trace gravel up to 1.5" diameter, subround
			8		
		5.5	9		8.5'-9.5', sandy silt, brown (7.5YR 4/4), loose, very fine to fine grain sand, dry
			10		SW
			11		
		9.5	12		
			13		
Composite / AOI01-04 SB-13-15			14		13'-15', well graded sand, strong brown (7.5YR 4/6), loose, dry, very fine to medium grain, trace gravel, trace coarse grain sand, trace silt
		7.7	15		
			16	SM	15'-16', silty sand, well graded, trace gravel up to 1.5" diameter, strong brown (7.5YR 4/6), loose, dry
		2.4	17	SW	16'-18.5', sand, brown (7.5YR 4/4), well graded, fine to coarse grain sand, fines downward, less coarse, one cobble up to 3" diameter, subrounded, loose to slightly moist
			18		
			19		
		5.2	20		18.5'-23.5', sand, brown (7.5YR 4/4), well graded, fine to coarse grain sand, slightly moist, fines downward to minor, one cobble up to 3" diameter, subrounded
			21		

Logged by: S. Lauricella

Date: 05/03/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.623216, -106.088671
 Surface Elevation: 6,323.35 ft
 Casing Elevation: 6,323.20 ft
 GW level at time of drilling: 110.57 ft
 GW level at time of sampling: 109.88 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-04	
Sampling Method: Sonic/Continuous Core		Sheet 2 of 6	
Drilling			
Water Level	-	Start	Finish
Time	-	5/3/2022	5/9/2022
Date	5/3/2022	1220	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground, 1" gravel	
	Full recovery unless noted	0.8	21	SW		
			22			
			23			
	12"	3.4	24	SW	23.5'-26', sand, brown (7.5YR 4/4), well graded, fine to coarse grain sand, trace gravel is subrounded, rounded, fines downward into very fine sand, trace minor silt,	
			25			
			26			
			27		26'-27.5', no recovery	
			28		ML	27.5'-28.5', silt, gray (10YR 6/1), loose, dry, trace sand medium to coarse, one gravel up to 2.5" diameter, subangular
	5.8		29	SW	28.5'-31', gravely sand, pale brown (10YR 6/3), loose, dry, very fine to coarse grain, well graded, trace cobbles up to 3"-4" diameter, trace silt, subrounded, subangular	
			30			
			31			
	6.9		32	SW	31'-35', gravely sand, well graded, loose, dry, very fine to medium grain, coarse grain is minor, one cobble is 3" minor, trace silt	
			33			
			34			
			35			
	2.9		36	GW	35'-36', gravely sand, pale brown (10YR 6/3), loose, dry, very fine to coarse grain, well graded, trace cobbles up to 3"-4" diameter, trace silt, subrounded,	
			37		ML	36'-37.5', silt, gray (10YR 5/1), loose, dry, trace coarse grain sand, trace gravel up to 1.5" diameter, subangular
	1.8		38	SW	37.5'-38', sand, yellowish brown (10YR 5/6), loose, dry, trace of medium dense, slightly moist, minor traces of clay, non plastic	
			39		SW	38'-41' gravely sand, yellowish brown (10YR 5/6), loose to medium dense, dry, coarse to gravel grains, trace fine to medium grain, gravel is up to 1"-3" diameter upward, trace cobbles up to 4"-5" diameter, subangular, angular downward
			40			
			41			

Logged by: S. Lauricella

Date: 05/03/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.623216, -106.088671
 Surface Elevation: 6,323.35 ft
 Casing Elevation: 6,323.20 ft
 GW level at time of drilling: 110.57 ft
 GW level at time of sampling: 109.88 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-04	
Sampling Method: Sonic/Continuous Core		Sheet 3 of 6	
Drilling			
Water Level	-	Start	Finish
Time	-	5/3/2022	5/9/2022
Date	5/3/2022	1220	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground, 1" gravel
	Full recovery unless noted	3.6	41		
			42	GC	41'-41.5', clayey gravel, dark yellowish brown (10YR 4/6), medium dense, slightly moist, low plasticity, gravel is 1.5"-4" diameter, trace medium to coarse grain
			43		41.5'-46', sand, brown (7.5YR 5/4), medium dense to loose, dry, fine to coarse grain sand, trace clayey silt, stiff, trace gravel up to 1.5" diameter, dimension increases downward
		2.4	44		
			45		
			46		
		15.2	47		46'-47.5', sand, reddish yellow (7.5YR 6/6), loose, dry, fine to coarse grain sand, well graded, trace gravel up to 2", trace silt
			48	SM	47.5'-48.5', silty sand, very fine to medium grain, well graded, yellowish brown (10YR 5/4), loose, dry, trace gravel up to 1" diameter, subangular, angular
			49	SW	48.5'-51', sand, yellowish brown (10YR 5/6), loose, dry, very fine to coarse grain, well graded, trace gravel up to 3" diameter, subrounded, subangular, trace silt, loose, with minor dense silty sand throughout
		29.4	50		
			51		
			52	SM	51'-56', silty sand, yellowish brown (10YR5/6), 50% loose, 50% dense, well graded, fine to medium grain sand, trace coarse grain, trace gravel up to 1" diameter, one cobble 3.5" diameter, subangular, trace clay throughout
		3.7	53		
			54		
			55		
		2.9	56		
			57	ML	56'-61', gravelly silt, light gray (10YR 7/2), loose, dry, slightly moist bottom 4", well graded, trace very fine to medium sand, gravel up to 1"-2" diameter, subrounded, subangular, trace coarse grain sand, trace silty clay, stiff to medium stiff, non plastic
			58		
		21.8	59		
			60		
			61		

Logged by: S.Lauricella

Date: 05/03/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.623216, -106.088671
 Surface Elevation: 6,323.35 ft
 Casing Elevation: 6,323.20 ft
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 GW level at time of sampling: 109.88 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-04	
Sampling Method: Sonic/Continuous Core		Sheet 4 of 6	
Drilling			
Water Level	-	Start	Finish
Time	-	5/3/2022	5/9/2022
Date	5/3/2022	1220	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground, 1" gravel
	Full recovery unless noted	14.4	61	ML	
			62		61'-63.5', clayey silt, dark yellowish brown (10YR 4/6), stiff, moist, low plasticity, minor coarse sand and gravel, gravel up to 1/2" diameter, subrounded, subangular
		1.8	63		
			64	SW	63.5'-64.5', sand, brown (7.5YR 5/4), loose, slightly moist, well graded, fine to coarse grain sand, trace gravel up to 1" diameter
		29.9	65	ML	64.5'-65.5', clayey silt, dark yellowish brown (10YR 4/6), stiff, plastic, medium dense, gravel traces up to 2" diameter, moist, low plasticity, minor coarse sand and
			66	SW	gravel, gravel up to 1/2", subrounded, subangular
		8.4	67	SC	65.5'-66', sand, brown (7.5YR 5/4), loose, slightly moist, well graded, fine to coarse grain sand, trace gravel up to 1" diameter
			68		66'-68.5', clayey sand, dark yellowish brown (10YR 4/6), stiff, medium dense, moist, trace stiff, very fine to fine sand, minor trace coarse grain, low plasticity, trace silt
		2.7	69	CL	68.5'-71.5', sandy clay, dark yellowish brown (10YR 4/6), stiff to medium stiff
			70		moist, fine to medium sand grain, trace coarse, minor trace gravel up to 1" diameter, subrounded, rounded, trace silt
		2.4	71		
			72	SW	71.5'-73.5', sand, yellowish brown (10YR 5/6), loose to medium dense, moist, fine to coarse grain sand, trace silty clay, non plastic, well graded
		0.3	73		
			74	ML	73.5'-75.5', silty clay, dark yellowish brown (10YR 4/6), soft, moist to wet, low plastic to non plasticity, minor coarse grain sand and very fine sand
		13.5	75		
			76	SW	75.5'-76', sand, yellowish brown (10YR 5/6), loose to medium dense, moist, fine to coarse grain sand, trace silty clay, non plastic, well graded
		11.4	77	CL	76'-78.5', sandy clay, dark yellowish brown (10YR 4/6), medium dense, moist fine to medium sand grain, trace coarse, minor trace gravel up to 1" diameter, subrounded, rounded, trace silt
			78		
			79	GW	78.5'-81', sandy gravel, well graded, loose, slightly moist, trace silty clay, medium dense, slightly moist, meium to coarse grain sand, trace fine grain, gravel up to 3" diameter, dark yellowish brown (10YR 4/6)
			80		
			81		

Logged by: S.Lauricella

Date: 05/03/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.623216, -106.088671
 Surface Elevation: 6,323.35 ft
 Casing Elevation: 6,323.20 ft
 GW level at time of drilling: 110.57 ft
 GW level at time of sampling: 109.88 ft

Job No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-04	
Sampling Method: Sonic/Continuous Core		Sheet 5 of 6	
Drilling			
Water Level	-	Start	Finish
Time	-	5/3/2022	5/9/2022
Date	5/3/2022	1220	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground, 1" gravel
	Full recovery unless noted	57.4	81	GW	
			82	SW	81'-86', gravely sand, brownish yellow (10YR 6/6), well graded, fine to coarse grain sand, loose, dry to slightly moist, minor trace of very fine sand, minor silty clay, non plastic, moist, stiff, two cobbles up to 3"-4" diameter, subangular, angular
			83		
		7.7	84		
			85		
			86		
		21.5	87		86'-88', gravely sand, brownish yellow (10YR 6/6), well graded, fine to coarse grain, dry to slightly moist, minor trace of very fine sand, minor silty clay, non plastic, moist, stiff, two cobbles up to 3"-4" diameter, subangular, angular
			88		
		75.5	89	GW	88'-91', sandy gravel, yellowish brown (10YR 5/6), loose, dry to slightly moist, fine to coarse grain sand, 2-3 cobbles 3"-4.5" diameter, subangular, subrounded, minor silt, fines downward into more sand than gravel, medium dense to dense, sandy silt downward, well graded
			90		
		83.4	91		
			92		91'-96', sandy gravel, yellowish brown (10YR 5/6), loose, slightly moist, fine to medium well graded, trace coarse grain sand, gravel up to 2" diameter, subangular, angular, well graded
			93		
		0.6	94		
			95		
			96		
		3.8	97		96'-100', sandy gravel, yellowish brown (10YR 5/6), loose, slightly moist, fine to medium well graded, trace coarse grain sand, gravel up to 2" diameter, one cobble up to 4.5" diameter, subangular, angular, well graded
			98		
		1.7	99		
			100		
			101	SW	100'-102', sand, well graded, yellowish brown (10YR 5/6), loose, slightly moist, medium to coarse grain, trace gravel up to 1" diameter

