SITE ASSESSMENT REPORT

SPOKANE INTERNATIONAL AIRPORT
Spokane, WA
Facility Site ID: 6332493; Cleanup Site ID: 16774

Prepared for:

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LIST OF ABBREVIATIONS

ADF	aircraft deicing fluid
AFB	Airforce Base
AFFF	aqueous film-forming foam
Amsl	above mean sea level
AOA	Air Operations Area
ARFF	Airport Rescue and Fire Fighting
bgs	below ground surface
BMPs	best management practices
CFR	Code of Federal Regulations
COO	Chief Operating Officer
CRBG	Columbia River Basalt Group
DoD	Department of Defense
Ecology	Washington State Department of Ecology
EO	Enforcement order
ERIS	Environmental Risk Information Services
FAA	Federal Aviation Administration
FWS	United States Fish and Wildlife Service
GRV	glycol recovery vehicle
GSI	GSI Environmental Inc.
HFPO-DA	hexafluoropropylene oxide-dimer acid
IAC	International Aerospace Coatings
ITRC	Interstate Technology and Regulatory Council
MCL	maximum contaminant level
MTCA	Model Toxics Control Act
NTSB	National Transportation Safety Board
PFAS	per- and polyfluoroalkyl substances
PFAS CAP	Per- and Polyfluoroalkyl Substances Chemical Action Plan
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoDA	perfluorododecanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid

LIST OF ABBREVIATIONS

PFODA	perfluorooctadecanoic acid
PFOS	perfluorooctane sulfonic acid
PFPeA	perfluoropentanoic acid
PFPrA	perfluoropropanoic acid
PFTetA	perfluorotetradecanoic acid
PFUDA	perfluoroundecanoic acid
POTW	Publicly owned Treatment Works
PWS	public water systems
SDWA	Safe Water Drinking Act
SIA	Spokane International Airport
SMaRT	Spokane Material and Recycling Technology
SRVP	Spokane Valley-Rathdrum Prairie Aquifer
SWGE	Synoptic well gauging event
UCMR	Fifth Unregulated Contaminant Monitoring Rule
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WA DoH	Washington State Department of Health

1.0 INTRODUCTION

GSI Environmental Inc. (GSI) prepared this Site Assessment Report on behalf of Spokane International Airport (SIA), also known by its International Air Transport Association code, GEG. The report addresses requirements detailed in Task 1A (Site Assessment Report for PFAS) of Enforcement Order No. DE22584 (the EO) as issued by the Washington State Department of Ecology (Ecology) on 29 March 2024. This report is meant as a preliminary review of information gathered to date and will serve to support additional work to be conducted in the Preliminary PFAS Investigation (Task 1B of the EO) and as part of the Remedial Investigation. The initial information and findings stated in this report may be subject to change following additional data collection and analyses conducted as part of the EO investigations. Table 1.1 states the required elements as outlined in the EO for the Site Assessment Report and the corresponding sections within this report. In addition, general background on environmental conditions at the site including the environmental setting and hydrogeology are provided.

The focus of this Site Assessment report is to provide preliminary information gathered to date regarding the potential and known usage of aqueous film-forming foams (AFFF) at SIA that contain per-and polyfluoroalkyl substances (PFAS) with an objective, “to identify potential source areas for further investigation and guide the collection and interpretation of soil and groundwater analytical data”, as stated in the EO. The airport’s usage of AFFF containing PFAS relates directly to the airport’s compliance with federal regulations. Recognizing these federal mandates is important for understanding AFFF usage on airport property, including past military operations at the airport. The Federal Aviation Administration (FAA) requires airports certificated pursuant to 14 CFR Part 139, like SIA, to use AFFF that meets certain federally mandated standards, including those established by the Department of Defense since at least the late 1960s. Through its advisory circulars and separate published guidance called “CertAlerts,” airports are provided the guidance needed to maintain their Part 139 certification which includes specification on the type of firefighting foam to use, amount of AFFF required on site, and testing protocols (see Section 4.1). Only in 2023 has a fluorine-free foam become an option and the transition to fluorine-free foam at Part 139 airports is likely to occur over the next several years. The new fluorine-free foams are not drop-in replacements for AFFF, as they may require modifications to equipment for application and discharge, cannot be mixed with AFFF products, and require new extensive training for firefighting personnel. The FAA and DoD are actively working on guidance for the proper and effective transition.

With this background and experience at other military and civilian airports, GSI conducted a review of documents, including publicly available sources and environmental and facility reports provided by SIA all with the goal of understanding AFFF usage at SIA under its FAA mandate. GSI staff also interviewed individuals from SIA with working knowledge of the SIA fire department and operations. This report serves as a compilation of SIA specific information, obtained to date, pertaining to the history and use of AFFF across the airport area. The report also identifies potential sources of PFAS that are not associated with airport operations. The findings from the historical and operational review, the interviews, and research from publicly available documents are summarized in this draft report and that information has helped to inform our initial focus on areas of potential concern for future investigation.

2.0 AIRPORT DESCRIPTION

SIA is located within Spokane County and is jointly owned by Spokane County (the County) and the City of Spokane (the City). The operating authority of Spokane Airports is the Spokane Airport

Board, consisting of seven appointees from the two governmental bodies. The airport property is comprised of multiple parcels with a range of property uses, the most common being vacant land (Table 2.1). The airport operates as a regional commercial service for the surrounding community and is the second largest airport in the State of Washington. The Airport offers service to destinations across the Western, Midwestern, and Central United States, and onward connections to the rest of the country and the world. The FAA recognizes SIA as a "small hub." As an airport serving passenger aircraft SIA is required by the FAA to be certified under 14 Code of Federal Regulations (CFR) Part 139, Certification of Airports (Part 139).[1] The Airport Operating Certificates specified in Part 139 are for compliance with safety and emergency response requirements, including the federal requirements for aircraft rescue and firefighting.

The term “Site” as used in this report refers to the main operational area within the SIA property boundary as shown in Exhibit A of the EO and presented in Figure 2.1 as the “Primary Airport Area” and is not meant to define the facility boundary as defined by WAC 173-340-200 as that spatial designation is the subject of this ongoing investigation. The fence line shown in Figure 2.1 surrounds the portions of the site that are considered part of the SIA secure operations, also called the “airside” or secure area, as discussed further in Section 2.1.

The sections below provide further information discovered to date regarding the airport operations and the environmental setting.

2.1 Current Operations

As mentioned above, the City and County of Spokane jointly own SIA and the Airport Business Park (Spokane Airports), which entails operational areas including the Airport Passenger Terminal and airfield. Existing buildings are leased for third-party use and real estate is available and designated for third-party development or built-to-suit. Combined, operations within the SIA property include airfield operations and supporting infrastructure, and several on-Site businesses.

Airport operations are divided into airside and landside areas, as shown in Figure 2.2**.** Airside operations are within the secure fenced Air Operations Area (AOA). The runway side of the passenger terminal, field maintenance, fuel station, and glycol storage area are all part of the AOA. Third party operators holding leases are also within the fenced area. The Aerospace center is a third party leased area where local businesses such as International Aerospace Coatings (IAC) and others operate.

Landside airport infrastructure, outside of the secure fenced AOA, includes the stormwater recovery area and land treatment area. Additional aviation-related support industries and non-aviation businesses are present outside the fence line. Several lease holders have operations concentrated in the Business Park area, including cargo/shipping facilities (Federal Express, United States Postal Service, United Parcel Service, Amazon Air), Spokane Waste to Energy, Spokane Materials and Recycling Technology Center (operated by Waste Management), and Geiger Corrections Center (operated by Spokane County).

2.2 Site History

The land upon which SIA is situated has been under the ownership and management of the City, County, Spokane Airport Board or a branch of the Department of Defense (DoD) since 1939. Prior to the formation of the Spokane Airport Board, it is unclear which roles the City and County assumed in the leasing and management of the property, but they will jointly be referred to as Spokane in this section. Construction of the initial airfield (called Sunset Field) began in 1939 after

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[1] https://www.faa.gov/airports/airport_safety/part139_cert

Spokane leased the land upon which SIA sits to the DoD. Sunset Field was then purchased by DoD from Spokane in 1941 and was renamed Geiger Field in 1943.

During World War II Geiger Field served as a DoD base for training bomber crews. (USACE, n.d.) After World War II management of the airport was given to Spokane in 1948, though this was short lived as Air Force activities resumed in 1950 during the Cold War. Over the years, Geiger Field continued to serve as a DoD airfield hosting different units such as the US Air Force, Army National Guard, and the Air National Guard. In 1960 was then renamed Spokane International Airport retaining the International Air Transport Association code of GEG. Major training and air defense missions were maintained at the airport until 1963. At this time, control of main runways was transferred to the Spokane Airport Board while some areas that are currently part of SIA, such as family housing units and National Guard areas were owned, leased or otherwise occupied by a branch of the DoD. The Army National Guard leased a portion of SIA, currently Aerospace Park, until 2006 (USAF, 2006). It in unknown what year SIA acquired this property and the adjacent parcels that encompass the current Air National Guard property as it was designated as the pre-existing location Amy National Guard in the 1950s Geiger Field Master Plan (USAAC, 1956).

Due to the types of operations and use of the Site formerly owned by, leased to, possessed by or otherwise operated by the DoD prior to October 1986, the site was classified as a Formerly Used Defense Site (FUDS) (FUDS Installation ID WA09799F340300) (USACE, n.d.) under the Defense Environmental Restoration Program (DERP). Prior to the establishment of DERP, the DoD began assessing and cleaning contaminated sites across the US in 1975 under the Installation Restoration Program (IRP). IRP has a broader constituency of sites as it applies to FUDS in use before or after 1986, Base Realignment and Closure (BARC) sites, and active installations. Initial investigations of DERP FUDS occurred from 1984 to 1991 (Herrera, 2003) when PFAS, associated with AFFF or other products, would not have been a potential contaminate of concern for evaluation. Additional IRP investigations managed by the USACE took place during this time and did not evaluate potential PFAS contamination.

Details related to DoD and SIA joint fire training areas have been documented in relation to soil and groundwater contamination of petroleum hydrocarbons (ERM-West, Inc., 1996; OpTech, 1995). In-between the southeast end of runway 3-21 and the current Air National Guard property a portion of land was used as a landfill from 1961 to 1967. While these waste pits were periodically burned – it is uncertain whether these burning events were used as fire training events. During this period, it is known that the Air National Guard began training firefighting crews north of the landfill on unprotected ground in a burn pit. A clay lined pad was installed in 1986 and it is reported that fuel and water runoff was drained into an adjacent catchment pond (location unknown). It is unknown what year SIA began participating in fire training exercises with the Air National Guard and if the Army National Guard participated. Further details of SIA participation are detailed in section 4.2.3. Given the timeline of fire training events, the use of AFFF by the Air National Guard prior to 1986 qualifies this specific area as a formal DERP-FUDS. At this time, documents cited in IRP reports which may contain further information have been requested but not yet received.

Exhibit 2.1 SIA Ownership & Historical Operations

Year	Geiger Field Ownership & Operations History
1939	Spokane leases what is now GEG to the military for one dollar a year, banning civilian use. The Works Progress Administration and the Army jointly prepared the runways at Sunset Field.[a]
1941	The DoD purchased Sunset Field from Spokane for World War II B-17 and C-47 training facility.[a]
1943	Sunset Field is renamed Geiger (GEG) Field, and the Army Air Depot begins operations.[a]
1946	A portion of the airfield was designated a municipal airport, and commercial airline operations were moved from Felts Field to Geiger Field.[a]
1948	Post WWII, the management of Geiger Field returned to Spokane.[a]
1950	The management of Geiger Field is returned to the DoD as Air Force activities resumed during the Cold War. [a] Additional base infrastructure constructed in current Business Park.
1960	Geiger Field was renamed to Spokane International Airport.[a]
	Air Force 116th Observation Squadron and the 141st Division Air Service move to present location at SIA and are redesignated as the 116th Fighter Interceptor Squadron and the 142nd Air Defense Wing.[c]
1962	Spokane Airport Board is formed under the Airport Joint Operations Agreement [b]
1963	Air Force training and defense operations cease at Geiger Field. All but the National Guard and the Air Force family housing were transferred to the Spokane Airport Board.[b]
1976	The Air Force moves the Air National Guard 141st from GEG to Fairchild Air Force Base.[d]
	The 242nd Combat Communications Squadron (CCSQ) moved in as the host unit of the Spokane ANGS after the 116th and 142nd transferred from the site.[d]
1979	Geiger Corrections Center Constructed from former base housing.[e]
1996	DoD transfers remaining Air Force family housing to the Spokane Airport Board.[b]
2006	Army National Guard transfers helicopter operations from SIA (current Aerospace Park Area) to Fairchild Airforce Base.[e]
2010	Air National Guard 242nd Combat Communications Squadron completes move to Fairchild Airforce Base. [f]

References:
- a) (Mead and Hunt, 2014)
- b) (USACE, n.d.)
- c) (Spokane County, 2019)
- d) (ERM-West, Inc., 1996)
- e) (GHD, 2018)
- f) (USAF, 2006)
- g) (USAF, 2009)

2.3 Current and Historical Land Use

Land use near SIA is mixed and includes commercial, industrial, residential, agricultural, and open space. Planning for land use around airports must address several fundamental compatibility issues including safety, operational expansion, and noise. In addition, the proximity to Fairchild Air Force Base (AFB) creates another layer of complexity in local land use planning.

Properties bordering SIA to the South are zoned as Light Industrial (LI), to the West are a mix of Rural Traditional (RT) and Light Industrial parcels. On the North side of SIA, properties in the city of Spokane are designated as LI and within the Airport Overlay Zone. East of SIA (East of S Geiger Blvd.), properties are zoned as a Rural Cluster (RC), LI, Low Density Residential (LDR), Medium Density Residential (MDR), and several small parcels of High Density Residential (HDR).

Parcels owned by the Spokane Airport Board are not zoned according to the county zoning codes as they are within the Airport Overlay Zone.(Board of Spokane County Commissioners, 2004) Property use descriptions indicate that the majority of parcels within SIA are labelled as vacant or used for aircraft transportation. Only five out of 67 parcels within the SIA area are not described in either of these two ways. These properties are described with a mix of other services, governmental, or unclassified labels.

The Environmental Risk Information Services (ERIS) data package was obtained to assess changes in land use and topography over time. It includes historical aerial photos from United States Geological Survey (USGS) and the United States Department of Agriculture (USDA showing the airport area. Aerial imagery from five different years is shown in Figure 2.3 and summarized below:

- 1952 aerial imagery shows Geiger Field runways and associated infrastructure in the current Business Park area and the Army Air National Guard in the current Aerospace Park area, corresponding to the Geiger Filed Master Plan (USAAC, 1956). The Park Drive waste disposal area and excavation pits, recognized as a United States Army Core of Engineers (USACE) cleanup site (Ecology Facility/ Site No. 664, Cleanup Site ID 1233) are also visible. An excavated dumping area is also visible at the southern end of what is currently runway 3-21 on W Electric Ave, also a recognized USACE cleanup site (Ecology Facility/ Site No. 665, Cleanup Site ID 1149).

- 1962 aerial imagery shows further development of Geiger Field in the current Business Park area. Structures on the eastern side of the Army Air National Guard area are demolished and replaced by pavement. The Air National Guard infrastructure also appears in the location it currently occupies on W Electric Ave. Excavation pits of the Park Drive waste disposal area have expanded to the south and west. An additional series of buildings appear northwest of the Park Drive waste disposal area, adjacent to the current stormwater collection area.

- 1972 aerial imagery shows the beginning of current SIA infrastructure including the Terminal, expanded runways, and fuel area, parking lots, and construction of W Airport Dr. Between 1962 and 1972, some structures in the former Geiger Field area were demolished. The northeast portion of the densely vegetated topographic low area appears to have been infilled.

- 1991 aerial imagery shows the continued growth of SIA infrastructure to the northeast of the passenger terminal along with additional roadways. The areas north and northwest of the passenger terminal along U.S. Highway 2 underwent non-residential development. The Park Dr. waste disposal area is visibly infilled and the Spokane Waste to Energy facility was constructed adjacent to its southeastern extent. Some structures remain on the western portion of forger Geiger Field parallel to runway 3-21, though a majority in this area were demolished except for the buildings which are utilized as the Spokane County Correctional Facility. On W Electric Ave activity at the Remtech soil remediation area west of the Air National Guard property is visible. Adjacent to Remtech, the previous Geiger Field dumping area was infilled, and the land surface displays scarring in what is known to be the fire training area.

- 2017 aerial imagery shows further growth of SIA infrastructure, including the southward expansion of runway 3-21 and pavement of ramps on the western side of the Business Park area. Additional large structures in the business park areas include the Waste Management Recycling Center adjacent to the Waste to Energy facility and the USPS hub. Non-residential development has continued to expand in the areas north and northwest of the passenger terminal along U.S. Highway 2.

2.4 Geology and Hydrogeology

The regional geological and hydrogeological framework, as well as other information foundational toward building a conceptual site model, are detailed in Appendix A Geology & Hydrogeology (Haley & Aldrich, 2024) and generally summarized below. Due to the geological complexity of the area and limited Site-specific data, the information below presents a regional review of information to serve as a basis for future Site-specific work.

2.4.1 Regional Geology and Hydrogeology

SIA is situated within the West Plains area of Spokane County, a subregion of the larger Columbia Basin. The West Plains is bounded in the north by the Spokane River; bounded in the east by Marshall Creek, Latah Creek (formerly Hangman Creek), and the Spokane River; bounded to the south by upland buttes; and bounded in the west by the upland buttes and Spring Creek of eastern Lincoln County (McCollum and Pritchard, 2012).

The regional geology of the Columbia Basin consists of three major units: basement rock, the Columbia River Basalt Group (CRBG) with associated sedimentary interbeds, and overburden. The basement rock was subject to compression which formed faults creating rugged, high areas. During the Miocene era, lava flows filled the valleys between elevated basement rock, the exposed peaks are called buried hills or steptoes. During the Pleistocene, deposits from glacial floods formed a sedimentary layer over the lava deposits. The deposition of the lava flows generally creates a stratigraphic sequence with three distinct segments: flow bottom, flow interior, and flow top. Additional processes such as inflation (when hot lava pushes into an already cooled lava flow) disrupt the vertical superposition of the typical flow sequence. Based on hydrological resources, the West Plains region in the eastern Columbia Basin drains generally from southwest to northeast. The basement rock has low permeability, acting as the lower boundary of the West Plains aquifer system. As with the greater Columbia Basin, the West Plains aquifers are contained in units of the flood basalts, the CRBG, and the overlying unconfined sediment (Deobald and Buchanan, 1995). Understanding the CRBG stratigraphy and sedimentary deposits is a critical piece to characterizing the West Plains hydrogeologic system.

2.4.2 Site-Specific Geology and Hydrogeology

The topography of the airport area is a relatively flat plain gently sloping downward from an elevation of 2390 feet to 2290 feet above mean sea level heading from the southern end of the site to the northeast area (Derkey et al., 2004; Hamilton et al., 2004). The geology at the Site generally consists of sedimentary overburden deposits underlain by the CRBG at variable depths. Overburden thickness across the site ranges between 4 feet and 32 feet consisting of mostly of silt, silty sand to sand, and gravels. Fill materials are also present in some areas from previous remedial and waste disposal activities related to Former Geiger Field operations. The depth to basalt under the overburden tends to be deeper in the southwestern portion of the Site and shallower in the stormwater recovery area to the northeast. Depth to groundwater was observed to range from less than 2 feet to 27 feet below ground surface (bgs) in March of 2024. Within the Former Geiger Field area sits another cleanup site, Geiger Corrections Facility (Facility/ Site No. 663, VCP No. EA0263). Ongoing investigations and groundwater monitoring at the Geiger Corrections Facility indicate seasonal variation in groundwater flow direction depending on depth with flow directions reported between east and northwest. Proximity to paleochannels may also influence flow paths in some sections of the northern and western boundaries of the Site. The southeastern boundary of the paleochannel closest to Airway Heights parallels the western portion of the Site and is located approximately 1.5 miles west of SIA and the southern point of the paleochannel originating near the north side of SIA (GeoEngineers Inc., 2007; Northwest Land & Water, Inc., 2012).

In general, more information is needed to determine Site-specific groundwater flow paths; more data is needed to substantiate groundwater elevations, flow directions, and hydraulic gradients. These will be evaluated in future investigations.

2.4.3 Topography and Land Cover

The landscape within the West Plains consists of mixed semi-arid shrub steppe grasslands, sparse mixed conifer forest and shrub steppe, barren rock surfaces, agricultural land, and urban-semi urban uses (GSI Water Solutions Inc. et al., 2015).The landscape around the Site also includes some stormwater infrastructure, impermeable surfaces caused by shallow to surficial bedrock, and coarse-grained deposits that infilled paleochannels to the north-northwest, west, and southwest of the Site.

2.5 Groundwater

Groundwater is present at the Site in unconfined sediments, also known as the overburden aquifer, and the CRBG aquifer. Groundwater in the West Plains area generally flows northeast, towards the Spokane River. Drinking water for the City of Airway Heights (Water System ID No. 006502) comes from two interties with the City of Spokane, as well as the CRBG aquifer, and the paleochannel within the West Plains (WA DoH, 2023). In 2017, perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) were detected in municipal wells and attributed to firefighting activities at Fairchild AFB (ATSDR, 2022). The City of Airway Heights has since been reliant on City of Spokane after emergency water supply connection was established in 2018 (City of Spokane, 2023). The alternative water supply identified for the City of Airway Heights is the Spokane Valley-Rathdrum Prairie Aquifer (SVRP) (GeoEngineers, 2021).

East of the West Plains, the SVRP is the only drinking water source for the City of Spokane; the U.S. Environmental Protection Agency (EPA) designated the aquifer as a sole source aquifer in 1978(USEPA, 1978).

According to the USGS, the SVRP aquifer in western Spokane consists of two relatively independent systems mostly separated by a buried basalt ridge. The basalt ridge extends approximately two miles south of Five Mile Prairie, a neighborhood located on the north side of Spokane. The main body of the aquifer is east of the basalt ridge. The two SVRP aquifer systems are presumably connected by the Trinity Trough that breaches the basalt ridge (USGS, 2005).

2.6 Surface Water

The Site is located within the Hangman Watershed (HUC 17010306) and the Lower Spokane Watershed (HUC 17010307). The United States Fish and Wildlife Service (FWS) has classified several streams within and surrounding the Site as perennial or intermittent in their database, as identified in Figure 2.4 and described below:

Unnamed Stream 1

This stream is comprised of a series of discontinuous perennial and intermittent streams along the northeastern portion of the Site. Segments east of the Perimeter Ditch located within the Primary Airport Area are classified as unknown perennial. The ‘unknown’ classification indicates uncertainty in consistency of water flow, underlying substrate, and dissolved oxygen concentrations. The flow direction of these stream segments is generally east, northeast. Outside of the Primary Airport Area segments are classified as intermittent seasonally flooded streams with unconsolidated beds. The flow path of the intermittent sections of this stream shifts to the northeast east of W. Allan Rd following S. Geiger Blvd. flowing towards Highway 2. Connectivity between segments is not known and requires further evaluation.

Unnamed Streams 2 & 3

There are two unnamed streams located within the southwestern portion of the Site boundary. The FWS classified both streams as intermittent seasonally flooded streams. The easternmost stream begins south of SIA and flows north, here referred to as Stream 2. Stream 2 begins as an outflow of the ponds located in The Plains Golf Course, then flows north toward W. Geiger Blvd, parallel to S. Thomas Mallen Rd. A waterbody located between the Caterpillar distribution center and the Keystone Automotive Operations drains into the stream prior to W. Geiger Blvd. Stream 3 begins as an outflow of a waterbody approximately 500m southwest of the Spokane County Sheriff's office. The stream flows though Spring Lake and Lake Eleanor before it continues northeast and converges with Stream 2, approximately 700 ft to the southwest of the current SIA Fire House. The combined flow is directed generally to the north towards the catchment basin of the perimeter ditch that runs along the western boundary of the airport.

Wetlands

In 1993 the Washington State Department of Ecology Wetlands Program conducted a site investigation to determine if on-Site areas were subject to wetland regulations. The investigation by Ecology concluded that the habitat and detention ponds at the mouth of the Stormwater Recovery Area did not exist prior to stormwater discharge and is part of the stormwater system. Therefore, the ephemeral ponds in the Stormwater Recovery Area are not subject to state regulation as wetlands (WA ECY: Nichols, 1993).

3.0 RECORDS REVIEW

Site-provided historical records, publicly available information, information purchased from a service provider of environmental due diligence data (ERIS), and interviews of onsite personnel were utilized in compiling this report. Details on the relevant reports and data sources are provided in this section and summarized in Exhibit 3.1.

Exhibit 3.1 Summary of Records Reviewed

Record Type	Reference	Description
Incident Records Review	National Transportation Safety Board (NTSB) Aviation Investigation Search	Aviation accident database contains civil aviation accidents and selected incidents that occurred from 1962 to present within the United States.
Site Environmental Records	Environmental Risk Information Services (ERIS)	Database report, Historical Aerials, Fire Insurance Maps.
Previous Investigations	Washington Department of Ecology – What's In My Neighborhood [a]	Previous and ongoing contamination cleanup site details.
Site Personnel Interviews	Former fire chief, current Chief Operating Officer (COO)	SIA Fire Chief from 1999-2022 SIA COO from 2008 to present

Notes:

a) https://apps.ecology.wa.gov/neighborhood/?lat=47.624284&lon=-117.528921&zoom=14&radius=false *accessed February 28, 2024.*

3.1 Interviews of Site Personnel

GSI conducted interviews with the former fire chief and COO at SIA. The former fire chief worked at SIA from March 1999 to January 2022. The former fire chief is well versed in the standard practices and procedures associated with aqueous film-forming foam (AFFF) use at the site and provided insight into historical AFFF use at the site. He was present for the 2016 changeout from C8 to C6 foam at SIA and is familiar with the procedures followed in those scenarios.[2] A second follow up interview was conducted with the COO employed at SIA since 2008. He provided additional information on general site operations. Information provided during these interviews with GSI is provided primarily in Section 4.0**.**

3.2 Incident Record Review

Records available from the National Transportation Safety Board (NTSB) were reviewed to identify potential incidents *that may have* been responded to by SIA ARFF. Aviation final investigation reports associated with the GEG airport code were reviewed for details indicating incident locations and details indicating aircraft fires and or explosions. Incidents with reports indicating hard landings or fires were further explored by researching local news records. Articles from local newspapers and media sources were also used to identify significant fire events in the area *that may have* required emergency response with AFFF by SIA or emergency response mutual aid partners. The identified NTSB incidents where fire was mentioned, and any incidents identified in public news articles were reviewed during the interview with site personnel to obtain additional details regarding the emergency response methods.[3] The NTSB reports do not provide detailed information regarding specific response actions for recorded incidents.

3.3 Site Environmental Record Review (ERIS)

The information received from ERIS that was used in this Site Assessment included aerial photographs and fire insurance maps. A summary analysis of historical aerial images is provided in Section 2.3; however, no fire insurance maps were found in the ERIS search for the Site.

3.4 Data Gaps

The review and compilation of SIA operations and PFAS usage provides a foundation for building the Preliminary PFAS Investigation and Remedial Investigation Workplans to evaluate the possible existence and extent of PFAS contamination on the Site. However, some information was either not available or could not be located at the time this report was prepared. In addition to the uncertainties in Site-specific hydrogeology already detailed in Section 2.4, additional specific data gaps include:

- Depth to groundwater and direction of groundwater flow across the site including seasonal variation.
- Connectivity between different groundwater bearing units across the site.
- Flow and connectivity of surface water features.
- Confirm current (2024) stormwater infrastructure.
- Purchase records for AFFF prior to 2017.
- Documentation of any soil work that has been conducted in the potential areas of concern (Section 8).

If additional information becomes available over the course of further investigation, it will be included in subsequent reports, such as the Remedial Investigation Report.

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[2] Legacy AFFF is often called "C8" due to presence of long-chain PFAS, including perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). Beginning in 2016, re-formulated AFFF without long-chain PFAS became commercially available, often designated as "C6" indicating that all PFAS in the AFFF have six or fewer fluorinated carbons. See further detail in Section 4.1.

[3] NTSB Incident Numbers SEA96FA040 and SEA94FA085 (https://carol.ntsb.gov/)

4.0 HISTORICAL AND CURRENT FIRE EMERGENCY RESPONSE SYSTEM

SIA is recognized by the FAA as a small hub with a Class I Part 139 classification. The FAA also prescribes an ARFF Index value for the purposes of aircraft rescue and firefighting, determined by the length of the aircraft serving the airport. The ARFF index then dictates the number of ARFF vehicles, quantity of AFFF to be stored, and several other emergency response related requirements needed to provide for the safety of passengers and airport staff.[4] SIA has been assigned an ARFF Index of “C”, which means that the mobile units at the site must include 1) one vehicle with a dry chemical extinguishing agent in addition to AFFF and 2) one or two vehicles carrying sufficient AFFF and water to produce at least 3,000 gallons from all vehicles, as specified in 14 CFR 139.317.

The SIA Fire Department currently consists of 22 career firefighters working out of the current SIA Fire House, which is equipped to respond to emergencies involving ARFF and structural firefighting for the airport. (“Spokane International Airport Fire Department,” 2024a) The ARFF division of SIA responds to all reportable hazardous material and/or chemical spills. (CES, 2015).

4.1 Fire Fighting Foam Background Information

Many airports began using AFFF in the 1970s, and in 2004, the FAA mandated the use of foam meeting DoD military specifications (Mil-Spec) at FAA-regulated Part 139 airports (HRP, 2024). The FAA has required that any Part 139 airport must use firefighting foam that met this military specification, as documented through the agency’s advisory circulars and “CertAlerts,” guidance (FAA, 2004). For example, the 2006 CertAlert stated that “[a]ny [aqueous film forming foam] purchased after July 1, 2006 by an airport operator certificated under Part 139 must meet the Mil Spec as mentioned above.” (FAA, 2006). The 2016 CertAlert further instructed airports to “check the [Department of Defense] [Qualified Product Database] web site before each AFFF purchase,” to ensure they were using the firefighting foam that met military specifications (FAA, 2016, p. 2). This 2016 guidance superseded CertAlerts from 2006 and 2011, each of which also required using AFFF that met military specifications (FAA, 2011, 2006).

As to FAA oversight, the FAA directly supervised the use of this firefighting foam, including discharges of the foam at the airport. As explained in the 2019 CertAlert, airports operating under Part 139 must maintain and test their firefighting systems, “must maintain proper successful documentation of the testing” of their aircraft rescue and firefighting vehicles and must “have [the documentation] available during the [airport’s] periodic [safety] inspection.” (FAA, 2019a, p. 1). The FAA guidance further stated that “[i]f the airport operator does not conduct testing within these intervals, *the FAA will require the airport operator to discharge AFFF during the airport’s periodic inspection*, for those vehicles identified to meet the ARFF [Aircraft Rescue and Firefighting] Index.” (emphasis added) (FAA, 2019b, p. 1). According to the FAA, “[t]esting the system is an integral part of maintaining [aircraft rescue and firefighting] vehicles in optimal condition for an emergency response.” (FAA, 2019b, pp. 1–2).

Before the 2019 CertAlerts, the FAA had not approved a method for testing the ability to discharge the firefighting foam other than by dispensing it onto the ground. But in the 2019 CertAlert the FAA began allowing airports to conduct their testing by using “AFFF testing equipment that do not require foam to be dispensed onto the ground.” (FAA, 2019b, p. 2). The reason for this shift was that the FAA recognized “growing concern over the use and discharge of AFFF at airports” because “[t]he molecular composition of specification MIL-PRF-24385 contains a chemical

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[4] https://nap.nationalacademies.org/read/23035/chapter/1

compound"—i.e., PFAS—"found to potentially contaminate drinking water." (FAA, 2019b, p. 2). Until 2023, the FAA did not allow using fluorine-free foams, because "the fluorine-free foams on the market do not match the performance of their fluorinated counterparts" and "are not able to provide the same level of fire suppression, flexibility, and scope of usage as MIL-PRF-24385 AFFF firefighting foam" (FAA, 2019b, p. 2).

In 2018, Congress directed the FAA to remove the requirement to use PFAS to meet the performance specifications of Mil-Spec foams, and in 2022, Congress further directed the FAA to develop a transition plan to replace all AFFF with fluorine free alternatives. In January 2023, the DoD issued Military Specification MIL-PRF-32725, which is a fluorine-free foam certification; fluorine-free alternatives were added to the Quality Product Database later that year (FAA, 2023).

The types of firefighting foams used to satisfy FAA regulations both historically and currently at SIA are discussed below and in Section 4.2.3.

4.1.1 Historical Foam System Transitions

During the interview with the former SIA fire chief, a historical review of foam types present at the site and typical changeout procedures were discussed. Prior to the development of PFAS-based AFFF, the primary fire response agent at SIA was protein foam. Between the 1970s and 1999, the first Mil-Spec C8 foams, including 3M Lightwater, were brought onsite, according to interviews with site personnel. As additional C8 formulations received Mil-Spec approval, other Mil-Spec foams were purchased as needed, but 3M Lightwater was the primary AFFF used at SIA and across most civilian and military airfields. Within the Mil-spec guidance, mixing of different Mil-Spec AFFF was permitted, and was also a historical practice at SIA. In the early 2000s, EPA negotiated an agreement with AFFF manufacturers to prohibit C8 foams by 2015, due to information it had obtained about the environmental and/or health impacts of those foams (EPA Docket ID: EPA-HQ-OPPT-2006-0621). Neither EPA nor foam manufacturers ever shared related information with SIA. After the C8 foam was banned, SIA transitioned to a C6 AFFF formulation in 2016.

During the 2016 foam changeout, two (2) 500-gallon single-wall plastic tanks storing C8 foam concentrate were emptied and refilled with the C6 AFFF concentrate. The legacy C8 foam concentrate was donated to an ARFF training facility outside of Spokane County. The concentrate-containing tanks on SIA crash response trucks were rinsed and washed out to remove debris from the tank bottoms. Rinse water was sent to the drains at the current SIA Fire House, which flow to an oil water separator, then to the sanitary sewer system and the City of Spokane publicly owned treatment works (POTW). During the interview with the former SIA fire chief, it was mentioned that the empty foam concentrate tanks on the airport's crash trucks may have been washed out outside of the current SIA Fire House (on the concrete pad on the south side of the building) prior to the filling the tanks with C6 foam concentrate, in which case rinse water may have flowed into the nearby grassy area or penetrated the concrete pad. In 2016 there was no guidance or established procedures related to rinsing of equipment or crash response trucks or management of the rinsate. No further information is currently available regarding this specific changeout event.

The SIA purchased fluorine-free foam to replace all PFAS-containing AFFF in September 2023, when approved to do so by the FAA. (SIA, n.d.) The SIA is waiting for guidance from regulators on best practices for removal of C6 foam concentrate and cleaning of mobile foam unit tanks and fixed foam concentrate storage tanks prior to replacing with fluorine-free foam. SIA must also retrain its firefighters to use the new F3 foams.

Exhibit 4.1 Types of Foam Used Over Time at SIA

Year	Event
Between 1970s and 1999	Mil-Spec 3%: 3% concentrate C8 foams (3M Lightwater, Ansulite, etc) installed in mobile units, fixed units, and stored at the SIA Fire House
2016	Mil-Spec 3%: 3% concentrate C6 foams (Ansulite, Chemguard, Tyco) installed in mobile units, fixed units, and stored at the SIA Fire House
2023	Fluorine-Free Foam purchased and stored at the SIA, n.d.). According to the COO, the SIA is waiting for guidance from regulators before changeouts from C6 to fluorine-free foams, particularly regarding rinsing procedures and handling of rinsate.

Only 3% concentrate foam was used at SIA and the types of foam used over time are presented in Exhibit 4.1. In the early 2000s (2002 or 2003), over 1,000 gallons of C8 3M Lightwater (Mil-Spec) foam was purchased from an aircraft carrier as military surplus. Typical foam purchases were primarily small quantity packaging such as 5-gallon pails and 55-gallon drums. While C8 was used at the site, a variety of Mil-Spec approved brands were mixed for use. The 3M Lightwater brand was primarily used with some Ansulite and National Foam mixed in. According to the former fire chief, foam restock purchases were budgeted every year, but actual purchases were not less frequent than every 5 years. In accordance with FAA regulations, foam supply at SIA was kept at roughly 1,300 to 1,600 gallons (depending on the truck inventory) to account for about 300 gallons more than the volume required to load the foam-containing trucks twice. During interviews with the former SIA fire chief, Ansulite was identified as the main C6 foam used at SIA after the 2016 transition. Based on purchase records from 2017 provided by SIA, Chemguard and Tyco were also C6 AFFF brands used at the site.

4.2 Fire Suppression System Information

The SIA fire suppression system consists of fixed and mobile foam systems. Fixed foam systems include foam concentrate storage and permanent infrastructure for foam application such as piping and nozzles. Mobile units typically include fire or crash trucks fitted with tanks for foam concentrate storage. In response scenarios, mobile units will connect hosing to hydrants or other water sources to be mixed with foam concentrate to deliver finished foam.

4.2.1 Fixed Foam Systems

Based on information provided during the SIA fire chief interview, foam is currently stored onsite at the SIA Fire House, the field maintenance warehouse, and Hangar 725 (Exhibit 4.2). The historical SIA Fire House, which was located directly northeast of the terminal as shown in Figure 4.1, was used from about the mid-1970s until 2014. During this time, a supply of C8 foam was stored in three 300-gallon plastic tanks joined together with a manifold and fitted with a pumping system used for resupplying mobile foam units. After 2014, the C8 foam concentrate was transferred into two 500-gallon poly tanks at the current SIA Fire House, located southwest of the terminal as shown in Figure 4.1. The three 300-gallon poly tanks and pumping system were left onsite and repurposed for refilling pavement (not aircraft) deicing trucks with deicing fluid. The two 500-gallon tanks at the current SIA Fire House are used for refilling the crash trucks. Spill containment is in place for storage tanks and floor drains in the SIA Fire House flow to the sanitary sewer (CES, 2015). SIA Fire House drains flow to the oil water separator, then to the unlined perimeter ditch. The former fire chief noted one incident of a leaking valve in the foam storage tank at the SIA Fire House. The leaking valve was repaired, and foam was cleaned from the area using absorbent pads.

The fixed foam system installed at Hangar 725, located in the General Aviation area on the east side of the airport property, consists of two 1,000-gallon tanks of AFFF concentrate. The system was installed in 2016 and contains ChemGuard (C301MS). The system is regularly maintained, in good condition. All historical testing was performed using only water with no usage or mixing of the stored AFFF concentrate (the concentrate is held in tanks and valved off from the system). There are no known incidents related to the discharge of AFFF in the hangar manifold system.

A dry manifold fire suppression system is installed at the fueling station that does not rely on the use of foam or foam concentrates. Historically, a supply of about 1,000 gallons of C8 foam concentrate was stored at the field maintenance building and could be connected to the manifold at the fueling station in case of a fire. When the tank was removed from the field maintenance building, the C8 foam was added to the storage capacity at the SIA Fire House. The former fire chief was unsure of the year this took place.

Prior to the former fire chief's time at SIA, the fuel farm was in the easternmost parking lot, near the Field Maintenance Area (near the intersection of West Aviation Avenue and Flint Road) until 1993. No evidence was found indicating the former fuel farm was fitted with a fixed foam manifold and storage tank or had any AFFF stored there.

Exhibit 4.2 Foam Storage Locations

Foam Type	Year(s)	Total (gallons)	Storage Equipment and Location
C8 foam [1]	(1990s)-2014	900	Stored outdoors at the historical SIA Fire House: • 3 x 300-gallon Poly Tanks (CES, 2015)
	Unknown years	1,000	Field maintenance building: • 1 x 1,000-gallon tank (based on interview)
	Current (unknown start year)	2,000	Stored at Hangar 725: • 2 x 1,000-gallon tanks of foam concentrate (based on interview)
	2014-2016	1,000	Stored at the current SIA Fire House: • 2 x 500-gallon Poly Tanks (CES, 2018)
C6 foam [2]	2016-current	1,000	Stored at the current SIA Fire House: • 2 x 500-gallon Poly Tanks (CES, 2018)
Fluorine-Free foam	2023-current	1,280	Stored at the current SIA Fire House: • 5 x 256-gallon totes (interview with COO)

Notes:
1. A variety of Mil-Spec C8 foams were mixed for use, including primarily 3M Lightwater with some Ansulite and National Foam mixed in.
2. In the interviews with the former fire chief, Ansulite was identified as the main C6 foam used at SIA. Based on purchase records from 2017 provided by SIA, Chemguard and Tyco were also foam brands used at the site.

No additional fixed foam systems are known to be located currently or historically at SIA.

4.2.2 Mobile Foam Systems

The current SIA Fire House was constructed in 2014. Before construction, mobile equipment was stored at the previous SIA Fire House, located northeast of the A and B concourses from 1978 to

2014 (*Spokane International Airport Fire Department*, 2024b).[5] Both current and historical SIA Fire Houses and current foam storage locations are shown in Figure 4.1.

Prior to 2020 there were three mobile foam systems in use, two trucks with 1,500-gallon water tanks and 200-gallon foam concentrate supply and one more truck that held 3,000-gallon water tank and a concentrate supply of 400-gallons. It is not currently known when these trucks came into service the number of active trucks in service (three) has been the same since 1999. One 1,500-gallon truck is inactive but still currently stored on the Site (see below), ownership of the two remaining two trucks was transferred to other firefighting training facilities.

Mobile foam systems currently stored at the current SIA Fire House (9000 West Airport Drive) include the following mobile units and foam concentrate capacities:

- 2 crash response trucks with 3000-gallon water tanks and 400-gallon foam concentrate capacity.
- 1 crash response truck with 1,500-gallon water tanks and 200-gallon foam concentrate capacity.
- As mentioned above, an additional 1,500-gallon water capacity truck is inactive and stored onsite. There are no additional trailers or response vehicles with foam onsite.

4.2.3 Fire Training Information

Every three years, a crash training exercise is required by the FAA for SIA to maintain its Part 139 Certification and remain operational as a commercial passenger airport. The most recent training exercise in 2016 was staged at the Postal Service processing and distribution center on the southeast side of the main runway where an old 737 obtained from Federal Express was parked for use in required training exercises. Known as the Triangle Ramp, location C in Figure 4.1, this location has been used as the primary training area since 2000. Based on information reviewed and discussion with SIA's former fire chief, it appears that only water (no foam) was used during this training.

In addition to the FAA required training exercises, joint training sessions between SIA, Air National Guard, and Army National Guard took place historically on the south side of the airport, Location B in Figure 4.1, but was discontinued before 1999 due to hydrocarbon use without a recovery system in-place. From the 1950s through the 1980s various oils and solvents were provided by the Air National Guard for use in fire-training exercises (OpTech, 1995). Per the former SIA Fire Chief, these fire trainings were led by the Air National Guard and SIA ARFF equipment was not used. It is possible that AFFF was sprayed from Air National Guard equipment during these trainings. Training at this location and any possible usage of foam was discontinued after 1999.