Logged by: S.Lauricella

Date: 5/3/2022 - 5/4/22

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.623216, -106.088671
 Surface Elevation: 6,323.35 ft
 Casing Elevation: 6,323.20 ft
 GW level at time of drilling: 110.57 ft
 GW level at time of sampling: 109.88 ft

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Sonic		Boring No. AOI01-04	
Sampling Method: Sonic/Continuous Core		Sheet 6 of 6	
Drilling			
Water Level	-	Start	Finish
Time	-	5/3/2022	5/9/2022
Date	5/3/2022	1220	1650

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Bare ground, 1" gravel
	Full recovery unless noted	55.7	101	SW	
			102		
			103		
		3.9	104	CL	102'-103.5', sand, well graded, yellowish brown (10YR 5/6), loose, slightly moist, minor trace gravel up to 1" diameter, minor silty clay, non plastic, fine to coarse grain sand, slightly moist
	105		103.5'-105.5', silty clay, dark yellowish brown (10YR 4/6), medium stiff, moist, non plastic to low plasticity, minor coarse grain sand		
		6.0	106	GW	105.5'-106', sand, well graded, yellowish brown (10YR 5/6), loose, slightly moist, minor, one cobble 4" diameter, subrounded
	107		106'-110.5', sandy gravel, yellowish brown (10YR 5/4), loose, moist, fine to medium grain sand, trace coarse sand, gravel up to 2" diameter, well graded, subangular to subround		
	108				
Discrete / AOI01-04-SB-109			109		
			110		
		32.8	111	CL	
	112		110.5'-113.5', sandy clay, yellowish brown (10YR 5/4), stiff to medium stiff, moist, trace wet areas inbetween stiff clayey sand, fine to coarse grain sand, minor silt, minor gravel up to 1/2" diameter, rounded, subrounded, non plastic		
	113				
		6.5	114	CL	113.5'-114.5', sandy clay, dark yellowish (10YR3/4), stiff, wet, medium to coarse grain sand, trace very fine to fine grain, minor gravel up to 1/2" diameter, subrounded, non plastic
	115		114.5'-116', silty clay, dark brown (10YR 3/3), soft, moist, low plasticity, minor medium to coarse sand, non plastic downward		
		2.5	116		
	117				
	118				
			119		TD= 115' 2" PVC SCH 80 0.010" screen: 105'-115' 2" PVC SCH 80 riser: 0-105'
			120		10/20 silica sand: 103'-115' 3/8" hole plug bentonite chips: 100'- 103'
			121		grout: <1 - 100'

Logged by: S.Lauricella

Date: 05/04/2022

Drilling Contractor: Environmental Works Inc.

Driller: Justin Maples



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.623176, -106.087902
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Direct push Geoprobe		Boring No. AOI01-05	
Sampling Method: PVC Sleeve		Sheet 1 of 1	
		Drilling	
Water Level		Start	Finish
Time	-		
Date	5/4/2022	5/4/2022 0900	5/4/2022 1020

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
Composite / AOI01-05 SB-0-2	48"		1	ML	0-8', sandy silt, yellowish red (5YR 5/6), loose, dry, fine sand, trace fine gravel, could not advance hand auger past 4'
		0.2	2		
			3		
		0.4	4		
Composite / AOI01-05 SB-6-8	45"		5		
		0.2	6		
			7		
		0.3	8		
	48"		9	SW	8'-15', sand, well graded, reddish brown (5YR 5/3), loose, dry, fine to coarse sand, trace silt, trace fine gravel
		0.6	10		
			11		
		0.3	12		
Composite / AOI01-05 SB-13-15	32"		13		
		0.5	14		
			15		
			16		
			17		
			18		
			19		
			20		
			21		
					TD' = 15

Logged by: D. Werth

Date: 05/04/2022

Drilling Contractor: JR Drilling

Driller: Rob Helton



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.623467, -106.086917
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Hand Auger		Boring No. AOI01-06	
Sampling Method: Hand Auger (Grab)		Sheet 1 of 1	
		Drilling	
Water Level		Start	Finish
Time	-		
Date	-	2/7/2022	2/7/2022

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:
					Snow, unpaved
Composite / AOI01-06 SB-0-2	2/2		1	ML	0'-2': silt, brown (10 YR 5/3), loose, dry, little sand and fine gravel top few inches
			2		
			3		
			4		
			5		
			6		
			7		
			8		
			9		
			10		
			11		
			12		
			13		
			14		
			15		
			16		
			17		
			18		
			19		
			20		
			21		
					TD' = 2'

Logged by: D. Werth

Date: 02/07/2022

Drilling Contractor: EA

Driller: D. Werth



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.623467, -106.087064
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Direct Push Geoprobe		Boring No. AOI01-06B	
Sampling Method: PVC Sleeve		Sheet 1 of 1	
		Drilling	
Water Level		Start	Finish
Time	-		
Date	5/4/2022	5/4/2022 1030	5/4/2022 1200

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions:		
Composite / AOI01-06B-SB-0-2	48"		1	SM	0-6', silty sands, reddish brown (5YR 5/4), loose, dry, fine sand		
		0.4	2				
			3				
		0.5	4				
Composite / AOI01-06B-SB-6-8	36"		5	SW	6-9', sand, well graded, reddish brown (5YR 5/3), loose, dry, fine to coarse sand, trace gravel, trace silt		
		0.5	6				
			7				
		0.2	8				
Composite / AOI01-06B-SB-13-15	48"		9	SM	9-10.5', silty sand, reddish brown (5YR 4/3), loose, dry to moist, fine sand, trace gravel		
		0.3	10				
			11			SW	10.5'-15', sand, well graded, reddish brown (5YR 5/3), loose, dry, fine to coarse sand, gravel
		0.3	12				
Composite / AOI01-06B-SB-13-15	30"		13				
			14				
			15				
			16				
			17				
			18				
			19				
			20				
			21				

TD' = 15'

Logged by: D. Werth

Date: 05/04/2022

Drilling Contractor: JR Drilling

Driller: Rob Helton



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624337, -106.088489
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Hand Auger		Boring No. AOI01-07	
Sampling Method: Hand Auger (Grab)		Sheet 1 of 1	
		Drilling	
Water Level		Start	Finish
Time	-		
Date	-	2/8/2022	2/8/2022

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Cleared away decorative gravel from location; log starts under landscaping fabric
Composite / AOI01-07 SB-0-2	2/2		1	ML	0'-2': silt, brown (10 YR 5/3), loose, dry
			2		
			3		
			4		
			5		
			6		
			7		
			8		
			9		
			10		
			11		
			12		
			13		
			14		
			15		
			16		
			17		
			18		
			19		
			20		
			21		

TD' = 2'

Logged by: D. Werth

Date: 02/08/2022

Drilling Contractor: EA

Driller: D. Werth



EA Engineering, Science,
and Technology, Inc., PBC

LOG OF SOIL/ROCK BORING

Coordinates: 35.624297, -106.088539
 Surface Elevation: NA
 Casing Elevation: NA
 GW level at time of drilling: NA
 GW level at time of sampling: NA

Job. No. 634250383	Client: ARNG	Location: Santa Fe, NM Army Aviation Support Facility	
Drilling Method: Hand Auger		Boring No. AOI01-08	
Sampling Method: Hand Auger (Grab)		Sheet 1 of 1	
		Drilling	
Water Level		Start	Finish
Time	-		
Date	-	2/8/2022	2/8/2022

Sample Type/ID	Feet Driven /Feet Recovered	PID ppm	Depth in Feet	USCS Log	Surface Conditions: Cleared away decorative gravel from location; log starts under landscaping fabric
Composite / AOI01-08 SB-0-2	2/2		1	ML	0'-2': silt, brown (10 YR 5/3), loose, dry
			2		
			3		
			4		
			5		
			6		
			7		
			8		
			9		
			10		
			11		
			12		
			13		
			14		
			15		
			16		
			17		
			18		
			19		
			20		
			21		