4.2.4 Required Foam Testing and Calibration Events

FAA required flow foam testing to pass inspections. In 2016, testing with foam was no longer required, but it was still common practice for water to be sprayed through the foam systems for testing. At SIA, no rinsing of the fixed or mobile systems took place between flowing foam and water through the nozzles, hoses, pipes, etc. Some residual amount of AFFF may have been entrained during these water-only exercises. In 2016 due to environmental concerns, SIA ceased spray testing with foam. No testing occurred at SIA from 2016 to 2019. In 2019 the FAA no longer

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[5] Please note that this information is sourced from a publicly editable wiki. While efforts were made to ensure accuracy, the content may be changed by users. The citation provides the date the information was accessed.

required foam to be sprayed during inspections. As of 2019, SIA has used a specialized NoFoam System apparatus to allow for the FAA-required testing of fire vehicle foam distribution mechanisms without discharge of AFFF (SIA, n.d.).

Annual inspections and maintenance of the fixed foam system at Hangar 725 is performed by Western States Fire Protection (Liberty Lake, WA). Testing is performed using water only with no co-mingling of the stored AFFF concentrate. During freezing temperatures, the system would occasionally be triggered and release water into the hangar however, the valve on the AFFF storage tank remained closed. There are no known incidents of foam being sprayed through the system or the system being deployed.

During mobile unit certifications and associated testing, which took place once or twice per year prior to 2016, foam was mixed outside of the SIA Fire House and would be sprayed onto the grassy area. This took place at both the old and new SIA Fire House, as indicated in Figure 4.1. A minimum of approximately 200 gallons of water per truck would be sprayed. If a truck did not pass certification in the first test, it would be sent to the Field Maintenance area for repairs before another attempt at certification near the SIA Fire House. Any testing performed at the maintenance area during equipment maintenance or repairs likely only involved spraying of water through the trucks, as indicated on Figure 4.1.

4.2.5 Local Firefighting Networks

The SIA Fire Department has mutual aid agreements with several local emergency response teams, listed below (“Spokane International Airport Fire Department,” 2024b).

- City of Spokane Fire Department, Fire Station 6
- Spokane County Fire District 10 (North of the SIA)
- Spokane County Fire District 3 (South of the SIA)
- Fairchild Fire Emergency Services

These fire teams would be prepared to respond to emergency events in the other fire teams’ jurisdictions if necessary, including bringing equipment onsite and utilizing their equipment and foam inventory to aid in the onsite fire team’s response. According to the former SIA fire chief, in general, the SIA fire team did not respond to incidents outside of the airport. The SIA property was originally in the jurisdiction of Spokane County Fire Departments 10 and 3. Although the SIA now has its own fire department, the City of Spokane Fire Department is still required to respond to aircraft emergency incidents within or near SIA in a support capacity. Based on the interview with SIA’s former fire chief, the City of Spokane Fire Department maintains a stock of 500 gallons of AFFF, comprised of 5-gallon pails, which would be brought onsite as needed. Additionally, trucks brought onsite from the City of Spokane or Spokane County would be used for foam mixing and dispensing.

As an example of the mutual aid operations, while the Fairchild AFB runway underwent a closure in 2011, some DoD emergency response operations were relocated to SIA (DVIDS, 2011).

4.3 Potential and Known Use of Firefighting Foam

AFFF can be deployed in the case of an emergency response (i.e., airplane crash), fuel spill, or fire. Foam can also be deployed during training exercises, equipment testing and calibration, or accidental spill. According to the 2023 Stormwater Pollution Prevention Plan (SWPPP), fire suppression systems are permitted for use if flammable liquid or hazardous substances are spilled at the site (Valley, 2023a).

The events discussed in Table 4.1 are also displayed in Figure 4.1. In 2019, the SIA acquired a "NoFoam" system to allow for testing of ARFF equipment without the need to create or spray foam. Between 2016 and 2019, no testing was performed at the site due to concerns with AFFF.

5.0 WASTE STREAMS

Information related to wastewater, stormwater, and solid waste associated with airport operations is provided in this section. Figure 5.1 provides an overview of the key locations discussed in this report, including the land treatment area, stormwater collection and outfall areas, along with outlines to denote which of these components are located within the site boundaries versus the property boundaries. Semiannual groundwater sampling in the stormwater recovery and land treatment area is performed in accordance with the permit specifications as outlined in State Waste Discharge Permit No. ST0045499 (Valley, 2023a).

5.1 Stormwater

Stormwater at SIA is collected from three drainage areas, which all discharge to a stormwater recovery area northeast of the runway. The three drainage areas are summarized in Exhibit 5.1 and Figure 5.1 provides a map of the stormwater infrastructure.

Exhibit 5.1 Stormwater Management

Collection Area	Discharge Water	Stormwater Infrastructure
Alpha	Stormwater collected from the western portion of Runway 3-21 and the northwestern portion of the airport, including the Terminal, fire department, parking structures. Operations in this area involve deicing fluid application and collection for land application.	Trench drains, pipelines, inflatable pipe plugs, outfall to unpaved channel
3-21	Stormwater collected from the eastern portion of Runway 3-21, including the landside Business Park operations extending to S Geiger Blvd. Stormwater from this area could be characterized as light industrial runoff associated with general aviation facilities and aircraft maintenance buildings.	Trench drains, pipelines, inflatable pipe plugs, outfall to unpaved channel
Perimeter Ditch	Stormwater collected from the south and southwest portion of airport and a portion of the Air National Guard property, along W Electric Ave to S Geiger Blvd. In addition to Air National Guard operations, other third-party industrial activities taking place in Aerospace Park would contribute to this stormwater collection area.	Drainage around airport to recovery area via the Perimeter Drainage outfall

The majority of stormwater at SIA is collected in drains and a series of swales/ditches and is conveyed to the stormwater recovery area. SIA implements a variety of stormwater best management practices (BMPs) before discharging to the stormwater recovery area, including an oil water separator for the vehicle parking areas, an oil water separator with a sand filter at the fuel storage area, and grass swales throughout the site to aid in detention and natural attenuation. A portion of the stormwater infiltrates to the subsurface through the swales, but the remainder reaches the main collection system and is discharged through the three permitted stormwater outfalls (Valley, 2023a). Part of the waste discharge permit associated with stormwater outfalls requires monthly discharge monitoring reports be submitted, reporting the flow of stormwater. Flow is measured via continuous meters installed at the Alpha and 3-21 outfalls, the Perimeter Ditch outfall flows periodically and is not required to be monitored for flow rates.

Paved areas around the airline refueler parking area and ground support equipment shop flow to a storm drain inlet and an oil water separator for pretreatment prior to entering a dry well located on the south side of the building. The floor drains and drain for the wash rack in the area flow to oil water separator that is connected to the sanitary sewer (Valley, 2023).

Based on Table 3 in the 2023 SWPPP, stormwater from the area where fuel storage and transferring, and storage of materials (including AFFF), take place would drain to the Alpha Outfall (Valley, 2023a). The stormwater recovery area includes two shallow channels; the Alpha outfall discharges to the north channel and the 3-21 outfall discharges to the south channel. The outfall for the Perimeter Drainage area discharges into the stormwater recovery area at a location north of the Alpha outfall. The north and south channels convey stormwater to three detention areas which are noted in the SWPPP. From early winter to spring the ponds fill as a result of precipitation and snowmelt that results in saturated soil conditions and a continuous baseflow through the outfalls. Between summer and late fall, the surface flows in the channels disappear due to lack of rainfall, evaporation, and infiltration resulting in the ponds becoming dry. There are no permanent receiving waters in the stormwater recovery area (Valley, 2023a). Groundwater monitoring is currently conducted twice per year in April and October in the stormwater recovery area, per the requirements of the permit. Previous quarterly groundwater monitoring has indicated little to no variation in groundwater flow direction between seasons, with groundwater flowing to the east, east-southeast (CES, 2019).

During the winter months, SIA applies surface deicers, consisting of sodium formate, sodium acetate, and potassium acetate, to control ice-buildup on paved surfaces. SIA airline operators spray aircraft deicing fluids (ADF), liquids consisting primarily of propylene glycol, onto aircraft to control ice-buildup and ensure safe operations of their aircraft pursuant to FAA mandates. ADF itself is not a source of PFAS (ITRC, 2023). SIA implemented BMPs in 2013 to recover as much aircraft deicing fluid (ADF) as feasible to minimize potential groundwater contamination. SIA operators currently use glycol recovery vehicles (GRV) to collect ADF-impacted stormwater before it reaches the stormwater collection system. GRVs are vacuum trucks used after each deicer application and the amount recovered is measured by the load when discharging from the GRVs to the storage tank. The ADF-impacted stormwater is stored in a covered holding tank at SIA during the deicing season until it is treated in the land treatment area in early spring.

During storm events, a “plug and pump” system is used to recover ADF that may reach the stormwater collection system. The application areas are isolated with inflatable pipe plugs and a 3,500-gallon suction truck removes the stormwater from those drains. With multiple GRVs operating and the “plug and pump” system, the recent glycol recovery in 2023 was 56% of the applied ADF (Valley, 2023b). SIA is authorized to discharge residual stormwater impacted with ADF to the recovery area. Stormwater discharge is measured at each of the three outfalls. During the deicing season, the Alpha and 3-21 outfalls are visually inspected for color and sheen daily and sampled for 5-day Biological Oxygen Demand weekly pursuant to the Department of Ecology permit (Valley, 2023a).

The land treatment area, as shown in Figure 2.2, is an approved natural management system to receive ADF-impacted stormwater for treatment by soil micro-organisms. ADF-impacted stormwater is land-applied to bare soil at a controlled rate that allows the soil profile to retain and treat it with little or no discharge to groundwater. The application rate is calculated for each tank load depending on the concentration of glycol in the recovered water and calibrated to truck equipment. The land treatment season begins in April or May and typically lasts 8-12 weeks. A grass or grain cover crop is planted after application and turned over the following fall to restore nutrient balance to the soil for the next application season. Soil samples are collected prior to application across the area where application occurs to monitor soil chemistry and fertility to support the desired treatment process. Groundwater monitoring has been conducted in the land treatment area since 2013 and groundwater flow has been observed to be the north-northeast (CES, 2020).

5.2 Wastewater

It is unknown, but possible, for industrial wastewater at SIA or at any industrial or commercial location to contain trace levels of PFAS if AFFF or other PFAS-containing materials were washed into the system. Some industrial wastewater from the current SIA Fire House may have collected in floor drains and flowed through an oil water separator to the sanitary sewer. Sewer water is piped to the City of Spokane River Park Water Reclamation Facility for treatment (Valley, 2023a)

Authorized non-stormwater discharges from passenger airlines and air cargo operators at SIA may include discharges from hydrant flushing, aircraft potable water tanks, and air conditioner or air compressor condensate from airport gates. These discharges occur on the ramp and during the summer months, the water typically evaporates before reaching a storm drain inlet (Valley, 2023a).

5.3 Solid Waste

Solid waste landfills may be a source of PFAS to the environment (ITRC, 2023). There are no current solid waste landfills located on the site; however, historically, four areas on or adjacent to the property have been used as waste dumps or treatment areas as shown in Figure 5.2. The Park Dr. waste disposal area, formerly Shamrock Paving and also known as cleanup site “USAAC GEIGER FIELD GF004,” was used as a dump area by the US Army during early operations at Geiger Field in the 1940s (Herrera, 2003). After dumping ceased in the area, asphalt and gravel operations started in the 1950’s and lasted until Spokane County constructed the Waste-to-Energy facility. At the southwestern end of runway 3-21 on W Electric Ave, the joint fire training area served as a landfill for Geiger Field operations from 1961-1967 (OpTech, 1995). A portion of Air National Guard property adjacent to the site to the east, was used as a dump from 1960-1976. Commonly known as the Swamp Dump, this area contained oils, solvents, paints, and construction debris. In-between the two sites on SIA property, a soil remediation area was operated by Remtech, which maintained ownership of the parcel from 1991-2000. Details of Remtech operations are unknown though historical aerial imagery indicates large volumes of displaced soil.

6.0 OTHER POTENTIAL SOURCES OF PFAS

Typical processes and materials associated with airport operations and onsite businesses unrelated to airport operation or emergency response were identified and researched to determine where potential PFAS-related products may have been in use.

6.1 On-Property Third Party Leased Facilities

Businesses are present within the site boundary that are unrelated to the airport activities. Among these onsite businesses, some were identified with potential to contribute to PFAS releases at the site. While the use or release of PFAS from these sites has not been confirmed, these sites will be considered, and potentially further investigated, as the SIA’s site investigation progresses.

- Waste to Energy Incineration Facility (2900 S Geiger Blvd): The Waste to Energy Facility located west of the SIA runway of SIA processes up to 800 tons per day of municipal solid waste through incineration at 2,500 degrees Fahrenheit to generate electricity (City of Spokane, 2024). Based on a statewide waste characterization study, 253,000 tons of municipal solid waste, including plastic, construction materials, metal and consumer products, were received in 2021 from across Spokane County (WA ECY, 2024). These waste types have the potential to contain PFAS (ITRC, 2023 which could persist in the incineration residues (i.e., sludge, flue gas, ash, process water)(Björklund et al., 2023). Ash from the incineration process was sent offsite to Klickitat County for disposal (City of Spokane, 2024) and is now disposed of at the Finley-Buttes Landfill in Oregon. The facility is also listed in the NPDES permit (WA0093317) for the Spokane County Regional Water Reclamation Facility (SCRWRF) as a receptor of solid waste derived from water treatment (WA ECY, 2022a).

- Waste Management (WM) Spokane Material and Recycling Technology (SMaRT) Center (2902 S Geiger Blvd): The SMaRT center collects about 25 tons per hour of mixed recyclables, including metal and plastic containers from businesses and residences in Washington, Idaho and British Columbia (Waste Management, 2024).

6.2 Potential or Known PFAS Sources Adjacent to SIA

This section discusses historical onsite land uses to identify potential historical sources outside of the scope of current airfield operations at the site. Also discussed in this section are nearby property land use and potential PFAS sources from operations based offsite and off property based off a preliminary review. None of the identified offsite properties or activities are confirmed to be additional PFAS environmental sources, yet the immediate proximity to the SIA site and potential for PFAS use are important considerations for future data interpretation. Further evaluations of PFAS sources will be conducted as more information regarding Site-specific groundwater flows is obtained to better define the relevant upgradient spatial extent.

The GEG property is neighbored by industrial properties to the northwest, south, and southeast. The nearest National Priority List (NPL) site is the Fairchild Air Force Base, located approximately 3.2 miles west of the SIA boundary. Based on an initial inventory of all properties in proximity to the site (within 1 mile) by ERIS, several businesses were identified which could work with PFAS-containing material, according to ITRC's guide on PFAS. The 1-mile radius was selected as it represents potential PFAS sources directly adjacent to the Site. The properties summarized in Table 6.1 are located directly adjacent to or in the vicinity of SIA and are depicted on Figure 6.1.

6.2.1 Investigations or Confirmed PFAS Contamination Near the Site

Fairchild AFB began using AFFF in the 1970s as a firefighting agent. AFFF continued to be used extensively at Fairchild AFB from the 1970s until 2016 to fight petroleum fires. In 2015, more environmentally responsible AFFF formulas were added to the DoD's qualified products list for firefighting agents. The Air Force began replacing both C8 with a C6 formula in August 2016. Delivery of the new foam was completed in 2017, the same year PFAS was discovered in drinking water at the base and in Airway Heights.[6]

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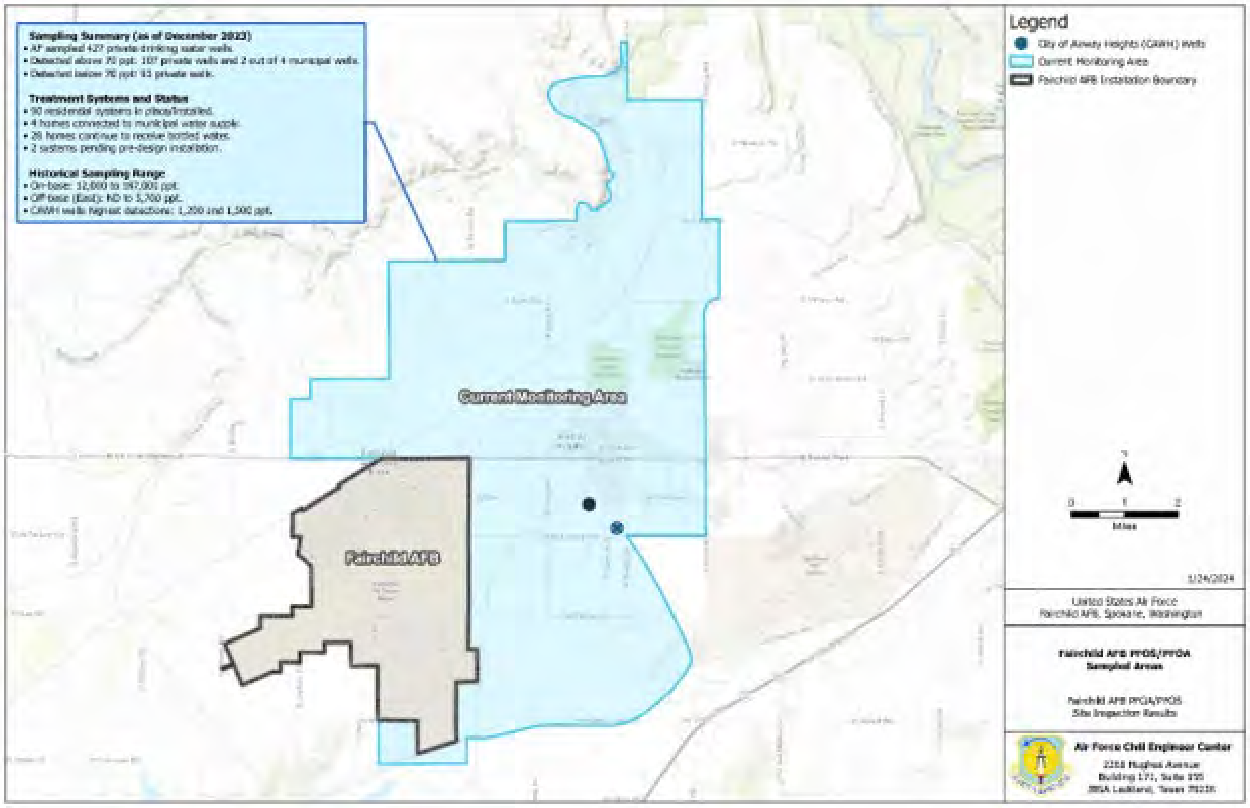
[6] Information provided by the Fairchild AFB Advisory Board (https://www.fairchild.af.mil/Information/Restoration-Advisory-Board/).

Exhibit 6.1 Map of 2024 monitoring area for Fairchild AFB[7]



Sampling Summary (as of December 2023)
- AF sampled 427 private drinking water wells.
- Detected above 70 ppt: 107 private wells and 2 out of 4 municipal wells.
- Detected below 70 ppt: 93 private wells.

Treatment Systems and Status
- 90 residential systems in place/installed.
- 4 homes connected to municipal water supply.
- 26 homes continue to receive bottled water.
- 2 systems pending pre-design installation.

Historical Sampling Range
- On-base: 12,000 to 597,000 ppt.
- Off-base (East): ND to 5,700 ppt.
- CAWH wells highest detections: 1,200 and 1,500 ppt.

Numerous studies have focused on determining the extent of PFAS contamination in groundwater on- and off-Base to support plume delineation. Initial groundwater investigations used South Hayford Road as the eastern boundary for sampling. Multiple studies have been conducted to both understand the groundwater flow directions both on- and off-Base. A recent synoptic well gauging event (SWGE) for two of the hydrostratigraphic units was conducted to support determination of highly localized groundwater flow directions and builds upon previously collected SWGE data (Tehama, LLC, 2019). Current efforts announced for the 2024 sampling campaign now extend the PFAS investigation further east towards SIA (Exhibit 6.1). In addition, documentation shows stormwater conveyance from the west side of the base flowing into Willow Creek (also identified by Wurtsmith AFB as "No Name Creek") which proceeds eastward toward South Craig Road and onto SIA property near Parcels 14022.0601 and 14022.0501 (see document provided on 12 June 2024 by Fairchild AFB in Appendix B.1 and Exhibit 6.2). The results from the investigation to be completed this summer will be critical in providing information regarding the potential for PFAS contaminated groundwater from Fairchild AFB migrating toward or onto SIA property.

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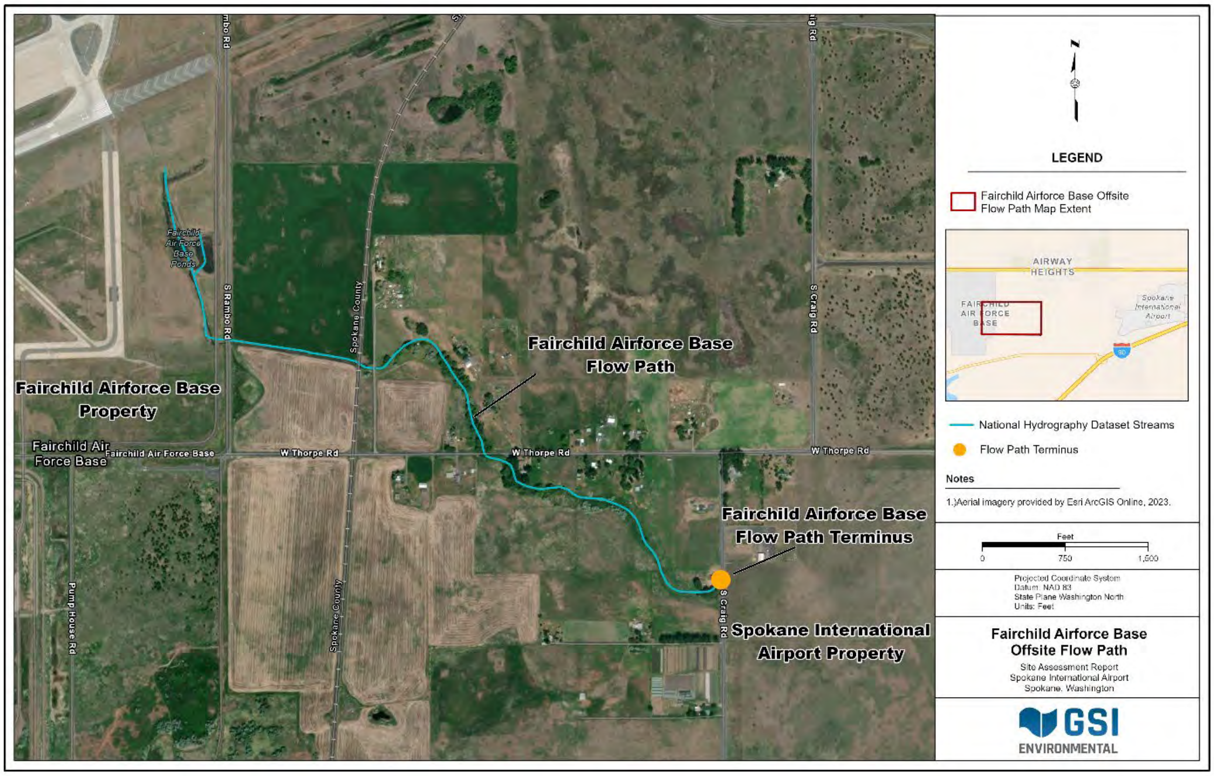
[7] Image source: https://www.fairchild.af.mil/Portals/23/Capture_1.PNG

Exhibit 6.2 Stormwater Flow Path from Fairchild AFB Toward SIA



7.0 HISTORICAL ONSITE PFAS DATA

PFAS investigations were conducted on SIA property from 2017 to 2019. The sampling in 2017 was conducted by AECOM, and the follow-on data were conducted by Spokane Environmental Solutions (SES).

Samples collected between 2017 and 2019 were analyzed by ALS Global Laboratories (ALS) in Kelso, Washington by USEPA Method 537M. However, as shown in Exhibit 7.1, ALS was initially not certified by Ecology for this PFAS analytical method and has evolving certifications. Importantly, ALS was not certified for PFOA and PFOS analysis until the third PFAS sampling event in August of 2018.

Exhibit 7.1 Analyte Certification Status for Historical Data

SDG	Analysis Date	Monitoring Wells Samples Analyzed	Analyte Specific Certification for PFAS from WA DOE[1]
K1705255	6/26/2017	Stormwater recovery area MW-3, MW-1, MW-5, and land treatment area MW-8	Not certified for any PFAS analyte.
K1712199	11/30/2017	Stormwater recovery area MW-5, MW-13, MW-14	Certified for the following analytes: 10:2 FTS, 4:2 FTS, HFPO-DA, N-Ethylperfluorooctane Sulfonamido acetic acid (N-EtFOSAA) and N-Methylperfluorooctane Sulfonamido acetic acid (NMeFOSAA)
K1807404	8/31/2018	Western peripheral MW-15, MW-16, MW-17 and Business Park MW-18	10:2 FTS, 4:2 FTS, 6:2 FTS, 8:2 FTS, HFPODA, N-Ethylperfluorooctane Sulfonamido acetic acid, EtFOSA, EtFOSE, MeFoSA, N-Methylperfluorooctane Sulfonamido acetic acid, MeFOSE, PFBS, PFBA, PFDS, PFDA, PFDOA, PFHpS, PFHPA, PFHxS, PFHxA, PFNA, PFOSA, **PFOS, PFOA**, PFPeA, PFTDA, PFTRIA, and PFUDA
K1901784	3/20/2019	Park Dr. Waste disposal area	
K1902735	4/18/2019	Electric Ave. burn pit area MW-13A, MW-13B, MW-14B	

Notes:

1.) ALS analyte certification for PFAS compounds at time of analysis; information provided by ALS via email on 1 May 2024.

The locations of sampled wells are shown in Figure 7.2 along with their respective concentrations for PFOS and PFOA.

Exhibit 7.2 Previous On-Property PFAS Results

Reference	Sampling Date	Activities	Monitoring Well ID	Well Depth (ft bgs)	Results (ng/L)^1	
					PFOA	PFOS
(AECOM, 2017a)	5/23/2017	Shallow groundwater samples: three collected from the stormwater recovery area and one, MW-8, collected from the land treatment area.	MW-1	15	130	130
			MW-3	8.5	330	93
			MW-5	20	110	140
			MW-8	25	1.4 U	9.5
(AECOM, 2017b)	11/8/2017	Shallow groundwater samples: two collected from newly installed monitoring wells constructed east-northeast of the stormwater recovery and one from the stormwater recovery area.	MW-5	20	66	120
			MW-13	11.5	85	72
			MW-14	16.5	350	50
(SES, 2018)	8/6/2018	Four new groundwater monitoring wells were installed near the airport fence line on the land side. Three west of the runway and one in the Business Park area.	MW-15	12	1.6	3.8
			MW-16	8.5	Dry	Dry
			MW-17	25	3.9	6.2
			MW-18	13	22	72
(SES, 2019a)	2/28/2019	Park Drive Waste Disposal Area sampling, two samples were collected from previously installed wells.	MW-1A	83	5.9	10
			MW-1B	65	12	27
(SES, 2019b)	3/27/2019	Electric Ave. Fire Pit Training Area sampling, three samples were collected and analyzed from previously installed wells.	MW-13A	42	60	480
			MW-13B	20	1,100	5,200
			MW-14B	20.5	230	860

Notes:

1) Non-detects are indicated with a “U” flag next to the reported concentration.

Appendix B.2 provides the reports for each of these sampling events along with associated laboratory reports.

8.0 AREAS OF POTENTIAL OR KNOWN CONCERN

Given historical use of PFAS on the site and results from groundwater sampling conducted in 2017-2019, PFAS concentrations have been identified or suspected at several locations. PFAS found in the environment onsite thus far are likely due to the FAA mandated storage, handling, and testing of AFFF as part of SIA’s federal mandate to maintain their Part 139 Certification and remain operational as a commercial airport.

Areas of potential or known concern were identified based on having a potential or known historical use or, as in the case of the Stormwater Recovery Area, the Park Drive Waste Disposal Area, and the southeastern portion of the Business Park, historical groundwater data where PFAS were detected. The potential and/or known PFAS areas of concern are listed below in Exhibit 8.1 and shown on Figure 8.1. Note that the map presentation of these areas is to highlight the general area and does not provide conclusive indication of known or suspected PFAS environmental contamination or a confirmed source; these spatial designations will be refined in the work plan for the Preliminary PFAS Investigation and once the initial round of soil and groundwater testing has been conducted. The extent covered on the map is not meant to reflect the exact sampling area nor that the potential release occurred over the entire space.

Exhibit 8.1 Potential or Known PFAS Areas of Concern - Summary

Area	Activity	Historical GW Data [a]
Air National Guard Operations Area	Training	No
Hanger 725	AFFF storage	No
Field Maintenance Area	AFFF storage	No
Current SIA Fire House	Storage and equipment washing	No
FAA Inspection and Testing	Equipment testing for compliance	No
Historical SIA Fire House	Storage and equipment washing	No
Park Drive Waste Disposal Area / Waste To Energy Plant Borrow Pit (SES, 2019a)	Waste incineration	Yes
Stormwater Recovery Area (AECOM, 2017b)	Stormwater collection and infiltration	Yes
South east area of Business Park (SES, 2018)	None identified	Yes
Joint Fire Training Area / Military Burn Pit (SES, 2019b)	Joint training with Air National Guard and Army National Guard	Yes

[a] Indicates if historical groundwater data was collected in the vicinity.

9.0 REGULATORY FRAMEWORK AND PRELIMINARY CONCEPTUAL SITE MODEL

Washington State Legislature passed the Model Toxics Control Act (MTCA) which gives Ecology broad authority to investigate and cleanup sites where a release or potential release of a hazardous substances may pose a risk to human health or the environment.

PFAS were added to the hazardous substance list in WA state in 2021 and Ecology's Hazardous Waste and Toxics Reduction Program published a revised Per- and Polyfluoroalkyl Substances Chemical Action Plan (PFAS CAP) in September 2022. The PFAS CAP does not contain regulatory statutes and is advisory in nature. Instead, it establishes PFAS CAP recommendations and requirements as set forth in WAC 173-333-420 and identifies requirements enacted and signed into law by the Washington State Legislature regarding management of certain PFAS (WA ECY, 2022b). No known releases of PFAS have occurred at SIA since at least 2016.

A guidance document has been provided by Ecology to support remedial investigations of PFAS sites (WA ECY, 2023). Action levels protective of human health and ecological receptors are available for all environmental media (soil, groundwater, sediment, and surface water). Ecology provided levels for eight PFAS for the protection of human health and ten PFAS for ecological assessments. The EPA recently finalized National Primary Drinking Water Regulations establishing maximum contaminant levels (MCLs) for six PFAS: 4.0 parts per trillion for PFOA and PFOS and 10 parts per trillion for PFNA, PFHxS, and HFPO-DA (GenX). In addition, EPA set an MCL for any mixture of the four PFAS (PFHxS, PFNA, HFPO-DA, and PFBS) through establishing a MCL hazard index of 1. Washington is likely to adopt these MCLs for both public water systems and as action levels for groundwater. As the science and level of information regarding compound-specific toxicity, fate and transport are rapidly evolving, incorporating newly published scientific research with that presented in the PFAS Guidance document will be critical.

9.1 Potential Contaminant Sources, Exposure Pathways and Receptors

The development of a conceptual site model (CSM) provides a framework for evaluating the fate and transport of chemicals of potential concern (COPCs) across a site and supports further investigations and ultimately identifying an appropriate remedial action. The CSM is developed in an iterative manner to describe physical processes, chemical fate and transport, biological systems, and potential exposure pathways, based on review of relevant literature and ongoing site-specific findings. The CSM also serves to direct and focus the strategic design of the field studies and subsequent analyses. This section presents some preliminary information used to develop the CSM for the SIA site.

Review of site related information has culminated in the identification of potential and known release areas for PFAS on the airport, as discussed above in Section 8. Potential exposure pathways, exposure points, and exposure routes for contamination within the airport generally include:

- Contact with AFFF as concentrate or foam – mainly applies to the remaining location where an AFFF-based suppression system is still in use (Hangar 725), and storage of current C6 AFFF in the mobile foam unit tanks and fixed foam concentrate storage tanks
- Direct contact with soil that has been contaminated by PFAS from a release
- Direct contact and/or ingestion of groundwater and/or surface water impacted due to a PFAS release

Further work is needed to determine if these exposure pathways are complete and their importance to the site will be determined during the Remedial Investigation.

From the limited groundwater data collected between 2017 and 2019, elevated PFAS concentrations were observed in shallow groundwater. Therefore, determining the site-specific connectivity of the different groundwater levels will be important for assessing the potential for any possible transport off site and whether there may have been any exposure to downstream receptors. In addition, there is no data for PFAS in soil at the airport.

Potential receptors are discussed below for both human health and ecological.

9.1.1 Human Health Receptors

Receptors with potentially complete exposure pathways include:

- any individuals with water sources that have direct connectivity to the underlying groundwater unit where PFAS are present on the airport grounds,
- any airport personnel or on-site workers engaged in construction or activities that bring them in contact with soil or groundwater on the site.

<u>Drinking Water</u>

GSI reviewed the WA DoH, Division of Environmental Health, Office of Drinking Water Sentry Internet Database (WA DoH, 2024) to identify water systems within a one-mile radius of the site.[8] Limitations on interpretation of available data include well status, indicating if the well is currently in use, and well locations which are expressed by quarter-quarter sections. From the available DoH data, no active public water system wells for drinking water use were identified within the Site. The search results within a one-mile radius of the Site were compared against the Spokane

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[8] https://doh.wa.gov/data-statistical-reports/environmental-health/drinking-water-system-data

County Southwest Area Water Districts map (Spokane County, 2024), identifying nine potentially active wells serving motels, mobile home parks, apartments, and subdivisions.

According to the WA DoH Washington Tracking Network for PFAS[9] the two public water systems with publicly available results nearest the Site, Patterson Addition and Sleepy Hollow Apartments, did not report detections of PFAS from September 2023 sampling. Patterson Addition (Water System ID 66565) is approximately one-half mile south of the Site at Highway 90 and S Fan Rd with one reported active well. Sleepy Hollow Apartments (Water System ID 803458) are approximately one-half mile east-northeast of the Site on S. Geiger Blvd. north of Highway 2 with one reported active well.

GSI reviewed the Fifth Unregulated Contaminant Monitoring Rule (UCMR 5) Data Finder for occurrences of PFAS detections in public water systems (PWS) located within, and surrounding, the site. UCMR 5 requires monitoring by certain PWSs for 29 PFAS in drinking water between 2023 and 2025. All community water systems and non-transient non-community water systems serving more than 10,000 people, all those serving between 3,300 and 10,000 people, and a representative sample of those serving fewer than 3,300 are required to monitor during a single 12-month timeframe in the three years of monitoring. The UCMR 5 did not indicate that there were any PFAS detected above the minimum reporting level for the following PWS:

- City of Airway heights
- Spokane County Water District 3 System 2
- Spokane County Water District 3 System 4

The searched PWS' had no detections of PFOS, PFOA, PFNA, PFHxS, PFHpA, or PFBS (USEPA, 2024). Three deep water wells used for drinking water at the Fairchild AFB are near the Spokane River. These wells have been tested for PFOA and PFOS with no detections as of March 2022 (AFCEC, Fairchild AFB, 2022).

PFAS in groundwater will continue to be evaluated in the Preliminary PFAS Investigation the residential use of groundwater as “tap” water will be considered a hypothetically complete exposure pathway for the purposes of conservatively evaluating potential human health risks.

Soil

No soil PFAS data has been collected to date within the site. Therefore, a field investigation and sampling will be required to confirm if PFAS in soil represents a complete exposure pathway. An initial soil survey in the identified areas of concern will be included in the Preliminary PFAS Investigation.

9.1.2 Ecological Receptors

Given the unique site setting and the size of the site, dividing the airport area into different ecological areas for evaluation may be appropriate. For example, there is a fence line that encloses the airside area and wildlife deterrents in place for airport security and passenger safety. Minimal animal activity is expected, and plant growth is also managed and minimized to maintain visibility. Therefore, wildlife exposure is unlikely within the fenced airside area of the airport (i.e., the airside space). Outside of the fenced area the potential receptors of concern may include:

- vegetation (e.g., shrubs and grasses),
- soil invertebrates,

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[9] https://doh.wa.gov/data-and-statistical-reports/washington-tracking-network-wtn/pfas/dashboard

- terrestrial birds,
- terrestrial small mammals,
- terrestrial small mammal predators, and
- herbivorous small mammals.

Other species that may occur at the Site but would likely be less exposed due to their greater home ranges, including resident predatory bird species. As discussed in Section 2.6, further evaluation of site associated water features is needed to determine any associated aquatic receptors. The extent to which a receptor for larger mammals is needed will be further evaluated and presented in the work plan for the remedial investigation.

10.0 SUMMARY AND CONCLUSION

The review of available information has resulted in the identification of ten potential or known PFAS areas of concern within SIA's main operational area (See also Exhibit 8.1 and Figure 8.1). These areas are listed due to storage of AFFF, potential or known usage of AFFF, and/or locations with historical PFAS data (Figure 8.1).

A. Hanger 725, due to the presence of a foam-based fire suppression system and AFFF storage (no documentation was found of the system being deployed).

B. Field Maintenance Area, due to AFFF storage and equipment maintenance.

C. Current SIA Fire House, due to AFFF storage and usage as mandated by FAA to remain operational.

D. Areas used for FAA inspections and testing as mandated to maintain Part 139 certification with the FAA.

E. Historical SIA Fire House, due to historical AFFF storage and usage as mandated to maintain Part 139 certification with the FAA.

F. Park Drive Waste Disposal Area / Waste to Energy Plant Borrow Pit, unknown source.

G. Stormwater Recovery Area, due to potential PFAS-impacted stormwater collection and infiltration.

H. Southeast area of Business Park, however there are no known AFFF activities in the immediate area, hence further investigation is needed.

I. Air National Guard Operations Area, due to historical AFFF usage for firefighting training activities when under DoD control and mandates.

J. Joint Fire Training Area / Military Burn Pit, due to joint training activities with AFFF, by the Airforce, SIA and the Air National Guard as mandated by federal authorities and regulations.

These areas have either confirmed PFAS in the local groundwater or have the potential to have PFAS present in the local environment due to the storage, handling, and testing of AFFF as part of SIA's federal mandate to maintain their Part 139 Certification.

These areas will be further evaluated for PFAS in groundwater and soil as part of the Preliminary PFAS Investigation stated in the EO issued by Ecology (Task 1B).

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SITE ASSESSMENT REPORT
Spokane International Airport
Spokane, WA

TABLES

Table 1.1. Ecology Enforcement Order (EO) Task 1A Requirements

Spokane International Airport

Spokane, WA

EO Subtask	Subtask Description	Section in Report
1. General Facility Information	Legal description of the facility,	2.0 Airport Description
	Present owner and/or operator including chronological listing of past owners and/or operators,	2.1 Current Operations 2.2 Site History 2.3 Current and Historical Land Use
	Adjacent property owners,	6.2 PFAS Sources Adjacent to SIA
	Zoning designations of property and adjacent properties, and other pertinent information.	2.0 Airport Description 2.3 Current and Historical Land Use 6.0 Other Potential Sources of PFAS
2. Site History	Providing descriptions of historical, current, and future Site activities/operations	2.1 Current Operations 2.2 Site History 2.3 Current and Historical Land Use
	Historical use of Aqueous Film Forming Foam (AFFF) and their location.	4.3 Potential and Known Uses of Firefighting Foam
3. Purchase History	Purchase history of AFFF relating the brand, quantity, and date.	4.1.1 Historical Foam Transitions
4. Suspected Source Areas (or known)	4.1 Firefighting training areas (historical and current).	4.2.3 Fire Training Information
	4.2 Firefighting equipment testing and maintenance areas.	4.2.4 Foam Testing and Calibration
	4.3 Disposal areas.	5.3 Solid Waste
	4.4 Stormwater drainage infrastructure and management areas receiving flows from suspected source areas.	5.1 Stormwater
	4.5 Wastewater systems used to contain discharged fire-extinguishing materials.	5.2 Wastewater
	4.6 Historic and current storage areas for AFFF.	4.2.1 Fixed Foam Systems
	4.7 Tanks, vehicles, equipment, and distribution systems that were used to store or apply AFFF.	4.2.2 Mobile Foam Systems
	4.8 Hangars that contain AFFF fire suppression systems (historical and current).	4.2.1 Fixed Foam Systems
	4.9 Spills.	4.3 Potential and Known Uses of Firefighting Foam
	4.10 Incident response(s) that used AFFF.	4.3 Potential and Known Uses of Firefighting Foam
	4.11 Historical grading/construction projects at the Site associated with suspected source areas.	7.0 Historical Onsite PFAS Data
5. Review Data Reports	Review Data Reports from previous analysis of PFAS in soils, groundwater, surface water, and sediments along with	7.0 Historical Onsite PFAS Data
	Documentation of any remedial activities if undertaken.	7.0 Historical Onsite PFAS Data
Conceptual Site Model (CSM)	Develop and present a preliminary Conceptual Site Model (CSM) that describes the current understanding of contaminant release,	8.0 Areas of Potential or Known Concern
	Fate and transport (including migration pathways in all environmental media and identifying potential receptors), and	2.4 Geology and Hydrogeology 8.0 Areas of Potential or Known Concern 9.0 Regulatory Framework and Preliminary Conceptual Site Model
	Site-specific concerns such as identification of natural resources and ecological receptors.	2.0 Airport Description 9.0 Regulatory Framework and Preliminary Conceptual Site Model

TABLE 2.1: Listing of Parcels that Comprise the SIA Property.
Spokane International Airport
Spokane, WA