Logged by: D. Werth

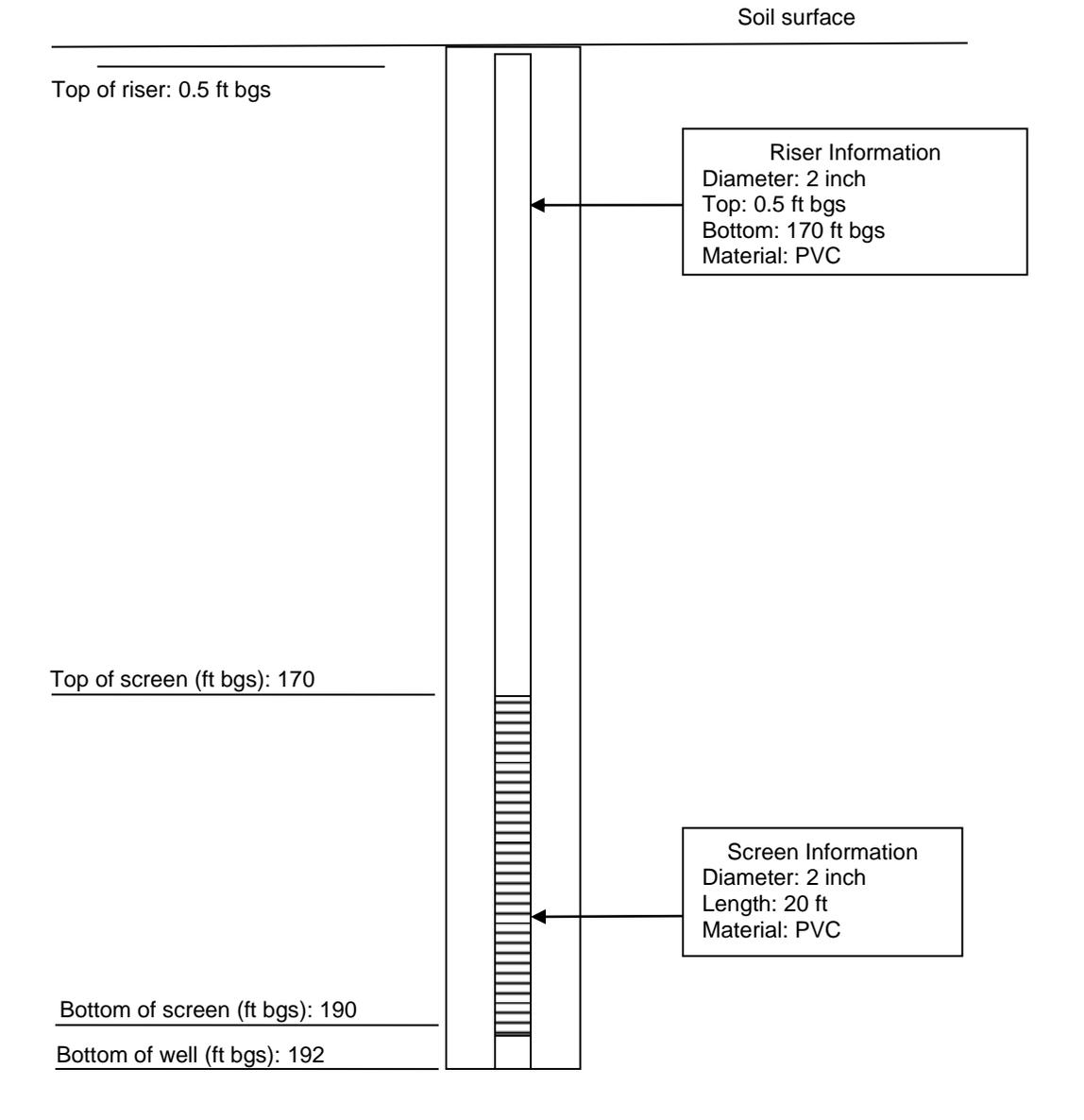
Date: 02/08/2022

Drilling Contractor: EA

Driller: D. Werth

RECORD OF MONITORING WELL CONSTRUCTION

 <p>EA Engineering, Science, and Technology, Inc., PBC</p>	Monitoring Well/Soil Boring ID No.: <h2 style="text-align: center;">AOI01-01</h2>
Project Title/ Project No.: Site Investigation for Per- and Polyfluoroalkyl Substances, Santa Fe Army Aviation Support Facility (AASF) (634250383)	Date/Time Installed: 04/25/2022 at 0850 Time Finished: 05/9/2022 at 1647
Location: East of former AASF	Depth to Water: 176.31 ft bgs
Site Geologist: Sindy Lauricella	Drilling Method: Sonic

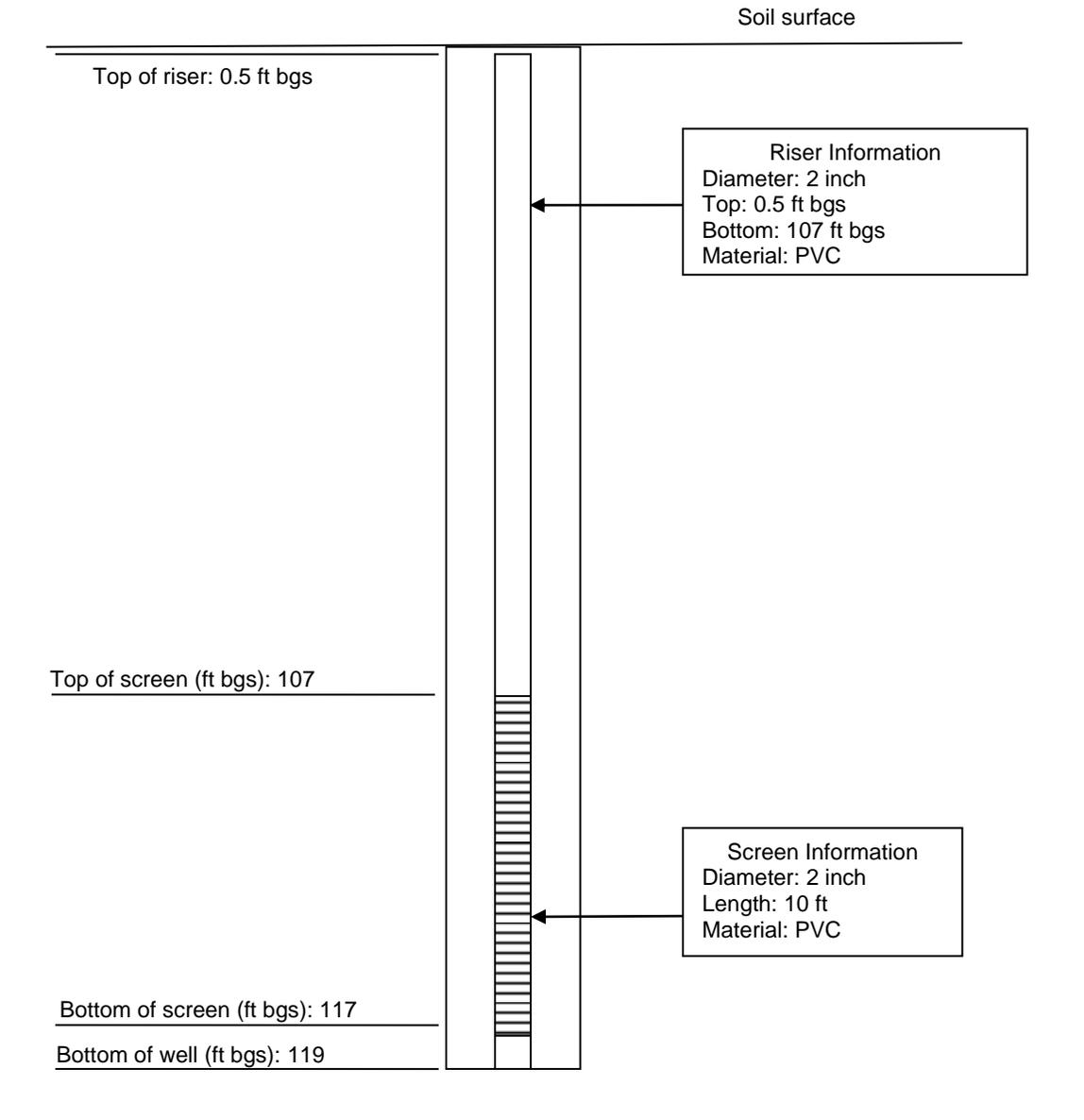


Note: All features not to scale

ags – Above Ground Surface
 bgs – Below Ground Surface
 ft – Feet
 PVC – Polyvinyl Chloride

RECORD OF MONITORING WELL CONSTRUCTION

 <p>EA Engineering, Science, and Technology, Inc., PBC</p>	Monitoring Well/Soil Boring ID No.: <h2 style="text-align: center;">AOI01-02</h2>
Project Title/ Project No.: Site Investigation for Per- and Polyfluoroalkyl Substances, Santa Fe Army Aviation Support Facility (AASF) (634250383)	Date/Time Installed: 04/27/2022 at 1145 Time Finished: 05/9/2022 at 1650
Location: Southwest of former AASF	Depth to Water: 110.80 ft bgs
Site Geologist: Sindy Lauricella	Drilling Method: Sonic

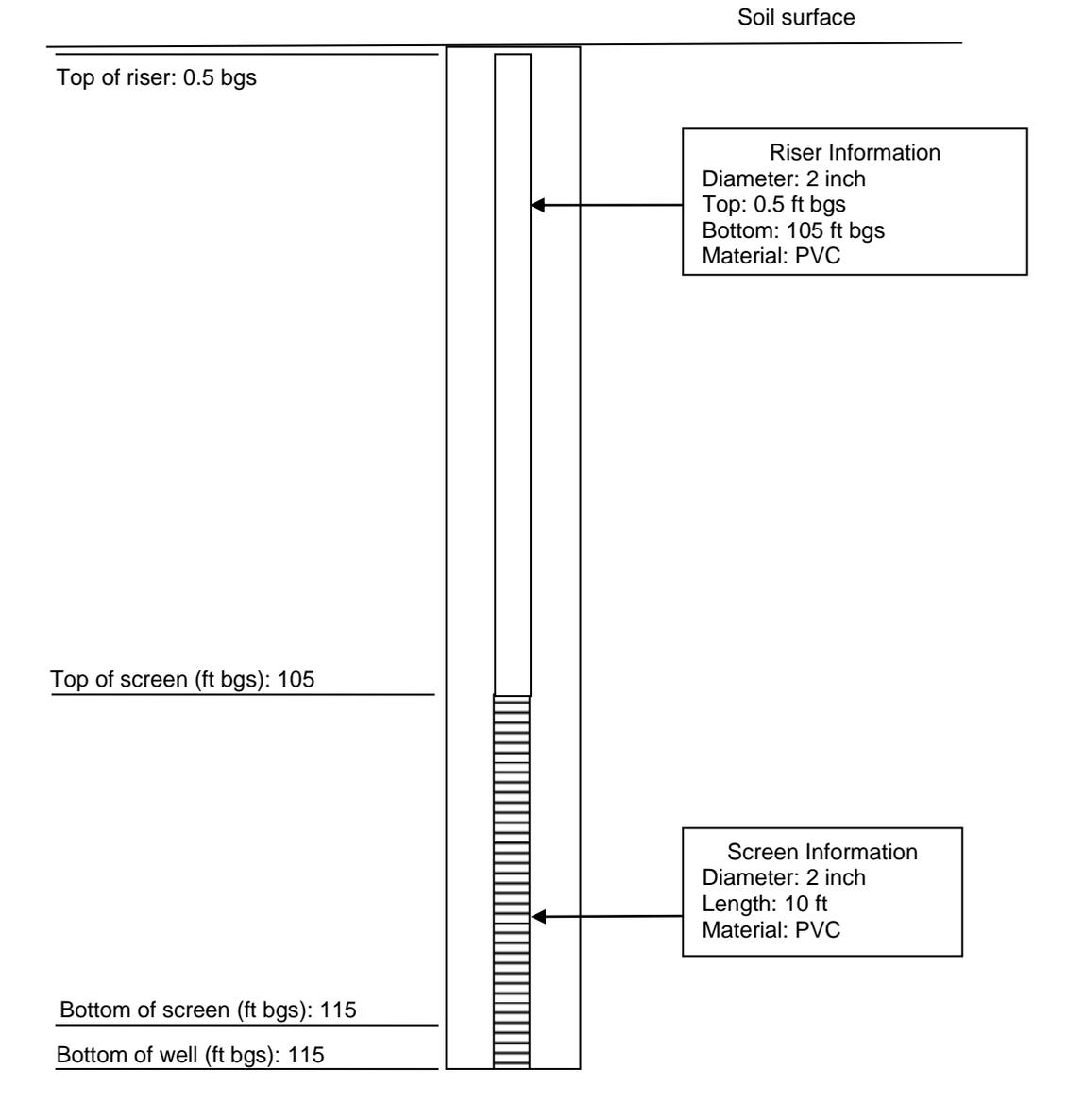


Note: All features not to scale

ags – Above Ground Surface
 bgs – Below Ground Surface
 ft – Feet
 PVC – Polyvinyl Chloride