Pacel Number	Property Use	Street Address	City	Zip Code	Land Size (acres)
15344.0105	Transportation - Railroad	Unassigned Address	Medical Lake	99022	9.98
24062.0206	Vacant Land	Unassigned Address	Spokane	99224	0.66
14013.9007	Vacant Land	Unassigned Address	Spokane	99224	37.6
15341.9001	Vacant Land	14100 W MCFARLANE RD	Spokane		9.09
14011.143	Vacant Land	11205 W ELECTRIC AVE	Spokane		18.5
25272.9099	Vacant Land	Unassigned Address	Spokane	99224	7.79
25333.6001	Vacant Land	Unassigned Address	Spokane	99224	3.09
14022.0601	Vacant Land	Unassigned Address	Spokane	99224	10.2
25333.0208	Vacant Land	4119 S GEIGER BLV	Spokane	99201	2.09
15344.0102	Transportation - Aircraft	Unassigned Address	Medical Lake	99022	9.5
14012.9001	Transportation - Aircraft	0 UNKNOWN	Spokane		0.95
15341.9009	Transportation - Aircraft	0 .VACANT LAND	Spokane		104.37
24062.901	Vacant Land	Unassigned Address	Spokane	99224	1.07
25333.0227	Vacant Land	4007 S GEIGER BLVD	Spokane		2.61
15365.1202	Transportation - Aircraft	0 UNASSIGNED ADDRESS	Spokane		534.91
24062.0143	Vacant Land	Unassigned Address	Spokane	99224	1.24
25335.0502	Vacant Land	3520 S GEIGER BLVD	Spokane		19.98
24062.0425	Vacant Land	5611 S HAYFORD RD	Spokane	99204	2.95
14012.9004	Vacant Land	Unassigned Address	Spokane	99224	35.59
24052.905	Vacant Land	Unassigned Address	Spokane	99224	0.57
25335.0503	Transportation - Aircraft	8125 W PILOT DR	Spokane		281.88
24062.0144	Vacant Land	Unassigned Address	Spokane	99224	1
15344.0108	Vacant Land	Unassigned Address	Medical Lake	99022	9.54
24062.0302	Vacant Land	Unassigned Address	Spokane	99224	2.15
14013.9008	Vacant Land	Unassigned Address	Spokane	99224	37.6
25286.1201	Transportation - Aircraft	2920 S SPOTTED RD	Spokane		918.26
15344.0111	Transportation - Aircraft	Unassigned Address	Medical Lake	99022	4.84
25333.0223	Vacant Land	Unassigned Address	Spokane	99224	1.44
14022.0101	Vacant Land	Unassigned Address	Spokane	99224	27.6
25335.0206	Vacant Land	6801 W FLIGHTLINE BLVD	Spokane	99224	11.95
24066.9046	Transportation - Aircraft	10900 W ELECTRIC AVE	Spokane	99224	334.82
14022.0701	Vacant Land	Unassigned Address	Spokane	99224	10.1
25310.9021	Transportation - Aircraft	9000 W AIRPORT DR GAR2	Spokane	0	629.22
15344.0103	Transportation - Aircraft	Unassigned Address	Medical Lake	99022	9.5
15342.9004	Service - Governmental	14811 W MCFARLANE RD	Spokane	99022	151.84
24062.9011	Vacant Land	Unassigned Address	Spokane	99224	0.15
15344.0113	Transportation - Aircraft	Unassigned Address	Medical Lake	99022	9.92
24062.0142	Vacant Land	Unassigned Address	Spokane	99224	1.24
24052.9071	Transportation - Aircraft	8520 W ELECTRIC AVE	Spokane		10.24
15344.0106	Transportation - Aircraft	Unassigned Address	Medical Lake	99022	9.69
25335.0207	Transportation - Aircraft	7109 W WILL D ALTON LN	Spokane	99224	3.15
15355.9007	Transportation - Aircraft	3911 S CRAIG RD	Spokane		550.84
15341.9007	Transportation - Aircraft	0 .UNKNOWN	Spokane		3.04
24062.0145	Vacant Land	Unassigned Address	Spokane	99224	1.14
14025.9004	Vacant Land	0 UNKNOWN CRAIG ST	Spokane		648.74
24062.0429	Vacant Land	Unassigned Address	Spokane	99224	42.86
25333.0229	Vacant Land	Unassigned Address	Spokane	99224	1.17
24063.0504	Vacant Land	0 .UNKNOWN	Spokane		5.53
15344.0109	Vacant Land	Unassigned Address	Medical Lake	99022	9.54

TABLE 2.1: Listing of Parcels the Comprise the SIA Property.

Spokane International Airport

Spokane, WA

Pacel Number	Property Use	Street Address	City	Zip Code	Land Size (acres)
24051.9059	Transportation - Aircraft	8314 W ELECTRIC AVE	Spokane		8.32
25333.0205	Vacant Land	Unassigned Address	Spokane	99224	0.37
24062.0303	Vacant Land	Unassigned Address	Spokane	99224	0.46
25305.9047	Transportation - Aircraft	0 ADDRESS UNKNOWN S	UNKNOWN		242.17
24052.9013	Transportation - Aircraft	9108 W ELECTRIC AVE	Spokane		18.61
14022.0501	Vacant Land	Unassigned Address	Spokane	99224	33.7
15341.9008	Vacant Land	0 .VACANT LAND	Spokane		39.89
24062.043	Vacant Land	5522 S CENTER RD	Spokane		10
15344.011	Vacant Land	Unassigned Address	Medical Lake	99022	9.69
24062.0426	Vacant Land	10903 W ELECTRIC AVE	Spokane		0.67
14022.9002	Vacant Land	Unassigned Address	Spokane	99224	39.09
15344.0104	Transportation - Aircraft	Unassigned Address	Medical Lake	99022	9.84
25320.1101	Transportation - Aircraft	8520 W ELECTRIC AVE	Spokane		646.44
14013.9006	Agricultural Not Classified	Unassigned Address	Spokane	99224	34.25
24062.9019	Single Unit	10220 W ELECTRIC AVE	Spokane	99224	0.46
15342.9011	Utilities	14811 W Mcfarlane Rd	Medical Lake	99022	1.03
15344.0107	Vacant Land	Unassigned Address	Medical Lake	99022	9.69
14015.0001	Vacant Land	0 UNKNOWN	Spokane		315.39

Notes: parcel information was obtained from Spokane County Assessor's Office and Treasurer's Office (https://cp.Spokanecounty.org/scout/scoutdashboard/Default.aspx)

Table 4.1. Summary of Potential or Known Firefighting Foam Usage Areas

Spokane International Airport

Spokane, WA

Location Key[1]	Year	Event Description	Potential or Known Usage[2]	Receiving Collection Area
A	3/18/1994	**Southwest of the runway:** Airplane crash with fire (“NTSB Report 1994,” 1994; “Victims Identified In Spokane Plane Crash -- Dc-3 Pilot Had Reported Trouble,” 1994)	**Potential** – AFFF use in emergency response incident	Outside of Collection Areas
B	Before 1999	**West of Air National Guard Property:** Joint training with National Guard took place prior to 1999 in the area directly west of the Air National Guard property. Foam was sprayed during these trainings from National Guard equipment.	**Known** – AFFF usage over several years	3-12
C	Prior to 2016	**Triangle ramp training area northeast of the runway:** Water was sprayed through system components that had been previously exposed to foam to satisfy mandated FAA testing.	**Potential** – AFFF usage over several years	3-21
D	Prior to 2014	**Southwest of the historical SIA Fire House:** FAA mandated testing took place in the grassy area southwest of the previous ARFF building. During testing, limited amounts of foam were sprayed through mobile unit components to satisfy FAA requirements.	**Known** – AFFF usage over several years	Alpha
E	Prior to 2014	**Northeast of the historical SIA Fire House:** It is likely that testing of mobile units took place in the grassy area northeast of the previous ARFF building. During testing, limited amounts of foam were sprayed through mobile unit components.	**Potential** – AFFF usage over several years	Alpha
F	2014-2016	**North of the current SIA Fire House:** It is likely that testing of mobile units took place in the grassy area northeast of the current ARFF building. During FAA mandated testing, limited amounts of foam were sprayed through mobile unit components.	**Known** – AFFF usage over several years	Alpha, Perimeter Drainage
G	2014-2016	**Southeast of the current SIA Fire House:** FAA mandated testing took place in the grassy area southwest of the current ARFF building. During testing, limited amounts of foam were sprayed through mobile unit components to satisfy FAA requirements.	**Known** – AFFF usage over several years	Alpha, Perimeter Drainage
H	Prior to 2016	**Northwest of the Control Tower (Taxiway K):** Several FAA mandated inspections requiring foam to be dispersed through mobile units took place at one location within view of the control tower, east of the runway.	**Known** – AFFF usage over several years	3-21 and Perimeter Drainage

Notes:

1. Location Key corresponds to inset table in Figure 4.1 Locations of Potential or Known Usage of Firefighting Foam.
2. All events involved the usage of C8 foam.

TABLE 6.1: Potential On- and Offsite Third-Party Sources of PFAS
Spokane International Airport
Spokane, WA

Location Key[1]	Company	Address	Description	Potential Uses of PFAS (ITRC, 2023)
A	Waste to Energy Incineration Facility	2900 S Geiger Blvd	Solid waste incineration	Polymers - Fluoropolymer films (such as FEP, PVDF) to cover solar panel collectors, electrolyte fuel cells, PTFE expansion joint materials for power plants, filtration of fly ash from stack emissions
				Nonpolymers - Fuel cell and battery electrolyte (such as the lithium salt of PFAAs)
B	Waste Management (WM) Spokane Material and Recycling Technology (SMaRT) Center	2902 S Geiger Blvd	Recycling facility	Nonpolymers - Fluorosurfactants are used to recover metals, including rare earth metals, and n-hexane from waste gases
C	International Aerospace Coatings[2]	8510 W Electric Ave	Coatings application	Polymers - Mechanical components made of fluoropolymers (such as PTFE and PFA tubing, piping, seals, gaskets, cables, and insulators)
				Nonpolymers - Hydraulic fluid additives made from PFSA salts (such as PFOS at about 0.1%) to prevent evaporation, fires, and corrosion
D	Extreme Industrial Coatings	11319 Willow Ave W, Airway Heights, WA 99001	Metals coating	Nonpolymers - Wetting agent, mist suppression for harmful vapors, and surfactants (may include potassium, lithium, diethanolamine and ammonium salts of PFOS or 6:2 FTS)
E	Performance Pro Supply	9616 W Harlan Ln Bldg 12, Spokane, WA 99224	Insulation Materials, "Fire Block" foams	Polymer - Fluoropolymer membranes and coatings (such as PTFE, PVDF, and/or side-chain fluorinated polymers) in architectural materials (like fabrics, roofing membranes, metals, stone, tiles, concrete, radomes); adhesives, seals, caulks; additives in paints (for example, low- and no-VOC latex paints), varnishes, dyes, stains, sealants; surface treatment agent and laminates for conserving landmarks
				Nonpolymers - Additives in paints, coatings, and surface treatments (PASF- and fluorotelomer-based compounds, ammonium salt of PFHxA)
F	Conoco Phillips Gieger Pipeline	4404 S Geiger Blvd, Spokane, WA 99224	Pipeline terminal, above ground storage	Polymer- Lining of gas pipes and insulation of cable and wire during drilling, and membranes for filtration
				Nonpolymers- Marketed for and potential instances of use in oil well production to change the permeability of the target formation, reduce viscosity for transport, prevent evaporative loss during storage, tracers
				Polymer- Fluoropolymers used in firefighting equipment and protective clothing (such as those woven with PTFE). Other polymer coatings using side-chain fluorinated polymers)
				Nonpolymers- Coatings and materials used as water repellents and some Class B foam (may contain PFCAs, PFSAs, and fluorotelomer-based derivatives), vapor suppression for flammable liquids (for example, gasoline storage)
G	Fisher Construction	4510 S Dowdy Rd, Spokane, WA 99224	Construction	Polymer- Fluoropolymer membranes and coatings (such as PTFE, PVDF, and/or side-chain fluorinated polymers) in architectural materials (like fabrics, roofing membranes, metals, stone, tiles, concrete, radomes); adhesives, seals, caulks; additives in paints (for example, low- and no-VOC latex paints), varnishes, dyes, stains, sealants; surface treatment agent and laminates for conserving landmarks
				Nonpolymers- Additives in paints, coatings, and surface treatments (PASF- and fluorotelomer-based compounds, ammonium salt of PFHxA)
H	Papé Machinery Construction & Forestry	6210 W Rowand Rd, Spokane, WA 99224	Construction and forestry	Polymer- Fluoropolymer membranes and coatings (such as PTFE, PVDF, and/or side-chain fluorinated polymers) in architectural materials (like fabrics, roofing membranes, metals, stone, tiles, concrete, radomes); adhesives, seals, caulks; additives in paints (for example, low- and no-VOC latex paints), varnishes, dyes, stains, sealants; surface treatment agent and laminates for conserving landmarks
				Nonpolymers- Additives in paints, coatings, and surface treatments (PASF- and fluorotelomer-based compounds, ammonium salt of PFHxA)

TABLE 6.1: Potential On- and Offsite Third-Party Sources of PFAS

Spokane International Airport

Spokane, WA

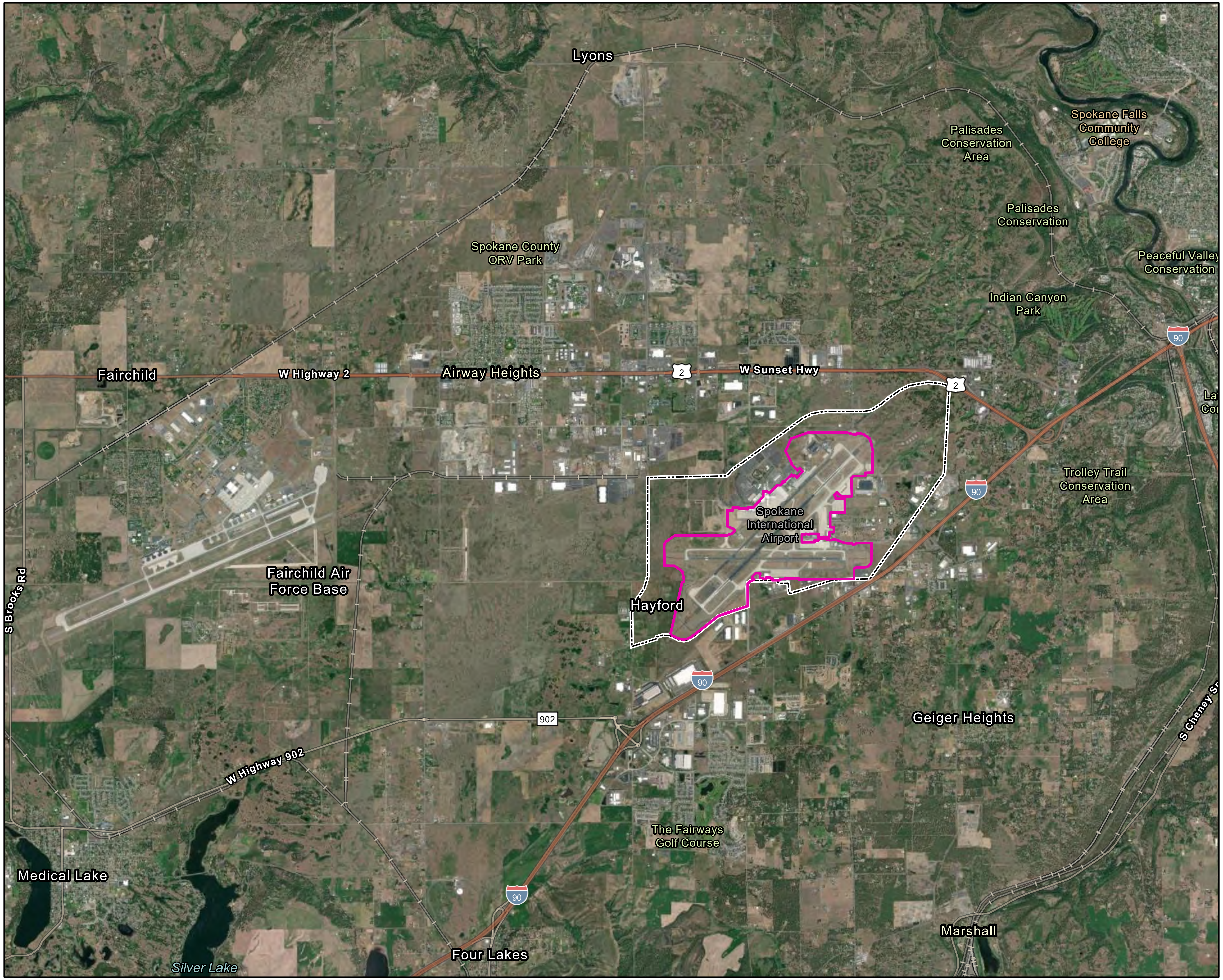
Location Key[1]	Company	Address	Description	Potential Uses of PFAS (ITRC, 2023)
I	Metals Fabrication Co.	2524 S Hayford Rd, Spokane, WA 99001	Metal fabrication	Nonpolymers- Wetting agent, mist suppression for harmful vapors, and surfactants (may include potassium, lithium, diethanolamine and ammonium salts of PFOS or 6:2 FTS)
J	Seaport Steel Building	2634 S Hayden Rd, Airway Heights, WA 99001	Metal fabrication	Nonpolymers- Wetting agent, mist suppression for harmful vapors, and surfactants (may include potassium, lithium, diethanolamine and ammonium salts of PFOS or 6:2 FTS)
K	Spokane Metals LLC	11315 Willow Ave W, Airway Heights, WA 99001	Metal fabrication	Nonpolymers- Wetting agent, mist suppression for harmful vapors, and surfactants (may include potassium, lithium, diethanolamine and ammonium salts of PFOS or 6:2 FTS)
L	Wilson Construction	4510 S Ben Franklin Ln, Spokane, WA 99224	Construction	Polymer- Fluoropolymer membranes and coatings (such as PTFE, PVDF, and/or side-chain fluorinated polymers) in architectural materials (like fabrics, roofing membranes, metals, stone, tiles, concrete, radomes); adhesives, seals, caulks; additives in paints (for example, low- and no-VOC latex paints), varnishes, dyes, stains, sealants; surface treatment agent and laminates for conserving landmarks
				Nonpolymers- Additives in paints, coatings, and surface treatments (PASF- and fluorotelomer-based compounds, ammonium salt of PFHxA)
M	Silgan Unicep	4122 S Grove Rd, Spokane, WA 99224	Single use plastic packaging manufacturer	Polymer - Fluoropolymers (such as PTFE) are used as processing aids, as a raw material in plastics and rubber production, and as an intermediate material. Used in molded material production to enable easy release and reduce imperfections, polymer processing aids
				Nonpolymers - Surface tension reduction for foams, etching of plastic, and production of rubber
N	Alloy Trailers, Inc.	S 3025 Geiger Blvd, Spokane, WA 99224	Former trailer manufacturing	Nonpolymers - Wetting agent, mist suppression for harmful vapors, and surfactants (may include potassium, lithium, diethanolamine and ammonium salts of PFOS or 6:2 FTS)
O	Wear Tech	8021 W Sunset Hwy, Spokane, WA 99224	Water and heat resistant metals casting	Nonpolymers - Wetting agent, mist suppression for harmful vapors, and surfactants (may include potassium, lithium, diethanolamine and ammonium salts of PFOS or 6:2 FTS)
P	Spokane Fire Department Station #6	1615 S Spotted Rd, Spokane, WA 99224	Fire department	Polymer- Fluoropolymers used in firefighting equipment and protective clothing (such as those woven with PTFE). Other polymer coatings using side-chain fluorinated polymers)
				Nonpolymers- Coatings and materials used as water repellents and some Class B foam (may contain PFCAs, PFSAs, and fluorotelomer-based derivatives), vapor suppression for flammable liquids (for example, gasoline storage)
Q	Reliance Trailer company	3025 South Geiger Blvd, Spokane, Washington 99224	Trailer manufacturing	Polymer - Fluoropolymer membranes and coatings (such as PTFE, PVDF, and/or side-chain fluorinated polymers) in architectural materials (like fabrics, roofing membranes, metals, stone, tiles, concrete, radomes); adhesives, seals, caulks; additives in paints (for example, low- and no-VOC latex paints), varnishes, dyes, stains, sealants; surface treatment agent and laminates for conserving landmarks
				Nonpolymers - Additives in paints, coatings, and surface treatments (PASF- and fluorotelomer-based compounds, ammonium salt of PFHxA)

Notes:

1. Location Key corresponds to inset table in Figure 6.1 Potential Third-Party PFAS Sources
2. In addition to the potential PFAS uses listed in ITRC, application of coatings to the external surface of airplanes is expected to take place at this location and would be an additional potential source of PFAS.

SITE ASSESSMENT REPORT
Spokane International Airport
Spokane, WA

FIGURES

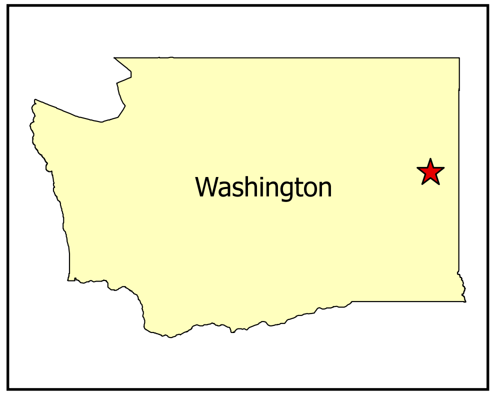


N

LEGEND

⬚ Primary Airport Area

— AOA Fenceline



Notes

1.) AOA - Air Operations Area
2.) Aerial imagery provided by Esri ArcGIS Online, 2023.

Feet
0 2,000 4,000

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

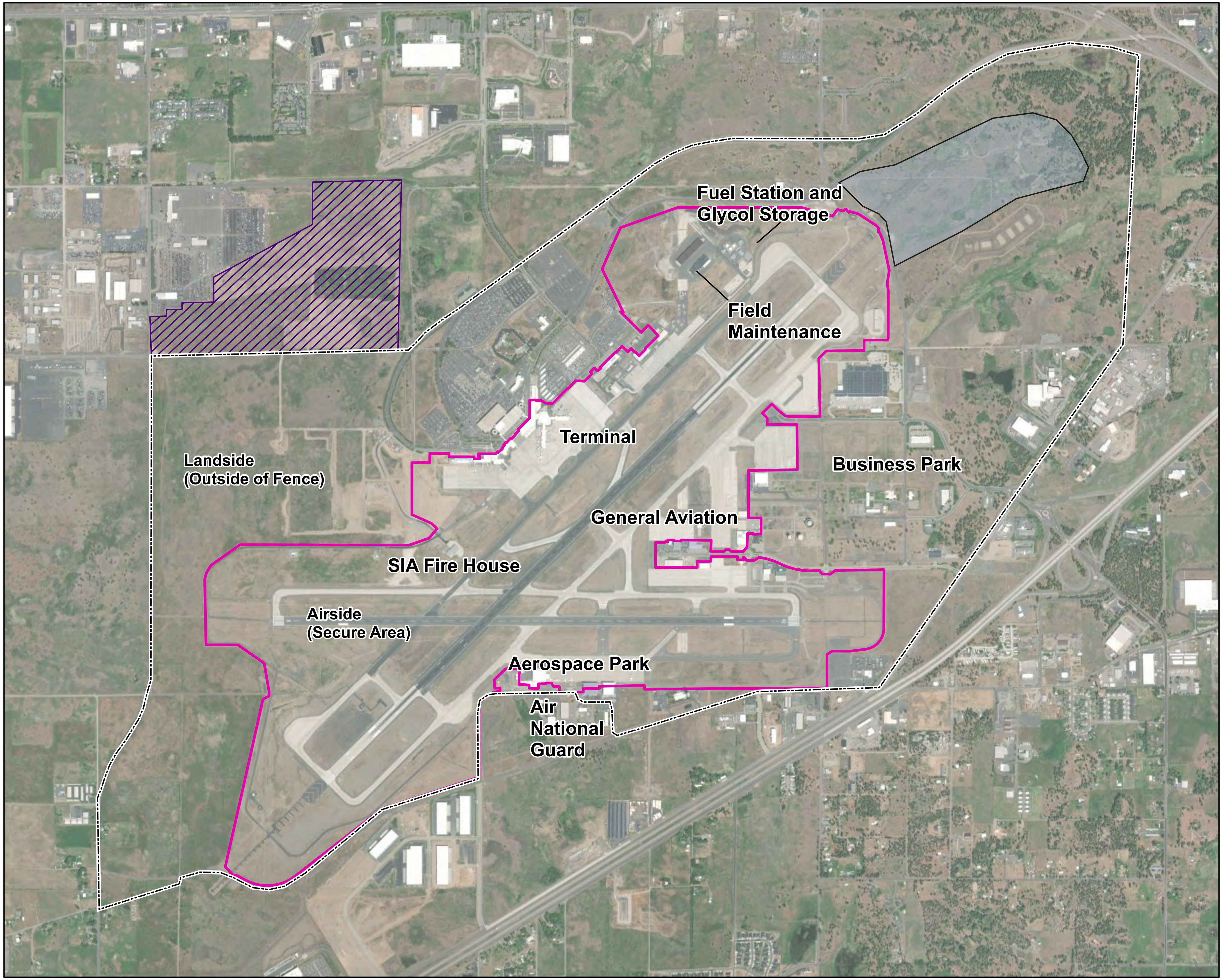
GSI ENVIRONMENTAL

SITE LOCATION MAP

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	**SIAWA_RLM**	Appv'd By:	KW

FIGURE 2.1



LEGEND

- ⬚ Primary Airport Area
- — AOA Fenceline
- ▭ Stormwater Collection Area
- ▨ Land Treatment Area

Notes

1.) AOA - Air Operations Area
2.) Aerial imagery provided by Esri ArcGIS Online, 2023.

Feet
0 750 1,500

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

GSI
ENVIRONMENTAL

CURRENT SITE OPERATIONS MAP

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	**SIAWA_CSO**	Appv'd By:	KW

FIGURE 2.2

N

LEGEND

▭ Primary Airport Area

Note

1.) Historical aerial imagery from 1952 provided by USGS

Feet
0 750 1,500

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

GSI ENVIRONMENTAL

HISTORICAL AERIAL IMAGERY OF THE SITE

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	**SIAWA_HAI**	Appv'd By:	KW

FIGURE 2.3 A

N

LEGEND

▭ Primary Airport Area

Note

1.) Historical aerial imagery from 1962 provided by USGS

Feet
0 750 1,500

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

GSI
ENVIRONMENTAL

HISTORICAL AERIAL IMAGERY OF THE SITE

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	**SIAWA_HAI**	Appv'd By:	KW

FIGURE 2.3 B

LEGEND

▭ Primary Airport Area

Note

1.) Historical aerial imagery from 1972 provided by USGS

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

GSI ENVIRONMENTAL

HISTORICAL AERIAL IMAGERY OF THE SITE

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	**SIAWA_HAI**	Appv'd By:	KW

FIGURE 2.3 C

LEGEND

⬚ Primary Airport Area

Note

1.) Historical aerial imagery from 1991 provided by USGS

Feet
0 750 1,500

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

GSI ENVIRONMENTAL

HISTORICAL AERIAL IMAGERY OF THE SITE

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	SIAWA_HAI	Appv'd By:	KW

FIGURE 2.3 D

N

LEGEND

⬚ Primary Airport Area

Note

1.) Historical aerial imagery from 2017 provided by USDA

Feet
0 750 1,500

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

GSI
ENVIRONMENTAL

HISTORICAL AERIAL IMAGERY OF THE SITE

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	**SIAWA_HAI**	Appv'd By:	KW

FIGURE 2.3 E

N

LEGEND

- ⬚ Primary Airport Area

US Fish and Wildlife Service
Stream Classification:

- ⬚ Intermittent
- 🟦 Unknown Perennial

Notes

1.) AOA - Air Operations Area
2.) All ponds are ephemeral.
3.) Aerial imagery provided by Esri ArcGIS Online, 2023.

Feet
0 750 1,500

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

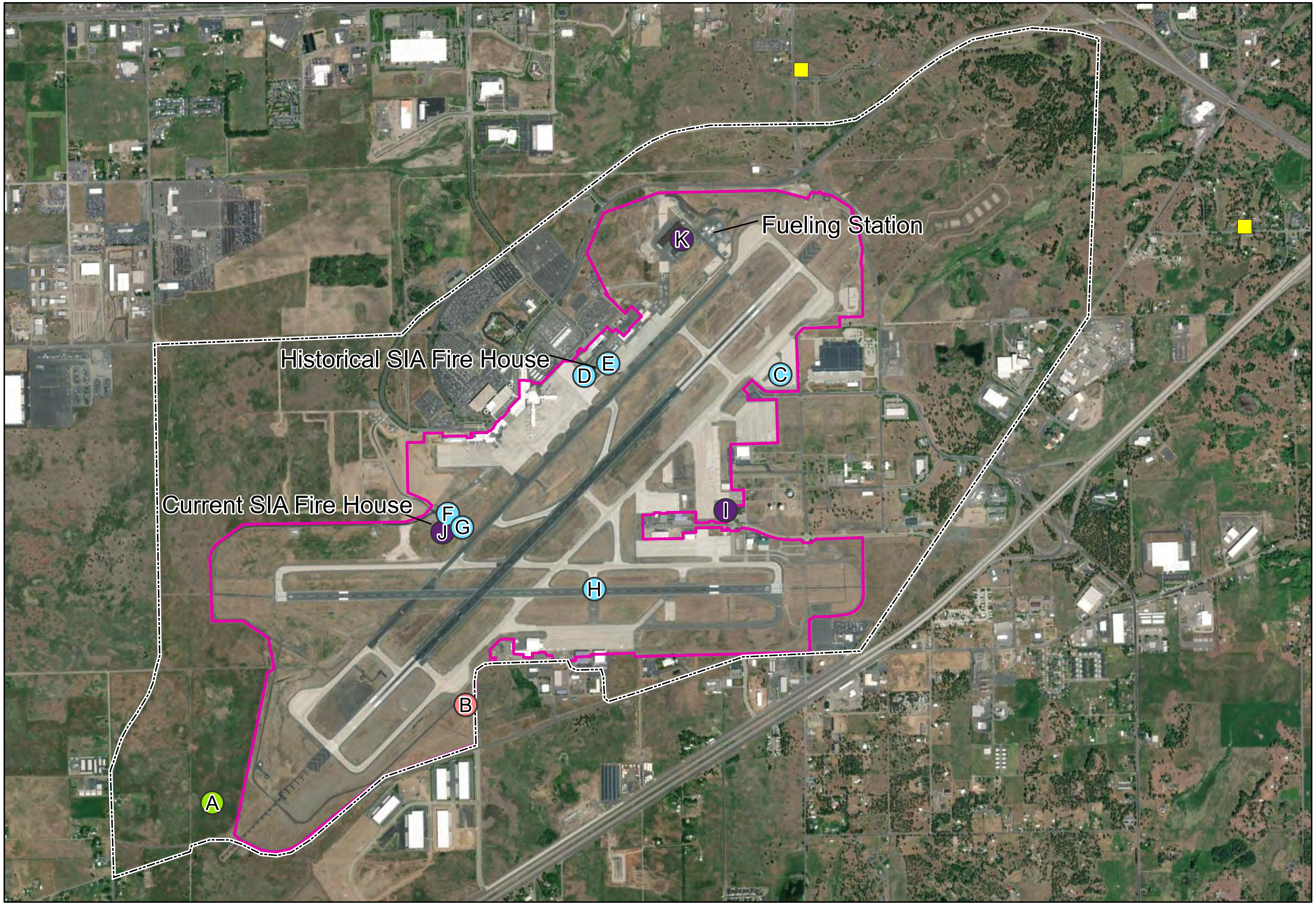
GSI ENVIRONMENTAL

SURFACE WATER FEATURES OF THE SITE

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	**SIAWA_SW**	Appv'd By:	KW

FIGURE 2.4



LEGEND

- ⬚ Primary Airport Area
- — AOA Fenceline
- ● Aviation Incident
- ● Joint Training Area
- ● FAA Mandated Testing and Training
- ● Storage
- ■ Spokane Fire Department

Notes

1.) AOA - Air Operations Area
2.) AFFF - Aqueous Film-Forming Foam
3.) ANG - Air National Guard
4.) The Joint Training Area (location B) was utilized through 1999.
5.) The Triangle Ramp Training Area (location C) has been utilized since 2000.
6.) Aerial imagery provided by Esri ArcGIS Online, 2023.

Key	Description
A	Potential: Aviation Incident - 1994
B	Known: ANG-SIA Joint Training Area
C	Potential: Triangle Ramp Training Area
D	Known: Historical SIA Fire House
E	Potential: Historical SIA Fire House
F	Known: North of Current SIA Fire House
G	Known: SE of Current SIA Fire House
H	Known: Taxiway K Testing Area
I	Hangar 725
J	Current SIA Fire House
K	Field Maintenance Building

GSI
ENVIRONMENTAL

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	SIAWA_AFFF	Appv'd By:	KW

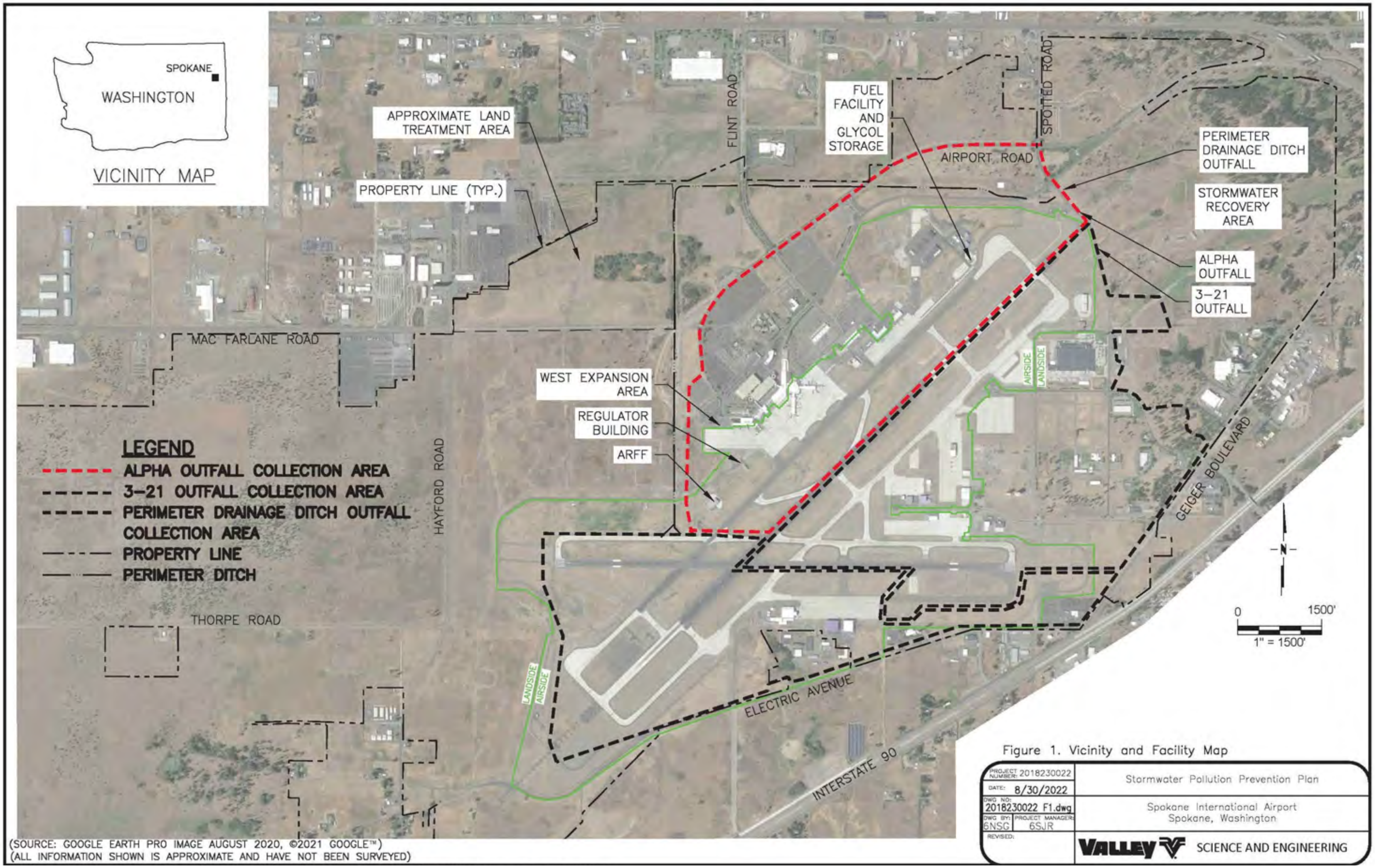
FIGURE 4.1

Locations of Potential or Known Usage of Firefighting Foam

Site Assessment Report
Spokane International Airport
Spokane, Washington

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

Feet
0 1,000 2,000

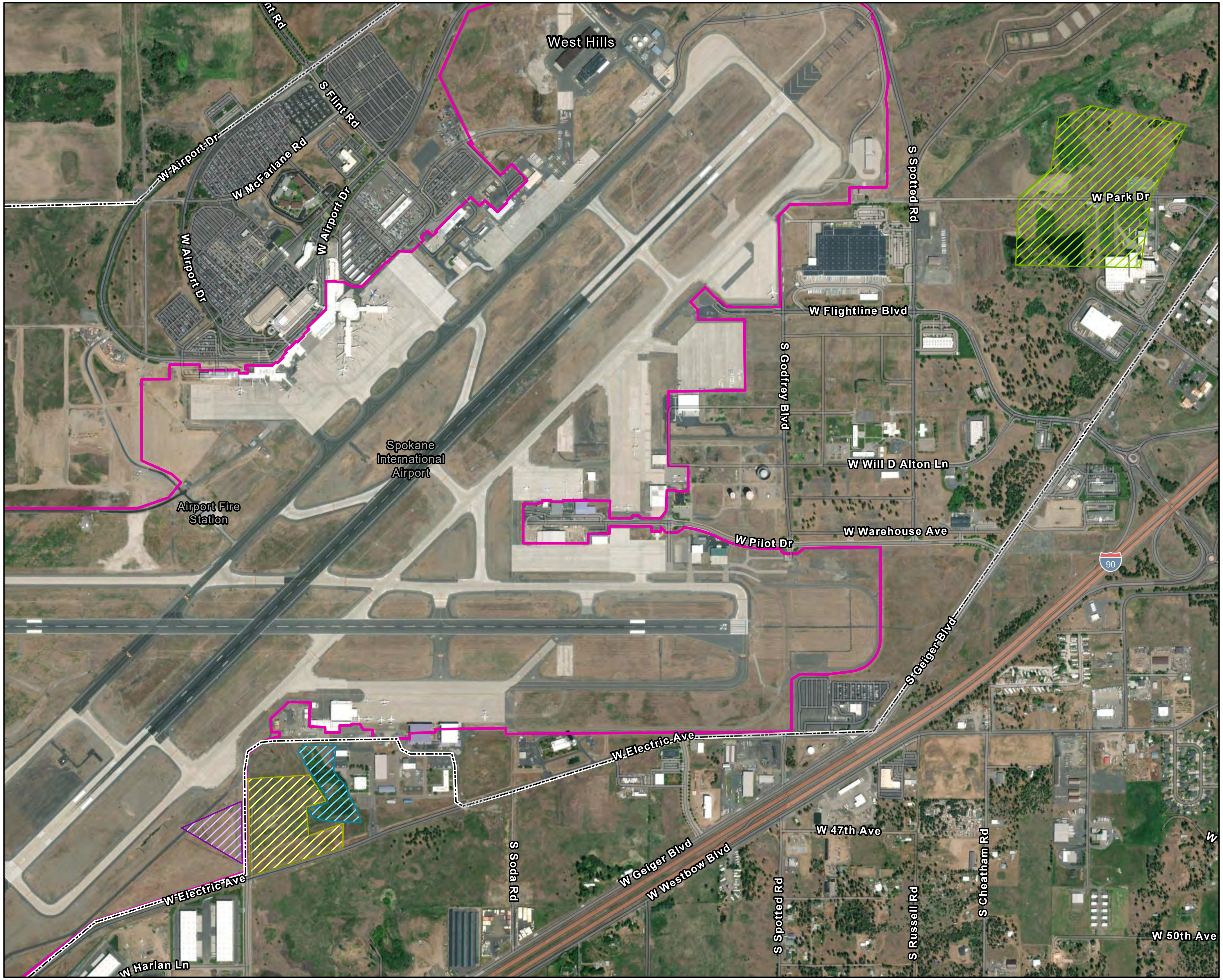


GSI ENVIRONMENTAL

FIGURE 5.1
Stormwater Pollution Prevention Plan
Vicinity and Facility Map

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI Job No.: 6892
Issued: 13-Aug-2024
Prepared By: EKS
Approved By: KW



N

LEGEND

- ⬚ Primary Airport Area
- ▬ AOA Fenceline
- ▨ Remtech Soil Remediation
- ▨ ANG Swamp Dump
- ▨ Geiger Field Landfill
- ▨ Park Drive Waste Disposal / Shamrock Paving

Notes

1.) AOA - Air Operations Area
2.) ANG - Air National Guard
3.) Areas identified are not exhaustive, additional sites may be discovered during further investigation.
4.) Outlined areas are approximate and generated from historical Installation Restoration Program reports and have been further refined by comparing historical aerial imagery.
5.) Aerial imagery provided by Esri ArcGIS Online, 2023.