RECORD OF MONITORING WELL CONSTRUCTION

 <p>EA Engineering, Science, and Technology, Inc., PBC</p>	Monitoring Well/Soil Boring ID No.: <h2 style="text-align: center;">AOI01-04</h2>
Project Title/ Project No.: Site Investigation for Per- and Polyfluoroalkyl Substances, Santa Fe Army Aviation Support Facility (634250383)	Date/Time Installed: 05/3/2022 at 1220 Time Finished: 05/9/2022 at 1650
Location: Southwest facility boundary	Depth to Water: 110.57 ft bgs
Site Geologist: Cindy Lauricella	Drilling Method: Sonic

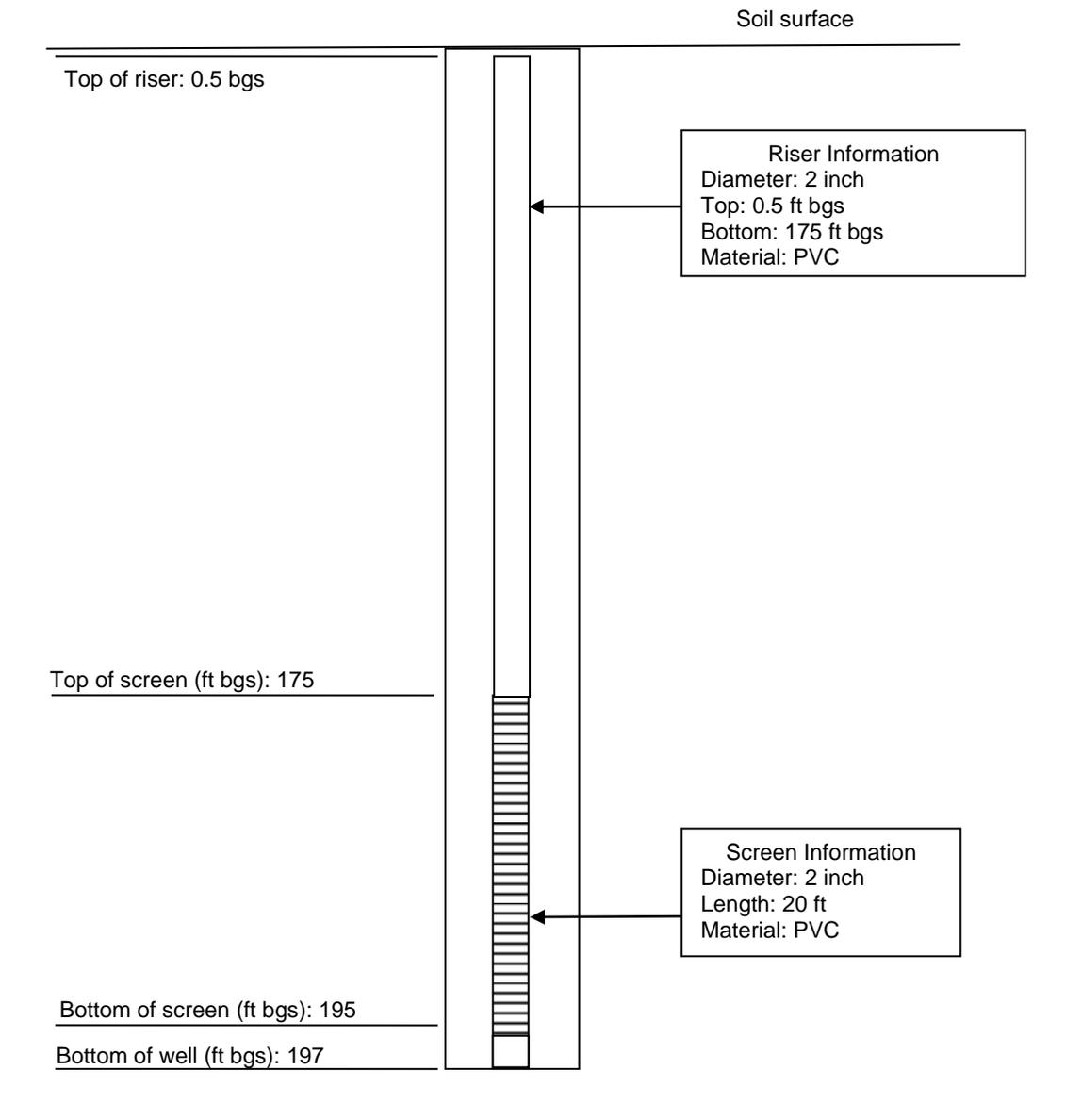


Note: All features not to scale

ags – Above Ground Surface
 bgs – Below Ground Surface
 ft – Feet
 PVC – Polyvinyl Chloride

RECORD OF MONITORING WELL CONSTRUCTION

 <p>EA Engineering, Science, and Technology, Inc., PBC</p>	Monitoring Well/Soil Boring ID No.: <h2 style="text-align: center;">SFAASF-03</h2>
Project Title/ Project No.: Site Investigation for Per- and Polyfluoroalkyl Substances, Santa Fe Army Aviation Support Facility (AASF) (634250383)	Date/Time Installed: 05/7/2022 at 1400 Time Finished: 05/11/2022 at 1130
Location: Eastern facility boundary, east of current AASF	Depth to Water: 184.95 ft bgs
Site Geologist: Cindy Lauricella	Drilling Method: Sonic

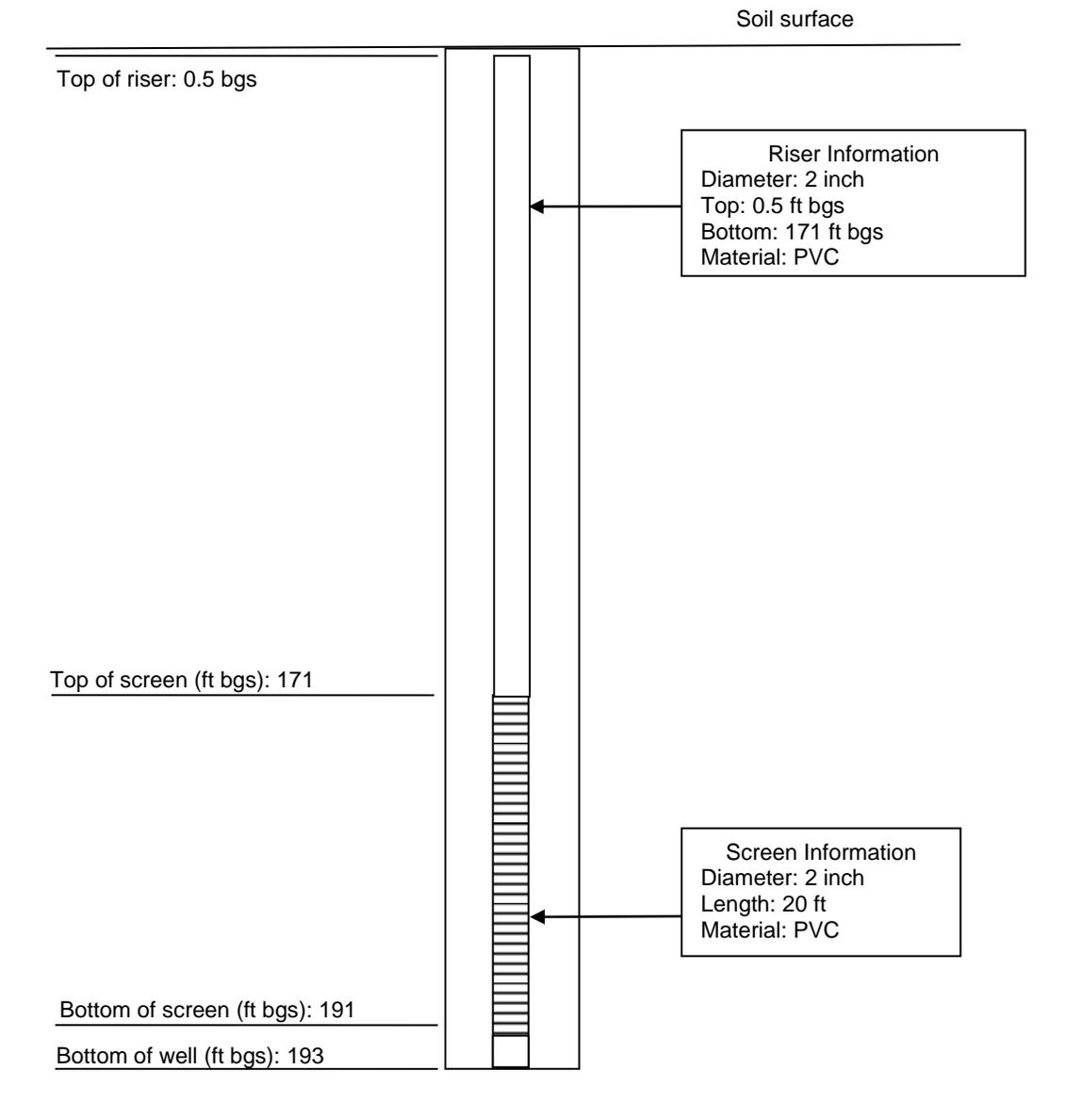


Note: All features not to scale

ags – Above Ground Surface
 bgs – Below Ground Surface
 ft – Feet
 PVC – Polyvinyl Chloride

RECORD OF MONITORING WELL CONSTRUCTION

 <p>EA Engineering, Science, and Technology, Inc., PBC</p>	Monitoring Well/Soil Boring ID No.: <h2 style="text-align: center;">SFAASF-04</h2>
Project Title/ Project No.: Site Investigation for Per- and Polyfluoroalkyl Substances, Santa Fe Army Aviation Support Facility (634250383)	Date/Time Installed: 04/28/2022 at 1645 Time Finished: 05/9/2022 at 1000
Location: Eastern facility boundary, east of tarmac	Depth to Water: 181.00 ft bgs
Site Geologist: Cindy Lauricella	Drilling Method: Sonic



Note: All features not to scale

ags – Above Ground Surface
 bgs – Below Ground Surface
 ft – Feet
 PVC – Polyvinyl Chloride

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Appendix F
Analytical Results

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Analyte ¹	Screening Level ¹	Location ID				AOI01-02				AOI01-02				AOI01-03			
		Sample Name				AOI01-01				AOI01-02-SB-0-2				AOI01-03-SB-0-2			
		Parent Sample ID				AOI01-01-SB-0-2				AOI01-02-SB-0-2				AOI01-02-SB-0-2-D			
		Sample Date				2/8/2022				2/8/2022				2/8/2022			
		Depth (ft bgs)				0-2				0-2				0-2			
		Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																	
4:2 Fluorotelomer sulfonate	--	<	1.6	2	U	<	1.7	2.2	U	<	1.9	2.3	U	<	1.8	2.2	U
6:2 Fluorotelomer sulfonate	--	<	1.6	2	U	<	1.7	2.2	U	<	1.9	2.3	U	<	1.8	2.2	U
8:2 Fluorotelomer sulfonate	--	<	1.6	3.1	U	<	1.7	3.3	U	<	1.9	3.5	U	<	1.8	3.4	U
N-ethyl perfluorooctanesulfonamidoacetic acid	--	<	0.41	2	UJ	<	0.43	2.2	U	<	0.46	2.3	UJ	<	0.45	2.2	U
N-methyl perfluorooctanesulfonamidoacetic acid	--	<	0.41	2	UJ	<	0.43	2.2	UJ	<	0.46	2.3	UJ	<	0.45	2.2	U
Perfluorobutanesulfonic acid (PFBS)	1900	<	1.6	2	U	<	1.7	2.2	U	<	1.9	2.3	U	<	1.8	2.2	U
Perfluorobutanoic acid	--	<	1.6	2	U	<	1.7	2.2	U	<	1.9	2.3	U	<	1.8	2.2	U
Perfluorodecanesulfonic acid	--	<	0.41	0.61	U	0.33	0.43	0.65	J	<	0.46	0.7	U	<	0.45	0.67	U
Perfluorodecanoic acid	--	<	0.41	0.61	U	0.34	0.43	0.65	J	<	0.46	0.7	U	<	0.45	0.67	U
Perfluorododecanoic acid	--	<	0.41	0.61	U	<	0.43	0.65	U	<	0.46	0.7	U	<	0.45	0.67	U
Perfluoroheptanesulfonic acid	--	<	0.41	0.61	U	<	0.43	0.65	U	<	0.46	0.7	U	<	0.45	0.67	U
Perfluoroheptanoic acid	--	<	0.41	0.61	U	<	0.43	0.65	U	<	0.46	0.7	U	<	0.45	0.67	U
Perfluorohexanesulfonic acid (PFHxS)	130	0.41	0.41	0.61	J	0.5	0.43	0.65	J	0.96	0.46	0.7		1.4	0.45	0.67	
Perfluorohexanoic acid	--	0.25	0.41	0.61	J	<	0.43	0.65	U	<	0.46	0.7	U	<	0.45	0.67	U
Perfluorononanesulfonic acid	--	<	0.41	0.61	U	<	0.43	0.65	U	<	0.46	0.7	U	<	0.45	0.67	U
Perfluorononanoic acid (PFNA)	19	<	0.41	0.61	U	0.32	0.43	0.65	J	0.51	0.46	0.7	J	<	0.45	0.67	U
Perfluorooctanesulfonamide	--	<	0.41	0.61	U	<	0.43	0.65	U	<	0.46	0.7	U	<	0.45	0.67	U
Perfluorooctanesulfonic acid (PFOS)	13	3.1	0.41	0.61		61	0.43	0.65		86	0.46	0.7		6.5	0.45	0.67	
Perfluorooctanoic acid (PFOA)	19	0.64	0.41	0.61		0.26	0.43	0.65	J	0.53	0.46	0.7	J	0.39	0.45	0.67	J
Perfluoropentanesulfonic acid	--	<	0.41	3.1	U	<	0.43	3.3	U	<	0.46	3.5	U	<	0.45	3.4	U
Perfluoropentanoic acid	--	<	0.41	0.61	U	<	0.43	0.65	U	<	0.46	0.7	U	<	0.45	0.67	U
AOI = Area of Interest.	--	<	0.41	0.61	U	<	0.43	0.65	U	<	0.46	0.7	U	<	0.45	0.67	U
mm = Millimeter(s).	--	<	0.41	0.61	U	<	0.43	0.65	U	<	0.46	0.7	U	<	0.45	0.67	U
µm = Micrometer(s).	--	<	0.41	0.61	U	<	0.43	0.65	U	<	0.46	0.7	U	<	0.45	0.67	U
ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing. J+ = Estimated concentration, biased high. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Feet below ground surface. LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier.																	
µg/kg = Microgram(s) per kilogram. < = Analyte not detected above the LOD. -- = No screening criteria available.																	

Analyte ¹	Screening Level ¹	Location ID				AOI01-04				AOI01-05				AOI01-06				AOI01-06B			
		Sample Name				AOI01-04-SB-0-2				AOI01-05-SB-0-2				AOI01-06-SB-0-2				AOI01-06B-SB-0-2			
		Parent Sample ID																			
		Sample Date				2/7/2022				2/7/2022				2/7/2022				5/4/2022			
		Depth (ft bgs)				0-2				0-2				0-2				0-2			
Analyte ¹	Screening Level ¹	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual				
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																					
4:2 Fluorotelomer sulfonate	--	<	1.7	2.1	U	<	1.7	2.2	U	<	1.7	2.1	U	<	1.8	2.2	U				
6:2 Fluorotelomer sulfonate	--	<	1.7	2.1	U	<	1.7	2.2	U	<	1.7	2.1	U	<	1.8	2.2	U				
8:2 Fluorotelomer sulfonate	--	<	1.7	3.2	U	<	1.7	3.3	U	<	1.7	3.1	U	<	1.8	3.3	U				
N-ethyl perfluorooctanesulfonamidoacetic acid	--	<	0.42	2.1	UJ	<	0.43	2.2	U	<	0.42	2.1	U	<	0.44	2.2	U				
N-methyl perfluorooctanesulfonamidoacetic acid	--	<	0.42	2.1	UJ	<	0.43	2.2	U	<	0.42	2.1	U	<	0.44	2.2	U				
Perfluorobutanesulfonic acid (PFBS)	1900	<	1.7	2.1	U	<	1.7	2.2	U	<	1.7	2.1	U	<	1.8	2.2	U				
Perfluorobutanoic acid	--	<	1.7	2.1	U	<	1.7	2.2	U	<	1.7	2.1	U	<	1.8	2.2	U				
Perfluorodecanesulfonic acid	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluorodecanoic acid	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluorododecanoic acid	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluoroheptanesulfonic acid	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluoroheptanoic acid	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluorohexanesulfonic acid (PFHxS)	130	0.64	0.42	0.63		<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluorohexanoic acid	--	0.32	0.42	0.63	J	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluorononanesulfonic acid	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluorononanoic acid (PFNA)	19	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluorooctanesulfonamide	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluorooctanesulfonic acid (PFOS)	13	3.6	0.42	0.63		<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluorooctanoic acid (PFOA)	19	0.36	0.42	0.63	J	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
Perfluoropentanesulfonic acid	--	<	0.42	3.2	U	<	0.43	3.3	U	<	0.42	3.1	U	<	0.44	3.3	U				
Perfluoropentanoic acid	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
AOI = Area of Interest.	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
mm = Millimeter(s).	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
µm = Micrometer(s).	--	<	0.42	0.63	U	<	0.43	0.65	U	<	0.42	0.63	U	<	0.44	0.66	U				
ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing. J+ = Estimated concentration, biased high. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Feet below ground surface. LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier.																					
µg/kg = Microgram(s) per kilogram. < = Analyte not detected above the LOD. -- = No screening criteria available.																					