Feet
0 500 1,000

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

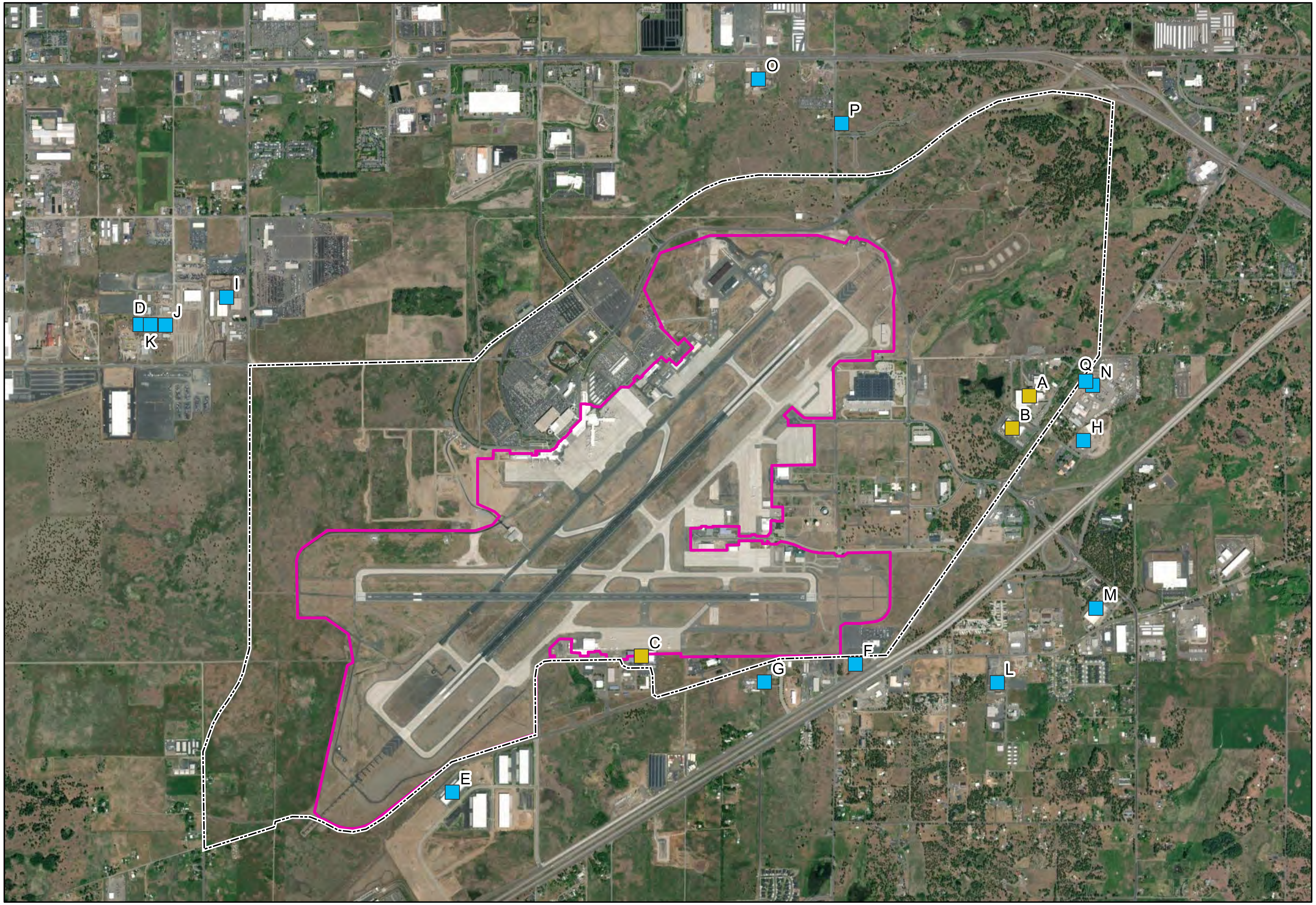
GSI ENVIRONMENTAL

HISTORICAL LANDFILLS AND SOLID WASTE FACILITES

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	SIAWA_HLFA	Appv'd By:	KW

FIGURE 5.2



LEGEND

⬚ Primary Airport Area

— AOA Fenceline

Potential PFAS Source

🟦 Outside Primary Airport Area (14)

🟨 Inside Primary Airport Area (3)

LOCATION KEY

Key	Company
A	Waste to Energy
B	WM Recycling Facility
C	Industrial Coatings (IAC)
D	Extreme Industrial Coatings
E	Performance Pro Supply
F	Conoco Phillips Geigier Pipeline
G	Fisher Construction
H	Papé Machinery Construction & Forestry
I	Metals Fabrication Co.
J	Seaport Steel Building
K	Spokane Metals LLC
L	Wilson Construction
M	Silgan Unicep
N	Alloy Trailers, Inc.
O	Wear Tech
P	Spokane Fire Department Station #6
Q	Reliance Trailer Company

Notes

1.) Potential PFAS sources as identified by Interstate Technology Regulatory Council (ITRC) guide
2.) Company names from inventory of all properties within 1 mile by ERIS
3.) Aerial imagery provided by Esri ArcGIS Online, 2023.

GSI ENVIRONMENTAL

GSI job No. 6892	Drawn By: EKS
Issued: 13-Aug-2024	Chk'd By: KW
Map ID: SIAWA_PFS2	Appv'd By: KW

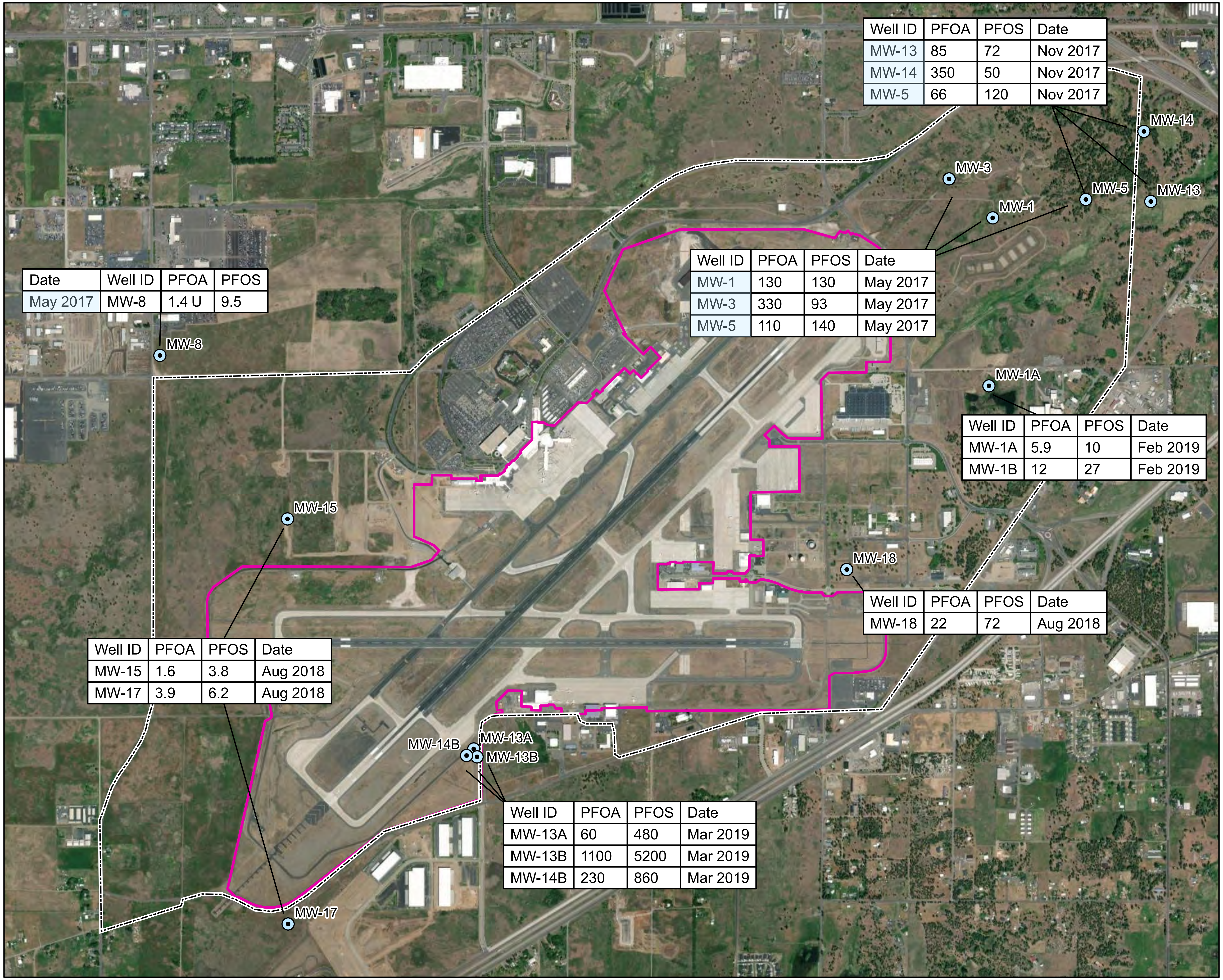
FIGURE 6.1

Potential Third-Party PFAS Sources

Site Assessment Report
Spokane International Airport - Spokane, Washington

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

Feet 0 1,000 2,000



Well ID	PFOA	PFOS	Date
MW-13	85	72	Nov 2017
MW-14	350	50	Nov 2017
MW-5	66	120	Nov 2017

Well ID	PFOA	PFOS	Date
MW-1	130	130	May 2017
MW-3	330	93	May 2017
MW-5	110	140	May 2017

Date	Well ID	PFOA	PFOS
May 2017	MW-8	1.4 U	9.5

Well ID	PFOA	PFOS	Date
MW-1A	5.9	10	Feb 2019
MW-1B	12	27	Feb 2019

Well ID	PFOA	PFOS	Date
MW-18	22	72	Aug 2018

Well ID	PFOA	PFOS	Date
MW-15	1.6	3.8	Aug 2018
MW-17	3.9	6.2	Aug 2018

Well ID	PFOA	PFOS	Date
MW-13A	60	480	Mar 2019
MW-13B	1100	5200	Mar 2019
MW-14B	230	860	Mar 2019

N

LEGEND

⬚ Primary Airport Area

━ AOA Fenceline

⊙ 2017 - 2019 PFAS Sampling Locations

▭ Environmental lab not certified for PFOA and PFOS

Notes

1.) MW-1A and MW-1B are adjacent to one-another
2.) PFOA and PFOS values are presented as previously reported in lab reports appended to previous investigations (2017-2019), at this time validated data has not yet been received by GSI from ALS.
3.) ALS certified by Ecology for USEPA Method 537M in 2018.
4.) 'U' indicates non-detects
5.) Aerial imagery provided by Esri ArcGIS Online, 2023.

Feet
0 750 1,500

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

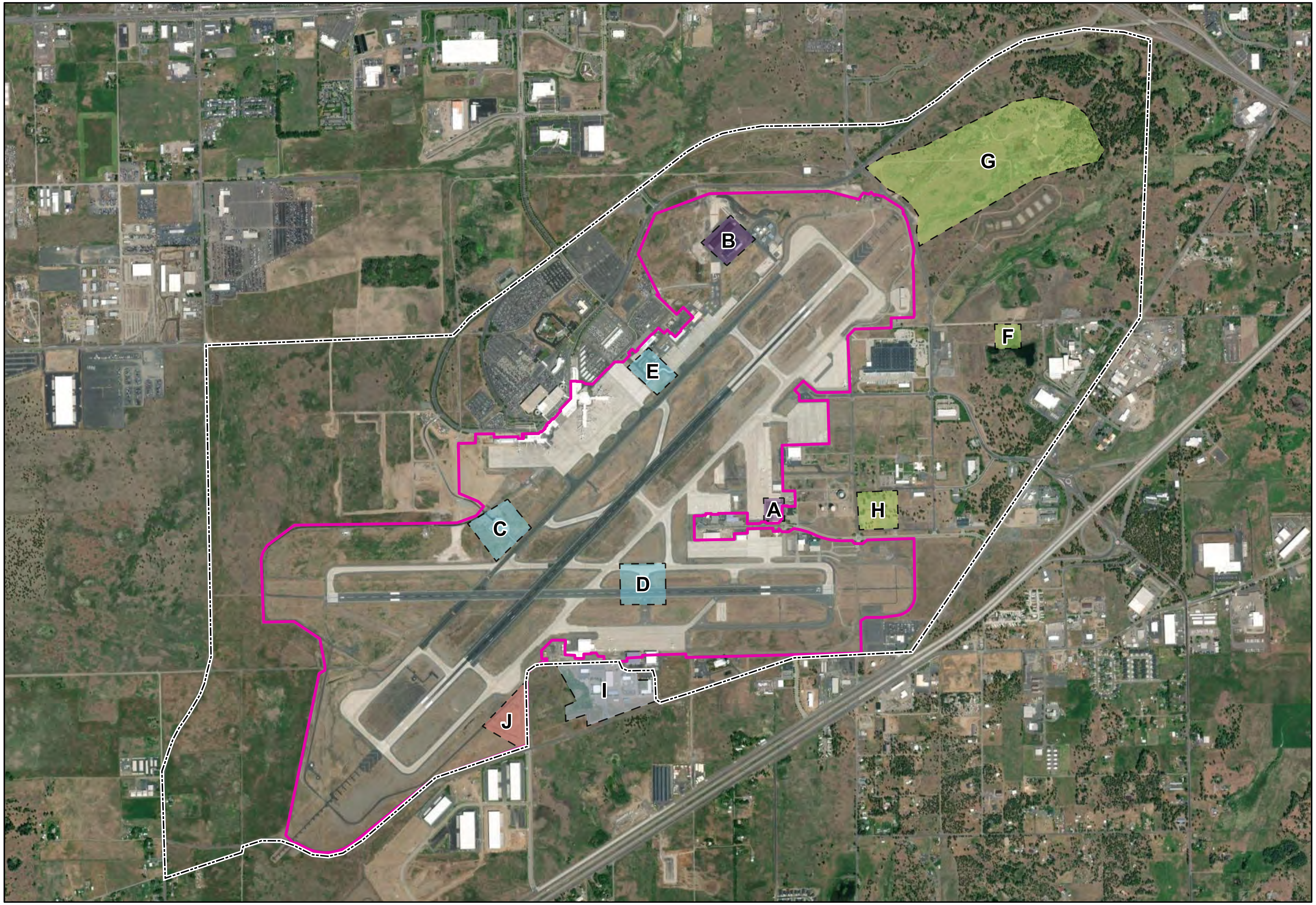
GSI ENVIRONMENTAL

ELEVATED PFAS IN GROUNDWATER

Site Assessment Report
Spokane International Airport
Spokane, Washington

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	SIAWA_prvPFAS	Appv'd By:	KW

FIGURE 7.1



LEGEND

⬚ Primary Airport Area

— AOA Fenceline

Potential Areas of Concern by Usage Type:

🟪 AFFF Storage

🟦 FAA Mandated Testing

🟩 Elevated PFAS in Groundwater

🟥 Joint Training Area

⬜ AFFF Storage and Training

Notes

1.) AOA - Air Operations Area
2.) Elevated PFAS in groundwater as reported from sampling events from 2017-2019
2.) Spatial extent of highlighted areas for visual purposes only and subject to further evaluation during subsequent investigations.
3.) Aerial imagery provided by Esri ArcGIS Online, 2023.

LOCATION KEY

Key	Name
A	Hangar 725
B	Field Maintenance Building
C	Current SIA Fire House
D	FAA Inspection Testing
E	Historical SIA Fire House
F	Park Dr. Waste Disposal Area
G	Stormwater Recovery Area
H	Southeast Area of Business Park
I	Air National Guard
J	Joint Fire Training Area

GSI
ENVIRONMENTAL

GSI job No.	6892	Drawn By:	EKS
Issued:	13-Aug-2024	Chk'd By:	KW
Map ID:	SIAWA_AOC	Appv'd By:	KW

FIGURE 8.1

Potential or Known PFAS Areas of Concern

Site Assessment Report
Spokane International Airport
Spokane, Washington

Projected Coordinate System
Datum: NAD 83
State Plane Washington North
Units: Feet

Feet
0 1,000 2,000

GSI Job No.: 6892
Issued: 13 August 2024

SITE ASSESSMENT REPORT
Spokane International Airport
Spokane, WA

APPENDIX A

Hydrology and Geology

www.haleyaldrich.com

REPORT ON

SPOKANE INTERNATIONAL AIRPORT - GEOLOGY AND HYDROGEOLOGY
9000 WEST AIRPORT DRIVE
SPOKANE, WASHINGTON

by
Haley & Aldrich, Inc.
Spokane, Washington

for
Spokane International Airport
Felts Field & Airport Business Park
Spokane, Washington

File No. 0209800-001
13 August 2024

HALEY ALDRICH

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SIGNATURE PAGE FOR

REPORT ON
SPOKANE INTERNATIONAL AIRPORT - GEOLOGY AND HYDROGEOLOGY
9000 WEST AIRPORT DRIVE
SPOKANE, WASHINGTON

PREPARED FOR
SPOKANE INTERNATIONAL AIRPORT
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1. Introduction

The objective of this report is to summarize the geologic and hydrogeologic framework around the Spokane International Airport (SIA) (Figure 1) as an Appendix to the Task 1.A "Site Assessment Report for Per-and Polyfluoroalkyl Substances (PFAS)" (Site Assessment Report) deliverable under Exhibit B "Scope of work and schedule" of Enforcement Order Number DE 22585 (EO), dated 29 March 2024. We understand that the Washington State Department of Ecology (Ecology) delivered the EO to the Airport Board City of Spokane/Spokane County (Airport Board) identifying them as the potentially liable party for the SIA PFAS Site (Facility Site ID 6332493, Cleanup Site ID 16774; the Site[1]). This report, as a component of the Site Assessment Report, will complete Task 1.A of the EO. This report provides a foundational understanding of the geologic and hydrogeologic framework around the Site and will help prepare a Site-specific geologic and hydrogeologic framework during the Final Remedial Investigation and Feasibility Study listed as Task 1.C in the EO.

Haley & Aldrich, Inc. (Haley & Aldrich) prepared this report by reviewing and compiling information from existing reports. This report relies mainly on data, reports, and information collected by the cited authors describing the geologic and hydrogeologic conditions around the Site and study area. This information has not been reinterpreted and will be used as a foundation to better understand the Site-specific geologic and hydrogeologic framework at SIA after future monitoring events at the Site, as required by the EO, are completed.

The study area for this report is located within the West Plains of western Spokane County, and the Site resides near the southeastern boundary of the West Plains as shown in Figure 1. The general location, Site area topography, geologic and hydrogeologic framework, and details of the limited available Site-specific geologic and hydrogeologic data are summarized in the following sections.

---

[1] The term 'Site' as used in this appendix refers to the main operational area within the SIA property boundary as shown in Exhibit A of the EO and presented in Figure 2 as Primary Airport Area and is not meant to define the Site boundary as defined by WAC 173-340-350. The Site boundary as defined by anywhere contamination has come to be located due to recent or historical releases at the SIA property (WAC 173-340-100) is undefined at the time of this report.

2. Site Location, Topography, and Landscape

The Primary Airport Area (Site) is located at the southwestern limit of the City of Spokane generally in Sections 5 and 6 of Township 24 North Range 42 East (T24N R42E) and Sections 28, 29, 30, 31, 32, and 33 of T25N R42E. For the purpose of this initial assessment, the Primary Airport Area is defined below and shown on Figure 2:

Northern Boundary: an unnamed road marking the northern boundary of Section 31 (T25N R42E) east from South Hayford Road to West Airport Drive; West Airport Drive east from the northern boundary of Section 31 (T25N R42E) to a point on the south side of the West Airport Drive onramp onto eastbound United States Highway 2 (US2) that lies south of the westbound US2 offramp underpass to West Airport Drive.

Eastern Boundary: the point on the south side of the West Airport Drive onramp onto eastbound US2 that lies south of the westbound US2 offramp underpass to West Airport Drive, south-southwest to the intersection of South Geiger Boulevard and West Garden Springs Road; South Geiger Boulevard south to the intersection with West Electric Avenue.

Southern Boundary: West Electric Avenue, west from the intersection with South Geiger Boulevard to the unnamed access road to 8520 West Electric Avenue; the unnamed access road to 8520 West Electric Avenue from West Electric Avenue looping north, west, and south back to West Electric Avenue at 9198 West Electric Avenue; West Electric Avenue west to intersection with West 53rd Avenue; West 53rd Avenue west to South Hayford Road.

Western Boundary: South Hayford Road, north from the intersection with West 53rd Avenue, to intersection with an unnamed road marking the northern boundary of Section 31 (T25N R42E).

The topography of the Site area is a relatively flat plain, gently sloping downward from an elevation of 2,390 feet above mean sea level (amsl) in the south Site area to approximately 2,290 feet amsl in the northeast Site area (Derkey et al., 2004; Hamilton et al., 2004). The landscape within the West Plains consists of mixed semi-arid shrub steppe grasslands, sparse mixed conifer forest and shrub steppe, barren rock surfaces, agricultural land, and urban-semi urban uses (GSI Water Solutions, Inc. [GSI Water Solutions] et al., 2015). The landscape around the Site also includes stormwater infrastructure and impermeable surfaces due to outcrops.

3. Geologic and Hydrogeologic Framework

The Site area lies in the West Plains in the northeast corner of the Columbia Basin. The West Plains is a physiographic region to the west of the City of Spokane, mostly lying in western Spokane County. The West Plains is bounded in the north by the Spokane River; bounded in the east by Marshall Creek, Latah Creek (formerly Hangman Creek), and the Spokane River; bounded to the south by upland buttes; and bounded in the west by the upland buttes and Spring Creek of eastern Lincoln County (McCollum and Pritchard, 2012); see Figure 1. Hydrogeologically, the West Plains region is unique in the eastern Columbia Basin in that groundwater generally flows from southwest to northeast. The West Plains is hydrogeologically separated from the greater Columbia Basin aquifer system by a divide that trends along the upland buttes of eastern Lincoln County, south and east along the upland buttes around Medical Lake and Four Lakes (Deobald and Buchanan, 1995); see Figure 1.

The regional geology of the northeast Columbia Basin consists of Precambrian metasediment and Cretaceous to Paleogene (K-Pg) intrusive basement rock (Deobald and Buchanan, 1995). The basement rock is cut by faults recording successive phases of pre-Miocene compression and tension. Along these faults, the Precambrian and K-Pg basement rock formed rugged paleotopographic highs (Soderberg et al., 2024). As Miocene flood basalts erupted, lava filled the valleys between these paleotopographic highs, leaving basement summits peaking though the surrounding lava. These upland buttes of basement rock surrounded by flood basalt are called buried hills or steptoes (Webster and Nunez, 1982; GWMA, 2009). Pleistocene glaciolacustrine and glacial flood deposits and Holocene alluvium overly the flood basalts that onlap the steptoes (Derkey et al., 2004; Hamilton et al., 2004).

Hydrogeologically, the basement rock has low permeability. As with the greater Columbia Basin, the West Plains aquifers are contained in units of the flood basalts, called the Columbia River Basalt Group (CRBG), and the overlying unconfined Pleistocene sediment (Deobald and Buchanan, 1995). The CRBG is frequently at the surface in the West Plains where it has been scoured by Pleistocene glacial floods, referred to here generally as Missoula Floods (Kiver et al., 2006). Understanding the CRBG stratigraphy and Missoula Flood deposits, which are presented in the following sections, is crucial to understanding the West Plains hydrogeologic system.