	Location ID	AOI01-07				AOI01-08				AOI01-09				SFAASF-01			
	Sample Name	AOI01-07-SB-0-2				AOI01-08-SB-0-2				AOI-01-09-SB-0-2				SFAASF-01-SB-0-2			
	Parent Sample ID																
	Sample Date	2/8/2022				2/8/2022				5/9/2022				2/8/2022			
Depth (ft bgs)	0-2				0-2				0-2				0-2				
Analyte ¹	Screening Level ¹	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																	
4:2 Fluorotelomer sulfonate	--	<	1.8	2.2	U	<	1.9	2.4	U	<	1.5	1.9	U	<	1.8	2.2	U
6:2 Fluorotelomer sulfonate	--	<	1.8	2.2	U	<	1.9	2.4	U	<	1.5	1.9	U	<	1.8	2.2	U
8:2 Fluorotelomer sulfonate	--	<	1.8	3.3	U	<	1.9	3.5	U	<	1.5	2.8	U	<	1.8	3.3	U
N-ethyl perfluorooctanesulfonamidoacetic acid	--	<	0.44	2.2	UJ	<	0.47	2.4	UJ	0.55	0.38	1.9	J+	7.6	0.44	2.2	
N-methyl perfluorooctanesulfonamidoacetic acid	--	<	0.44	2.2	UJ	<	0.47	2.4	UJ	<	0.38	1.9	U	0.93	0.44	2.2	J+
Perfluorobutanesulfonic acid (PFBS)	1900	<	1.8	2.2	U	<	1.9	2.4	U	<	1.5	1.9	U	<	1.8	2.2	U
Perfluorobutanoic acid	--	<	1.8	2.2	U	<	1.9	2.4	U	<	1.5	1.9	U	<	1.8	2.2	U
Perfluorodecanesulfonic acid	--	0.72	0.44	0.66		<	0.47	0.71	U	0.37	0.38	0.57	J	11	0.44	0.67	
Perfluorodecanoic acid	--	2.1	0.44	0.66		<	0.47	0.71	U	1.4	0.38	0.57		4.8	0.44	0.67	
Perfluorododecanoic acid	--	<	0.44	0.66	U	<	0.47	0.71	U	0.54	0.38	0.57	J	2	0.44	0.67	
Perfluoroheptanesulfonic acid	--	2	0.44	0.66		<	0.47	0.71	U	<	0.38	0.57	U	0.45	0.44	0.67	J
Perfluoroheptanoic acid	--	0.43	0.44	0.66	J	<	0.47	0.71	U	<	0.38	0.57	U	7.8	0.44	0.67	
Perfluorohexanesulfonic acid (PFHxS)	130	8.3	0.44	0.66		<	0.47	0.71	J	<	0.38	0.57	U	2.7	0.44	0.67	
Perfluorohexanoic acid	--	0.73	0.44	0.66		<	0.47	0.71	U	<	0.38	0.57	U	1.2	0.44	0.67	
Perfluorononanesulfonic acid	--	1.4	0.44	0.66		<	0.47	0.71	U	<	0.38	0.57	U	<	0.44	0.67	U
Perfluorononanoic acid (PFNA)	19	3.8	0.44	0.66		<	0.47	0.71	U	0.4	0.38	0.57	J	1.8	0.44	0.67	
Perfluorooctanesulfonamide	--	1.2	0.44	0.66		<	0.47	0.71	U	<	0.38	0.57	U	1.3	0.44	0.67	
Perfluorooctanesulfonic acid (PFOS)	13	920	4.4	6.6		21	0.47	0.71		7.5	0.38	0.57		42	0.44	0.67	
Perfluorooctanoic acid (PFOA)	19	1.2	0.44	0.66		0.47	0.47	0.71	J	0.68	0.38	0.57		19	0.44	0.67	
Perfluoropentanesulfonic acid	--	0.3	0.44	3.3	J	<	0.47	3.5	U	<	0.38	2.8	U	0.45	0.44	3.3	J
Perfluoropentanoic acid	--	0.48	0.44	0.66	J	<	0.47	0.71	U	<	0.38	0.57	U	0.52	0.44	0.67	J
AOI = Area of Interest.	--	<	0.44	0.66	U	<	0.47	0.71	U	<	0.38	0.57	U	0.6	0.44	0.67	J
mm = Millimeter(s).	--	<	0.44	0.66	U	<	0.47	0.71	U	<	0.38	0.57	U	0.27	0.44	0.67	J
µm = Micrometer(s).	--	0.56	0.44	0.66	J	<	0.47	0.71	U	0.27	0.38	0.57	J	0.81	0.44	0.67	
ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing. J+ = Estimated concentration, biased high. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Feet below ground surface. LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier.																	
µg/kg = Microgram(s) per kilogram. < = Analyte not detected above the LOD. -- = No screening criteria available.																	

Analyte ¹	Screening Level ¹	Location ID				Sample Name				Parent Sample ID				Sample Date				Depth (ft bgs)			
		SFAASF-02				SFAASF-02				SFAASF-03-PA											
		SFAASF-02-SB-0-2				SFAASF-02-SB-0-2-D				SFAASF-03-PA-SB-0-2											
						SFAASF-02-SB-0-2															
		2/8/2022				2/8/2022				2/7/2022											
0-2				0-2				0-2													
Analyte ¹	Screening Level ¹	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual								
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																					
4:2 Fluorotelomer sulfonate	--	<	1.7	2.2	U	<	1.8	2.2	U	<	1.7	2.2	U								
6:2 Fluorotelomer sulfonate	--	<	1.7	2.2	U	<	1.8	2.2	U	<	1.7	2.2	U								
8:2 Fluorotelomer sulfonate	--	<	1.7	3.2	U	<	1.8	3.3	U	<	1.7	3.2	U								
N-ethyl perfluorooctanesulfonamidoacetic acid	--	12	0.43	2.2		9.8	0.44	2.2		<	0.43	2.2	UJ								
N-methyl perfluorooctanesulfonamidoacetic acid	--	1.4	0.43	2.2	J	1.1	0.44	2.2	J+	<	0.43	2.2	UJ								
Perfluorobutanesulfonic acid (PFBS)	1900	0.58	1.7	2.2	J	0.59	1.8	2.2	J	<	1.7	2.2	U								
Perfluorobutanoic acid	--	<	1.7	2.2	U	<	1.8	2.2	U	<	1.7	2.2	U								
Perfluorodecanesulfonic acid	--	13	0.43	0.65		9.5	0.44	0.67		<	0.43	0.65	U								
Perfluorodecanoic acid	--	6.1	0.43	0.65		5.4	0.44	0.67		0.22	0.43	0.65	J								
Perfluorododecanoic acid	--	2.3	0.43	0.65		2.1	0.44	0.67		<	0.43	0.65	U								
Perfluoroheptanesulfonic acid	--	0.82	0.43	0.65		0.73	0.44	0.67		<	0.43	0.65	U								
Perfluoroheptanoic acid	--	8.2	0.43	0.65		9.1	0.44	0.67		<	0.43	0.65	U								
Perfluorohexanesulfonic acid (PFHxS)	130	4.5	0.43	0.65		4.7	0.44	0.67		<	0.43	0.65	U								
Perfluorohexanoic acid	--	3.8	0.43	0.65		3.9	0.44	0.67		0.45	0.43	0.65	J								
Perfluorononanesulfonic acid	--	<	0.43	0.65	U	<	0.44	0.67	U	<	0.43	0.65	U								
Perfluorononanoic acid (PFNA)	19	2.9	0.43	0.65		2.9	0.44	0.67		<	0.43	0.65	U								
Perfluorooctanesulfonamide	--	2.3	0.43	0.65		1.7	0.44	0.67		<	0.43	0.65	U								
Perfluorooctanesulfonic acid (PFOS)	13	60	0.43	0.65		49	0.44	0.67		0.48	0.43	0.65	J								
Perfluorooctanoic acid (PFOA)	19	30	0.43	0.65		33	0.44	0.67		0.53	0.43	0.65	J								
Perfluoropentanesulfonic acid	--	0.64	0.43	3.2	J	0.74	0.44	3.3	J	<	0.43	3.2	U								
Perfluoropentanoic acid	--	1.9	0.43	0.65		1.9	0.44	0.67		0.29	0.43	0.65	J								
AOI = Area of Interest.	--	0.68	0.43	0.65		0.6	0.44	0.67	J	<	0.43	0.65	U								
mm = Millimeter(s).	--	0.26	0.43	0.65	J	0.22	0.44	0.67	J	<	0.43	0.65	U								
µm = Micrometer(s).	--	1.1	0.43	0.65		0.87	0.44	0.67		<	0.43	0.65	U								
ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing. J+ = Estimated concentration, biased high. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Feet below ground surface. LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier.																					
µg/kg = Microgram(s) per kilogram. < = Analyte not detected above the LOD. -- = No screening criteria available.																					

Analyte ¹	Screening Level ¹	Location ID				Sample Name				Parent Sample ID				Sample Date				Depth (ft bgs)			
		SFAASF-03				SFAASF-04				SFAASF-05											
		SFAASF-03-SB-0-2				SFAASF-04-SB-0-2				SFAASF-05-SB-0-2											
		5/7/2022				2/7/2022				2/7/2022											
		0-2				0-2				0-2											
		Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual								
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																					
4:2 Fluorotelomer sulfonate	--	<	1.7	2.2	U	<	1.7	2.1	U	<	1.7	2.1	U								
6:2 Fluorotelomer sulfonate	--	<	1.7	2.2	U	<	1.7	2.1	U	<	1.7	2.1	U								
8:2 Fluorotelomer sulfonate	--	<	1.7	3.2	U	<	1.7	3.2	U	<	1.7	3.1	U								
N-ethyl perfluorooctanesulfonamidoacetic acid	--	<	0.43	2.2	UJ	<	0.43	2.1	UJ	0.48	0.42	2.1	J+								
N-methyl perfluorooctanesulfonamidoacetic acid	--	<	0.43	2.2	UJ	<	0.43	2.1	UJ	<	0.42	2.1	UJ								
Perfluorobutanesulfonic acid (PFBS)	1900	<	1.7	2.2	U	<	1.7	2.1	U	<	1.7	2.1	U								
Perfluorobutanoic acid	--	<	1.7	2.2	U	<	1.7	2.1	U	<	1.7	2.1	U								
Perfluorodecanesulfonic acid	--	<	0.43	0.65	U	0.37	0.43	0.64	J	0.28	0.42	0.63	J								
Perfluorodecanoic acid	--	<	0.43	0.65	U	0.47	0.43	0.64	J	0.27	0.42	0.63	J								
Perfluorododecanoic acid	--	<	0.43	0.65	U	0.22	0.43	0.64	J	<	0.42	0.63	U								
Perfluoroheptanesulfonic acid	--	<	0.43	0.65	U	<	0.43	0.64	U	<	0.42	0.63	U								
Perfluoroheptanoic acid	--	<	0.43	0.65	U	0.47	0.43	0.64	J	0.33	0.42	0.63	J								
Perfluorohexanesulfonic acid (PFHxS)	130	<	0.43	0.65	U	<	0.43	0.64	U	<	0.42	0.63	U								
Perfluorohexanoic acid	--	<	0.43	0.65	U	0.48	0.43	0.64	J	0.43	0.42	0.63	J								
Perfluorononanesulfonic acid	--	<	0.43	0.65	U	<	0.43	0.64	U	<	0.42	0.63	U								
Perfluorononanoic acid (PFNA)	19	<	0.43	0.65	U	<	0.43	0.64	U	<	0.42	0.63	U								
Perfluorooctanesulfonamide	--	<	0.43	0.65	U	<	0.43	0.64	U	<	0.42	0.63	U								
Perfluorooctanesulfonic acid (PFOS)	13	<	0.43	0.65	U	0.94	0.43	0.64		0.93	0.42	0.63									
Perfluorooctanoic acid (PFOA)	19	<	0.43	0.65	U	0.6	0.43	0.64	J	0.96	0.42	0.63									
Perfluoropentanesulfonic acid	--	<	0.43	3.2	U	<	0.43	3.2	U	<	0.42	3.1	U								
Perfluoropentanoic acid	--	<	0.43	0.65	U	0.23	0.43	0.64	J	0.24	0.42	0.63	J								
AOI = Area of Interest.	--	<	0.43	0.65	U	<	0.43	0.64	U	<	0.42	0.63	U								
mm = Millimeter(s).	--	<	0.43	0.65	U	<	0.43	0.64	U	<	0.42	0.63	U								
µm = Micrometer(s).	--	<	0.43	0.65	U	<	0.43	0.64	U	<	0.42	0.63	U								
ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing. J+ = Estimated concentration, biased high. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Feet below ground surface. LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier.																					
µg/kg = Microgram(s) per kilogram. < = Analyte not detected above the LOD. -- = No screening criteria available.																					

Analyte	Screening Level ^{1,2}	Location ID				AOI01-02				AOI01-03				AOI01-03					
		Sample Name				AOI01-02-SB-13-15				AOI01-03-SB-13-15				AOI01-03-SB-6-8					
		Parent Sample ID																	
		Sample Date				4/25/2022				4/27/2022				5/4/2022					
Depth (ft bgs)				13-15				13-15				13-15				6-8			
Analyte	Screening Level ^{1,2}	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual		
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																			
4:2 Fluorotelomer sulfonate	--	<	1.7	2.1	U	<	1.7	2.2	U	<	1.6	2	U	<	1.6	2	U		
6:2 Fluorotelomer sulfonate	--	<	1.7	2.1	U	<	1.7	2.2	U	<	1.6	2	U	<	1.6	2	U		
8:2 Fluorotelomer sulfonate	--	<	1.7	3.1	U	<	1.7	3.3	U	<	1.6	3	U	<	1.6	3.1	U		
N-ethyl perfluorooctanesulfonamidoacetic acid	--	<	0.41	2.1	U	<	0.43	2.2	U	<	0.4	2	U	<	0.41	2	U		
N-methyl perfluorooctanesulfonamidoacetic acid	--	<	0.41	2.1	U	<	0.43	2.2	U	<	0.4	2	U	<	0.41	2	U		
Perfluorobutanesulfonic acid (PFBS)	25000	<	1.7	2.1	U	<	1.7	2.2	U	<	1.6	2	U	<	1.6	2	U		
Perfluorobutanoic acid	--	<	1.7	2.1	U	<	1.7	2.2	U	<	1.6	2	U	<	1.6	2	U		
Perfluorodecanesulfonic acid	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
Perfluorodecanoic acid	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
Perfluorododecanoic acid	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
Perfluoroheptanesulfonic acid	--	<	0.41	0.62	U	0.48	0.43	0.65	J	<	0.4	0.59	U	<	0.41	0.61	U		
Perfluoroheptanoic acid	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
Perfluorohexanesulfonic acid (PFHxS)	1600	<	0.41	0.62	U	3	0.43	0.65		0.27	0.4	0.59	J	0.23	0.41	0.61	J		
Perfluorohexanoic acid	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
Perfluorononanesulfonic acid	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
Perfluorononanoic acid (PFNA)	250	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
Perfluorooctanesulfonamide	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
Perfluorooctanesulfonic acid (PFOS)	160	<	0.41	0.62	U	1.2	0.43	0.65		5.9	0.4	0.59		0.66	0.41	0.61			
Perfluorooctanoic acid (PFOA)	250	<	0.41	0.62	U	0.59	0.43	0.65	J	<	0.4	0.59	U	<	0.41	0.61	U		
Perfluoropentanesulfonic acid	--	<	0.41	3.1	U	<	0.43	3.3	U	<	0.4	3	U	<	0.41	3.1	U		
Perfluoropentanoic acid	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
AOI = Area of Interest.	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
mm = Millimeter(s).	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
µm = Micrometer(s).	--	<	0.41	0.62	U	<	0.43	0.65	U	<	0.4	0.59	U	<	0.41	0.61	U		
ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Feet below ground surface. µg/kg = Microgram(s) per kilogram. LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. < = Analyte not detected above the LOD. -- = No screening criteria available.																			

Analyte	Screening Level ^{1,2}	Location ID				AOI01-04				AOI01-05				AOI01-05				AOI01-06B			
		Sample Name				AOI01-04-SB-13-15				AOI01-05-SB-13-15				AOI01-05-SB-6-8				AOI01-06B-SB-13-15			
		Parent Sample ID																			
		Sample Date				5/3/2022				5/4/2022				5/4/2022				5/4/2022			
Depth (ft bgs)				13-15				13-15				6-8				13-15					
Analyte	Screening Level ^{1,2}	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual				
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																					
4:2 Fluorotelomer sulfonate	--	<	1.8	2.3	U	<	1.8	2.2	U	<	1.7	2.2	U	<	1.5	1.9	U				
6:2 Fluorotelomer sulfonate	--	<	1.8	2.3	U	<	1.8	2.2	U	<	1.7	2.2	U	<	1.5	1.9	U				
8:2 Fluorotelomer sulfonate	--	<	1.8	3.4	U	<	1.8	3.4	U	<	1.7	3.2	U	<	1.5	2.9	U				
N-ethyl perfluorooctanesulfonamidoacetic acid	--	<	0.45	2.3	U	<	0.45	2.2	U	<	0.43	2.2	U	<	0.39	1.9	U				
N-methyl perfluorooctanesulfonamidoacetic acid	--	<	0.45	2.3	U	<	0.45	2.2	U	<	0.43	2.2	U	<	0.39	1.9	U				
Perfluorobutanesulfonic acid (PFBS)	25000	<	1.8	2.3	U	<	1.8	2.2	U	<	1.7	2.2	U	<	1.5	1.9	U				
Perfluorobutanoic acid	--	<	1.8	2.3	U	<	1.8	2.2	U	<	1.7	2.2	U	<	1.5	1.9	U				
Perfluorodecanesulfonic acid	--	0.29	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluorodecanoic acid	--	0.3	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluorododecanoic acid	--	0.34	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluoroheptanesulfonic acid	--	0.33	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluoroheptanoic acid	--	0.4	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluorohexanesulfonic acid (PFHxS)	1600	1.2	0.45	0.68		<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluorohexanoic acid	--	0.63	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluorononanesulfonic acid	--	0.28	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluorononanoic acid (PFNA)	250	0.37	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluorooctanesulfonamide	--	0.35	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluorooctanesulfonic acid (PFOS)	160	3.2	0.45	0.68		<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluorooctanoic acid (PFOA)	250	0.52	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
Perfluoropentanesulfonic acid	--	0.34	0.45	3.4	J	<	0.45	3.4	U	<	0.43	3.2	U	<	0.39	2.9	U				
Perfluoropentanoic acid	--	0.33	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
AOI = Area of Interest.	--	0.33	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
mm = Millimeter(s).	--	0.3	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
µm = Micrometer(s).	--	0.31	0.45	0.68	J	<	0.45	0.67	U	<	0.43	0.65	U	<	0.39	0.58	U				
ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Feet below ground surface. µg/kg = Microgram(s) per kilogram. LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. < = Analyte not detected above the LOD. -- = No screening criteria available.																					

Analyte	Screening Level ^{1,2}	Location ID				AOI01-06B				AOI01-09				SFAASF-03-PA				SFAASF-04			
		Sample Name				AOI01-06B-SB-6-8				AOI01-09-SB-13-15				SFAASF-03-PA-SB-13-15				SFAASF-04-SB-13-15			
		Parent Sample ID																			
		Sample Date				5/4/2022				5/5/2022				5/1/2022				4/28/2022			
		Depth (ft bgs)				6-8				13-15				13-15				13-15			
Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual		
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																					
4:2 Fluorotelomer sulfonate	--	<	1.5	1.9	U	<	1.6	2.1	U	<	1.5	1.8	U	<	1.6	2	U				
6:2 Fluorotelomer sulfonate	--	<	1.5	1.9	U	<	1.6	2.1	U	<	1.5	1.8	U	<	1.6	2	U				
8:2 Fluorotelomer sulfonate	--	<	1.5	2.8	U	<	1.6	3.1	U	<	1.5	2.8	U	<	1.6	2.9	U				
N-ethyl perfluorooctanesulfonamidoacetic acid	--	<	0.38	1.9	U	<	0.41	2.1	U	<	0.37	1.8	U	<	0.39	2	U				
N-methyl perfluorooctanesulfonamidoacetic acid	--	<	0.38	1.9	U	<	0.41	2.1	U	<	0.37	1.8	U	<	0.39	2	U				
Perfluorobutanesulfonic acid (PFBS)	25000	<	1.5	1.9	U	<	1.6	2.1	U	<	1.5	1.8	U	<	1.6	2	U				
Perfluorobutanoic acid	--	<	1.5	1.9	U	<	1.6	2.1	U	<	1.5	1.8	U	<	1.6	2	U				
Perfluorodecanesulfonic acid	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluorodecanoic acid	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluorododecanoic acid	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluoroheptanesulfonic acid	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluoroheptanoic acid	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluorohexanesulfonic acid (PFHxS)	1600	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluorohexanoic acid	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluorononanesulfonic acid	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluorononanoic acid (PFNA)	250	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluorooctanesulfonamide	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluorooctanesulfonic acid (PFOS)	160	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluorooctanoic acid (PFOA)	250	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
Perfluoropentanesulfonic acid	--	<	0.38	2.8	U	<	0.41	3.1	U	<	0.37	2.8	U	<	0.39	2.9	U				
Perfluoropentanoic acid	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
AOI = Area of Interest.	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
mm = Millimeter(s).	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
µm = Micrometer(s).	--	<	0.38	0.57	U	<	0.41	0.62	U	<	0.37	0.55	U	<	0.39	0.59	U				
ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Feet below ground surface. µg/kg = Microgram(s) per kilogram. < = Analyte not detected above the LOD. -- = No screening criteria available.																					

Analyte	Screening Level ^{1,2}	Location ID				Sample Name				Parent Sample ID				Sample Date				Depth (ft bgs)			
		SFAASF-05				SFAASF-05				SFAASF-05				SFAASF-05							
		SFAASF-05-SB-13-15				SFAASF-05-SB-13-15-DUP				SFAASF-05-SB-6-8											
						SFAASF-05-SB-13-15															
		5/4/2022				5/4/2022				5/4/2022											
		13-15				13-15				6-8											
Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual						
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																					
4:2 Fluorotelomer sulfonate	--	<	1.5	1.8	U	<	1.5	1.9	U	<	1.7	2.1	U								
6:2 Fluorotelomer sulfonate	--	<	1.5	1.8	U	<	1.5	1.9	U	<	1.7	2.1	U								
8:2 Fluorotelomer sulfonate	--	<	1.5	2.8	U	<	1.5	2.9	U	<	1.7	3.1	U								
N-ethyl perfluorooctanesulfonamidoacetic acid	--	<	0.37	1.8	U	<	0.39	1.9	U	<	0.41	2.1	UJ								
N-methyl perfluorooctanesulfonamidoacetic acid	--	<	0.37	1.8	U	<	0.39	1.9	U	<	0.41	2.1	UJ								
Perfluorobutanesulfonic acid (PFBS)	25000	<	1.5	1.8	U	<	1.5	1.9	U	<	1.7	2.1	U								
Perfluorobutanoic acid	--	<	1.5	1.8	U	<	1.5	1.9	U	<	1.7	2.1	U								
Perfluorodecanesulfonic acid	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluorodecanoic acid	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluorododecanoic acid	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluoroheptanesulfonic acid	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluoroheptanoic acid	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluorohexanesulfonic acid (PFHxS)	1600	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluorohexanoic acid	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluorononanesulfonic acid	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluorononanoic acid (PFNA)	250	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluorooctanesulfonamide	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluorooctanesulfonic acid (PFOS)	160	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluorooctanoic acid (PFOA)	250	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
Perfluoropentanesulfonic acid	--	<	0.37	2.8	U	<	0.39	2.9	U	<	0.41	3.1	U								
Perfluoropentanoic acid	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
AOI = Area of Interest.	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
mm = Millimeter(s).	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
µm = Micrometer(s).	--	<	0.37	0.55	U	<	0.39	0.58	U	<	0.41	0.62	U								
ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing. UJ = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD). Associated numerical value is approximate. Values exceeding the Screening Level are shaded gray. ft bgs = Feet below ground surface. LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. µg/kg = Microgram(s) per kilogram. < = Analyte not detected above the LOD. -- = No screening criteria available.																					

Location ID	AOI01-01				AOI01-02				AOI01-02				AOI01-04				AOI01-04				AOI01-09				SFAASF-03-PA				SFAASF-04							
	Sample Name				AOI01-01-SB-181-182				AOI01-02-SB-113-115				AOI01-02-SB-113-115-DUP				AOI01-04-SB-109-110				AOI01-04-SB-109-110-DUP				AOI01-09-SB-111-112				SFAASF-03-PA-SB-183-184				SFAASF-04-SB-180-181			
Parent Sample ID									AOI01-02-SB-113-115								AOI01-04-SB-109-110																			
Sample Date	4/26/2022				4/28/2022				4/28/2022				5/4/2022				5/4/2022				5/6/2022				5/2/2022				4/30/2022							
Depth (ft bgs)	181-182				113-115				113-115				109-110				109-110				111-112				183-184				180-181							
Analyte ¹	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																																				
4:2 Fluorotelomer sulfonate	<	1.6	2	U	<	1.7	2.2	U	<	1.8	2.3	U	<	1.7	2.1	U	<	1.6	1.9	U	<	2.1	2.6	U	<	1.6	2	U	<	1.6	2	U	<	1.6	2	U
6:2 Fluorotelomer sulfonate	<	1.6	2	U	<	1.7	2.2	U	<	1.8	2.3	U	<	1.7	2.1	U	<	1.6	1.9	U	<	2.1	2.6	U	<	1.6	2	U	<	1.6	2	U	<	1.6	2	U
8:2 Fluorotelomer sulfonate	<	1.6	3	U	<	1.7	3.2	U	<	1.8	3.5	U	<	1.7	3.1	U	<	1.6	2.9	U	<	2.1	3.9	U	<	1.6	3	U	<	1.6	3	U	<	1.6	3	U
N-ethyl perfluorooctanesulfonamidoacetic acid	<	0.4	2	U	<	0.43	2.2	U	<	0.46	2.3	U	0.28	0.41	2.1	J	<	0.39	1.9	U	<	0.52	2.6	UJ	<	0.4	2	U	<	0.4	2	U	<	0.4	2	U
N-methyl perfluorooctanesulfonamidoacetic acid	<	0.4	2	U	<	0.43	2.2	U	<	0.46	2.3	U	<	0.41	2.1	UJ	<	0.39	1.9	U	<	0.52	2.6	UJ	<	0.4	2	U	<	0.4	2	U	<	0.4	2	U
Perfluorobutanesulfonic acid (PFBS)	<	1.6	2	U	<	1.7	2.2	U	<	1.8	2.3	U	<	1.7	2.1	U	<	1.6	1.9	U	<	2.1	2.6	U	<	1.6	2	U	<	1.6	2	U	<	1.6	2	U
Perfluorobutanoic acid	<	1.6	2	U	<	1.7	2.2	U	<	1.8	2.3	U	<	1.7	2.1	U	<	1.6	1.9	U	<	2.1	2.6	U	<	1.6	2	U	<	1.6	2	U	<	1.6	2	U
Perfluorodecanesulfonic acid	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.3	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluorodecanoic acid	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.3	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluorododecanoic acid	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.32	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluoroheptanesulfonic acid	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.34	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluoroheptanoic acid	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.44	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluorohexanesulfonic acid (PFHxS)	<	0.4	0.6	U	0.32	0.43	0.65	J	<	0.46	0.69	U	1.1	0.41	0.62	J	<	0.39	0.58	UJ	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluorohexanoic acid	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.7	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluorononanesulfonic acid	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.28	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluorononanoic acid (PFNA)	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.32	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluorooctanesulfonamide (PFOSA)	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.34	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluorooctanesulfonic acid (PFOS)	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	2.2	0.41	0.62	J+	<	0.39	0.58	UJ	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluorooctanoic acid (PFOA)	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.48	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
Perfluoropentanesulfonic acid	<	0.4	3	U	<	0.43	3.2	U	<	0.46	3.5	U	0.38	0.41	3.1	J	<	0.39	2.9	U	<	0.52	3.9	U	<	0.4	3	U	<	0.4	3	U	<	0.4	3	U
Perfluoropentanoic acid	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.37	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
AOI = Area of Interest.	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.33	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
mm = Millimeter(s).	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.31	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
µm = Micrometer(s).	<	0.4	0.6	U	<	0.43	0.65	U	<	0.46	0.69	U	0.3	0.41	0.62	J	<	0.39	0.58	U	<	0.52	0.78	U	<	0.4	0.6	U	<	0.4	0.6	U	<	0.4	0.6	U
ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing. ft bgs = Feet below ground surface. LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. µg/kg = Microgram(s) per kilogram. < = Analyte not detected above the LOD.																																				

Location ID Sample Name Parent Sample ID Sample Date Depth (bgs ft)	AOI01-01				AOI01-02			
	AOI01-01-SB-135-136				AOI01-02-SB-119-120			
	4/25/2022				4/28/2022			
	135-136				119-120			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
Grain Size (D422) (%)								
Sieve, 50000 microns (50mm)	100	1	1		100	1	1	
Sieve, 37500 microns (37.5 mm)	100	1	1		100	1	1	
Sieve, 25000 microns (25mm)	100	1	1		100	1	1	
Sieve, 19000 microns (19mm)	100	1	1		100	1	1	
Sieve, 9510 microns (9.51mm)	100	1	1		100	1	1	
No. 4 sieve (4.75 mm)	100	1	1		98.4	1	1	
No. 10 sieve (2.00mm)	95.4	1	1		96.3	1	1	
No. 20 sieve(0.85mm)	91	1	1		90.6	1	1	
No. 40 sieve (0.425 mm)	84.8	1	1		82	1	1	
No. 60 sieve (0.25 mm)	79.9	1	1		75.1	1	1	
No. 80 sieve (0.177 mm)	76.9	1	1		61.6	1	1	
No. 100 sieve (0.15 mm)	75.3	1	1		59.2	1	1	
No. 200 sieve (0.075 mm)	69.5	1	1		48.1	1	1	
36.1um (Hydrometer)	23.4	1	1		17.1	1	1	
22.9um (Hydrometer)	20.6	1	1		12.7	1	1	
13.4um (Hydrometer)	16.4	1	1		9.8	1	1	
9.8um (Hydrometer)	15	1	1		9.8	1	1	
6.7um (Hydrometer)	12.2	1	1		6.9	1	1	
3.3um (Hydrometer)	9.4	1	1		6.9	1	1	
1.4um (Hydrometer)	9.4	1	1		6.9	1	1	
Notes: AOI = Area of Interest. mm = Millimeter(s). µm = Micrometer(s). ft = Foot (feet). LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier. % = Percent passing.								

Location ID	AOI01-03				AOI01-03				SFAASF-03-PA			
Sample Name	AOI01-03-SB-0-2				AOI01-03-SB-0-2-D				SFAASF-03-PA-SB-0-2			
Parent Sample ID					AOI01-03-SB-0-2							
Sample Date	2/7/2022				2/7/2022				2/7/2022			
Depth (bgs ft)	0-2				0-2				0-2			
Analyte	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual	Result	LOD	LOQ	Qual
pH (SW9045D) (SU)	8.9	0.01	0.01		8.8	0.01	0.01		8.7	0.01	0.01	
Temperature (SW9045D) (deg C)	19.9	0.01	0.01		19.9	0.01	0.01		20.7	0.01	0.01	
Total Organic Carbon (SW9060) (mg/kg)	2400	240	360		3300	220	330		4600	230	350	
Notes: SU= Standard unit. °C = Degrees Celsius. mg/kg= Milligram(s) per kilogram. ft = Foot (feet). bgs = Below ground surface. LOD = Limit of Detection. LOQ = Limit of Quantitation. Qual = Qualifier.												

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Appendix G

Laboratory Reports

Due to file size, laboratory reports are provided electronically (CD) or can be requested.

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