3.1 CRBG AND SEDIMENTARY INTERBEDS

The CRBG erupted during the Miocene (Kasbohm et al., 2023) and covers an area of greater than 81,000 square miles (mi^2) in Washington, Oregon, and Idaho (Reidel et al., 2013a). The greatest thickness of the CRBG is in the Pasco Basin of southeastern Washington where the CRBG is estimated to be 15,000 ft thick, but in the West Plains the CRBG thickness is less than 1,000 ft (Derkey et al., 2004; Hamilton et al., 2004; Burns et al., 2011).

The CRBG formations are formally referred to by their geographic designator followed by “Basalt.” Of the seven formal formations comprising the CRBG in the Columbia Basin (Reidel et al., 2013a), only two are found in the West Plains: the Grande Ronde Basalt and the overlying Wanapum Basalt. Across the Columbia Basin, the Grande Ronde Basalt consists of 25 members (Reidel and Tolan, 2013a) and the Wanapum Basalt consists of six members (Reidel et al., 2013a). However, the CRBG thins toward the basin edges, and in the West Plains there are only three members between the Grande Ronde and Wanapum Basalts. Derkey et al., (2004) and McCollum and Hamilton (2012) identify the Wapshilla Ridge and Sentinel Bluffs Members of the Grande Ronde Basalt and the Priest Rapids Member of the

Wanapum Basalt in both outcrop and well logs (see Figure 3). Reidel (2005) further divided the Sentinel Bluffs Member into six chemically distinct compositions.

During eruptive hiatuses, fluvial, lacustrine, pedogenic, volcaniclastic debris flow, and ash-fall deposits accumulated between flood basalts. These primarily sedimentary beds interfinger with the CRBG. Generally, the term for these sediments is the Ellensburg Formation in most of Washington and the Latah Formation toward Idaho (Swanson et al., 1979; Reidel et al., 2013a). The Ellensburg and Latah Formations are composed of many formal and informal sedimentary members and beds (Swanson et al., 1979) (see Figure 3).

3.1.1 Stratigraphic Architecture of the CRBG

More than 350 lava flows comprise the CRBG (Reidel et al., 2013a), each of which represents a single outpouring of lava (Self et al., 1996). Flows range from 10-300 feet thick (Tolan et al., 1989) and show repeated stratigraphic patterns, often consisting of the following: a sparsely vesicular flow bottom; a dense, jointed, and typically non-vesicular flow interior; and a vesicular, brecciated flow top (Reidel and Tolan, 2013a) as generally shown in Figure 4.

The pattern of flow bottom, flow interior, and flow top is often complicated by inflation, a process of lava flow emplacement where hot magma injects into the interior of a cooler, previously emplaced flow (Soderberg et al., 2024). The inflation process results in compound flows consisting of several individual lava flows stacked through internal emplacement rather than vertical superposition (Self et al., 1998). Individual flows within these compound flows may lack the complete sequence of flow bottom, flow interior, and flow top. Furthermore, porous zones of vesicles may form within the usually dense, non-vesicular flow interiors, but these instances lack the brecciation found in vesicular flow tops (Goff et al., 1996; Reidel et al., 2013a). This complexity is important for understanding the position and connectivity of aquifer zones.

Aside from the process of flow inflation, each successive lava flow stacked on top of the preceding flow. Sedimentary interbeds deposited during eruptive hiatuses (Reidel et al., 1989) (see Figure 5). CRBG stratigraphy does not always consist of horizontal stacked lava flows. Lava flow deposition followed paleotopography, filling in paleo-geomorphic depressions before ponding to form horizontal strata (Reidel and Tolan, 2013). Horizontal flows were frequently cut by paleochannels (Soderberg et al., 2024) related to the paleo-Columbia River drainage (Reidel and Tolan, 2013). Where lava flows deposited in fluvial or lacustrine environments, flow bottoms commonly consist of pillow basalts (Reidel et al., 2013a) consisting of highly porous and permeable hyaloclastite (Soderberg et al., 2024). Horizontal and extensive basalt flows also are cut by vertical feeder dikes that tend to regionally mass in swarms (Reidel et al., 2013b). Dikes are considered to be hydrologic flow barriers (GWMA, 2009).

On a regional scale, sedimentary interbeds are considered confining units while CRBG flow tops and flow bottoms form aquifers (Burns et al., 2011). However, locally, sedimentary interbeds may form significant aquifers (Lite, 2013; Taylor and Gazis, 2014). The hydrogeologic unit called an interflow zone is the combination of a lava flow top, any subsequently deposited interbed sediments, and an overlying flow base of the subsequent lava flow (Reidel et al., 2003). The hydrologic significance of interflow zones is their wide range of permeabilities (Lite, 2013), cementation (Gaylord et al., 1989), and connectivity (Reidel et al., 2003). Because of variation in the permeability and connectivity of interflow zones, they are referred to in this report as aquifer zones rather than discreet aquifers.

The hydrologic significance of CRBG stratigraphic architecture is the connectivity of porous and permeable flow tops and flow bottoms (Spane, 2013; Burns et al., 2016; White et al., 2020). Despite endemic jointing, flow interiors are considered confining units (Reidel et al., 2003; Burns et al., 2016; White et al., 2020) but may transmit groundwater through structurally controlled fracture networks (Jayne and Pollyea, 2018). Similarly, the thickness, extent, pinch-out patterns, and cementation of sedimentary interbeds influence both regional and local hydrology (Lite, 2013; Burns et al., 2011; Taylor and Gazis, 2014; Burns et al., 2016).

3.2 OVERBURDEN

Near surface or surficial overburden which overlies the CRBG generally includes sedimentary deposits and sedimentary rocks varying in thickness and origin (Drost et al., 1990). Across the Columbia Basin, these deposits consist of Pliocene and Pleistocene deposits of alluvium, colluvium, eolian, glacial, lacustrine, and peat deposits (Kahle et al., 2011) (Figure 5). In the West Plains area, these sediments are restricted to Pleistocene alluvium and glacial flood sediment (Derkey et al., 2004; Hamilton et al., 2004). In this report the overburden aquifer is synonymous with alluvial aquifer.

3.3 COLUMBIA BASIN HYDROGEOLOGIC FRAMEWORK

Kahle et al. (2011) divided the hydrogeologic framework of the Columbia Basin into four general regions as shown on Figure 6. The Columbia Basin hydrogeologic units generally consist of the confining basement, a series of aquifer zones consisting of interflows divided among the CRBG formations, significant interbed confining units between the CRBG formations, and an overlying unconfined aquifer in the Pleistocene alluvium and glacial flood deposits, also known as the overburden aquifer (Kahle et al., 2011). Local groundwater flow direction is dependent on stratigraphic architecture and structure. These local variables include the thickness, lateral extent, and internal continuity of interflows; the extension or truncation of interflows based on paleotopography; the presence of dikes or faults may act as barriers or conduits; and fracture networks that may compromise the confining capacity of basalt flow interiors.

3.4 WEST PLAINS GEOLOGY

3.4.1 West Plains Basement Hydrogeology

The basement rocks within the West Plains consist of a variety of crystalline rocks of igneous and metamorphic origin that span in age over 1.4 billion years old (giga annum-Ga) (McCollum and Pritchard, 2012; GSI Water Solutions et al., 2015). These rocks originated as either sediments, which had undergone compaction and cementation of pore space through a process called diagenesis, or as magmatic (igneous) intrusions, subject to mineral recrystallization during igneous cooling and/or metamorphism. The region was subjected to tectonic compression in the Cretaceous period followed by extension in the Eocene time which resulted in several periods of igneous intrusion, folding, normal and reverse faulting, and repeated reactivation of faults during periods of tectonic activity (McCollum and Pritchard, 2012). Several of these structural features are mapped in the West Plains area and are interpreted to influence the occurrence and topography of the basement units, as well as enhance groundwater flow.

These rocks are predominantly exposed in the bedrock buttes and hills (locally termed steptoes) within and surrounding the West Plains and represent the elevated portions of ancient paleotopography that was buried by CRBG flows in the Miocene time. The basement rocks appear to underlie each geologic unit within the West Plains. GSI Water Solutions et al. (2015) included a top of basement map using hydrographs of regional groundwater wells and geologic mapping by state and local agencies that indicates the top of bedrock elevation varies across the West Plains forming buried ridges in the subsurface that likely influence groundwater flow and aquifer compartmentalization; a general representative cross-section of buried ridges is shown in Figures 7. These buried highs appear to form the northern, southern, and western boundaries of the West Plains aquifer system, separating it from the regional Columbia Plateau Regional Aquifer System [CPRAS (GSI Water Solutions et al., 2015)].

Groundwater flow in the West Plains generally is from southwest to northeast, as opposed to a regional flow direction that is northeast to southwest in the majority of the Palouse Slope sub-province. Additionally, several northwest-southeast trending basement ridges are identified and create several sub-basins within the West Plains that influence groundwater conditions (Figure 8). GSI Water Solutions, et al. subdivided these basement ridges into four sub-basins including the Central Plains Subsystem where the Site is located. According to Figure 8, the SIA generally sits within the Medical Lake-Airway Heights Ridge and the Needham Hill Ridge creating a divide between the Central Plains Subsystem and the other subsystems within the West Plains.

3.4.2 West Plains CRBG

Two CRBG formations exist in the area: the overlying Wanapum Basalt and underlying Grande Ronde Basalt units (GSI Water Solutions et al., 2015). Individual members identified by others in the West Plains include the Priest Rapids Member of the Wanapum Basalt and the Sentinel Bluffs and Wapshilla Ridge Members of the Grande Ronde Basalt (see Figure 3).

Table 1. Basalt Stratigraphy in the West Plains

Wanapum Basalt	Priest Rapids Member
Grande Ronde Basalt	Sentinel Bluffs Member
	Wapshilla Ridge Member

Note:
Derkey et al. (2004); Reidel (2005)

Variations in geologic properties exist within and between individual basalt flows, as well as the occurrence of sedimentary interbeds between flows/members create a geologically complex stratigraphy that affects both horizontal and vertical heterogeneity of the basalt aquifer system of the West Plains. Identifying the areal extent and thickness of these formations is critical to understanding groundwater flow within the aquifer zones hosted in the CRBG formations. Sedimentary strata interbedded within the CRBG are collectively referred to as the Latah Formation (Figure 7).

3.4.2.1 Wapshilla Ridge Member, Grande Ronde Basalt

The lowest CRBG member in the West Plains is the Wapshilla Ridge Member of the Grande Ronde Basalt. Within the CRBG, the Wapshilla Ridge Member is the greatest volume of the Grande Ronde Basalt members and contains at least 18 individual basalt flows (Reidel and Tolan, 2013). Locally, the Wapshilla Ridge Member consists of several individual basalt flows and is only exposed in the lower reaches of incised creek valleys, such as the Deep Creek and Latah Creek valleys (Figure 9).

The Wapshilla Ridge flows were the first CRBG flows to be deposited the West Plains area and buried the existing paleotopography which was eroded into the basement rocks, filling valleys, and flowing around ridges and peaks. These flows encountered thick deposits of Miocene-age sediments of the Latah Formation that were deposited over the basement rocks, forming extensive pillow basalt at the base of the flows (McCollum and Pritchard, 2012). A period of erosion and alluvial deposition followed emplacement of the Wapshilla Ridge flows, resulting in hundreds of feet of relief and extensive Latah Formation sediments between it and the overlying flows of the Sentinel Bluffs Member (McCollum and Hamilton, 2012). The top of the Wapshilla Ridge Member was mapped in the subsurface by Pritchard (2013) using well log data and “whole rock” geochemistry and is shown as sloping down to the east-northeast, dropping from 1,950 feet amsl at the bedrock highs in the south and west of the West Plains to lower than 1,700 feet amsl at the bottom of the Latah Creek and Spokane River Valleys.

3.4.2.2 Sentinel Bluffs Member, Grande Ronde Basalt

Basalt belonging to the Sentinel Bluffs member of the Grande Ronde Formation overlies the Wapshilla Ridge Member across the West Plains. The Sentinel Bluff Member is identified as the “upper Grande Ronde Basalt” hydrogeologic unit by GSI Water Solutions et al. (2015) and contains several interbeds of Latah Formation sediments. Each flow is bounded by a vesicular flow top and massive base that overlies either the vesicular top of the flow below or a sedimentary layer. Flow thickness ranges from 26 to 88 feet, and the vesicular flow top of the Airway Heights flow is up to 45 feet thick (Reidel, 2005). Where exposed, the three flow units have well-developed entablatures and colonnades exposed in the West Plains but can exhibit blocky jointing near the flow edges (Reidel, 2005).

The upper surface of the Sentinel Bluffs Member is mapped by Pritchard (2013) as between approximately 2,300 and 2,000 feet above amsl, except where ridges of basement rock extend above ground surface or where erosion has incised into underlying units (Figure 9). Total thickness of the Sentinel Bluffs unit can be quite variable due to irregular erosion of the upper contact and underlying topography at the time of emplacement (Reidel, 2005). The underlying Wapshilla Ridge Member flows blocked drainages and created extensive lakes, which formed lacustrine and alluvial deposits that were invaded by Sentinel Bluff flows, which “buried” into soft sediments during emplacement (McCollum and Hamilton, 2012).

3.4.2.3 Priest Rapids Member, Wanapum Basalt

The Wanapum Basalt is the uppermost CRBG formation in the West Plains and consists of one to four flows of the Priest Rapids Member emplaced approximately 14.5 to 15.3 Ma (Derkey et al., 2004). This formation is generally found between approximately 2,300 feet and 2,450 feet amsl across the West Plains and forms the capping unit that overlies all other basalt flows (SCWR, 2013). The total thickness is up to 250 feet thick (SCWR, 2011); however, it is not present in areas where the flows thin and onlap basement rocks that extend above ground surface or where this unit has been removed by erosion (SCWR, 2013). In general, the top of the Wanapum Basalt gently slopes eastward toward the Spokane River valley, and individual units dip to the east-northeast (GSI Water Solutions et al., 2015).
The top of the Wanapum Basalt was heavily eroded by glacial-outburst megafloods at the end of the last glacial period; these events incised several paleochannels that subsequently were filled with later megaflood and recent alluvial sediments (see Figure 1). Some reaches of these paleochannels appear to fully incise locally through the Wanapum Basalt and into the underlying units (GSI Water Solutions et al., 2015;). Several creek channels, such as the Deep Creek, Marshall Creek, and Coulee Creek canyons, fully penetrate the Wanapum Basalt in the West Plains.

3.4.2.4 *Latah Formation*

Throughout the Columbia Plateau, a wide variety of sedimentary strata are interbedded within the CRBG as the lava flows buried existing sediments, dammed natural drainages, and were subjected to erosion after emplacement creating accommodation for sediments to accumulate on the surface of the flow. These sedimentary deposits collectively are referred to as the Latah Formation in eastern Washington and Idaho and are correlative to other sedimentary formations interbedded with the CRBG flows, such as the Ellensburg Formation in the western Columbia Plateau (Reidel et al., 2013).

The Latah Formation deposits in the West Plains were formed in river and lake systems prior to and after CRBG flow emplacement (GSI Water Solutions et al., 2015). The Latah Formation interbeds observed in the Palouse Slope region, including in wells drilled within the West Plains, are commonly 20 feet thick but can vary from 1 to 200 feet thick and are predominantly described as clays and silts that can locally be cemented, forming relatively hard, 0.5- to 2-foot-thick shale and siltstone layers (Northwest Land & Water, Inc. [NLW], 2011; NLW, 2012). Sandy to gravelly deposits are described throughout the Latah Formation as isolated layers within CRBG units but typically occur in direct contact with clays (NLW, 2011). Because of the variable composition of Latah Formation interbeds, they can locally behave as either aquifer or aquitard units.

Due to the nature of these deposits, they are also laterally variable in the subsurface and are shown thickening, thinning, and pinching out in cross-sections based on publicly available well logs (NLW, 2011; NLW, 2012; McCollum and Pritchard, 2012; GSI Water Solutions et al., 2015;). In the West Plains area, informal subdivisions of the Latah Formation have been variably applied based on their stratigraphic position between the CRBG unit (GSI Water Solutions et al., 2015):

- Latah I - Sediments between Wanapum Basalt and Grande Ronde Basalt
- Latah II - Sediments between the Sentinel Bluffs Member and Wapshilla Ridge Member of the Grande Ronde Basalt
- Latah III - Sediments between the Grand Ronde Basalt and the Basement Rocks

Complications can arise when using these Latah subdivisions, because in addition to the numbered subdivisions, unnumbered interbeds can and do occur within individual CRBG units. Additionally, because they are not defined by their lithological characteristics and instead by the correct identification of the bounding CRBG units, separate named units cannot be identified where CRBG units either are missing or cannot be determined by lithological or geochemical identifiers.

3.4.3 Glacial Outburst Flood Deposits and Alluvium

Sedimentary strata overlying the CRBG in the West Plains consist predominantly of Pleistocene glacial-outburst flood deposits, Pleistocene loess, and Pleistocene to Holocene-aged (11,700 years before present to present) alluvium (GSI Water Solutions et al., 2015). During the last glacial period, the Purcell Trench lobe of the Cordilleran Ice Sheet periodically formed an ice dam near the Idaho-Montana border approximately 70 miles upstream from the West Plains and impounded glacial Lake Missoula. Between 17,500 to 14,500 years before present, this dam repeatedly failed releasing glacial-outburst megafloods that flowed down the Spokane River valley and across the West Plains and deposited high-energy flood deposits that the Spokane Valley Rathdrum Prairie Aquifer now inhabits. These megafloods produced erosional features in the underlying basalt, including steep sided canyons called “coulees,” dry falls, cataracts, and potholes across the Columbia Plateau in areas that are now called the Channeled

Scablands (Baker, 2009). The megafloods also deposited widespread gravel fan and bar accumulations, gravel-dominated megaripples, and thick successions of sand, silt, and clay-rich slackwater deposits (Waitt, 2017).

GSI Water Solutions et al. (2015) subdivided these sediments into two hydrogeologic units based on their granular characteristics: coarse-grained Quaternary deposits and fine-grained Quaternary deposits. The coarse Quaternary deposits consist of silt, sand, and gravel deposited predominantly by Pleistocene glacial outburst floods and by stream reworking of flood deposits. These Quaternary deposits generally are located within and near coulees, streams, and river canyons, and steep cliffs cut into CRBG basalt and basement bedrock. Fine-grained Quaternary deposits consist predominantly of silt, silty sand, and fine, sandy loess. These materials mantle many of the hills and valleys in the northern and western portions of the West Plains and are largely absent from coulees and drainages.

Five northeast- to southwest-trending, sediment-filled paleochannels on the West Plains were carved from glacial-outburst megaflood channels trending north and east from the steptoes along the southern West Plains as shown on Figure 1 (Deobald and Buchanan, 1995; Budinger and Associates, 2001; Pritchard, 2013; Osborn et al., 2021). These paleochannels are approximately 3 to 12 miles long by 0.3 to 1.5 miles wide and can be several hundred feet deep, incising into the upper Wanapum Basalt and occasionally into the underlying Latah Formation (Latah I subdivision) and Grande Ronde Basalt (Pritchard, 2013). The sedimentary deposits that fill the West Plains paleochannels contain from several feet to greater than 300-foot-thick successions of poorly to moderately sorted, relatively clean gravelly and sandy sediment containing massive, horizontal strata, and low- to high-angle planar cross-strata (Derkey et al., 2004; GSI Water Solutions et al., 2015; Osborn et al., 2021). Paleochannel deposits generally dip 10 to 20 degrees to the west-southwest and are different in alignment from the southwest-northeast orientation of the paleochannels (Pritchard, 2013). These cross-stratified sedimentary deposits may locally influence groundwater movement.

Reworking of glacial-outburst megaflood sediments during the latest Pleistocene and Holocene produced variable alluvial and colluvial deposits across the West Plains. These post-megaflood sedimentary deposits also served as sources for eolian sand dunes and loess deposits that mantle much of the West Plains and obscure the extent of the underlying paleochannel deposits (Hamilton et al., 2004). The eolian sedimentary deposits include inches-thick to several-feet-thick accumulations of loess and northeast-trending parabolic dunes in the western West Plains (Hamilton et al., 2004).

3.4.4 Structural Geology

Surface geologic maps of the West Plains area indicate little to no major structural deformation of surficial geologic units, however, major structural features mapped outside of and shown projecting into the West Plains include the Latah Fault, St. Joe Fault, Minnie Creek Lineament, and the Jump Off Joe Fault (GSI Water Solutions et al., 2015) (Figure 10). These faults and structural features are discontinuously mapped within the underlying basement rock units and likely continue into the West Plains, influencing the distribution of geologic units, providing structural weakness for preferential erosion, and acting as pathways for groundwater flow within the basement rocks. For example, the Latah Fault is mapped following a 50-mile-long linear feature that trends north-northwest which corresponds to the valley of Latah Creek and the Spokane River and forms the eastern boundary of the West Plains (Figure 10).

While the faults exposed in basement rocks are shown to have several thousands of feet of either vertical or horizontal offset; no deformation has been observed in the exposed CRBG units within the West Plains (McCollum and Pritchard, 2012). These faults are related to pre-Miocene orogenic events that influenced the observed paleotopography that formed ridges and steptoes (Soderberg et al., 2024); this paleotopography influences regional groundwater flows.

High density fracture zones of the Cheney Fracture Zone are observed in the CRBG units to the southwest in the Cheney-Palouse Scabland Tract and have a similar orientation as mapped basement faults. This indicates that younger faults and folds associated with basement faults projected into the West Plains either are missing or overlain by the surficial cover in the West Plains region (McCollum and Pritchard, 2012).

3.5 WEST PLAINS HYDROGEOLOGY

As discussed above, the West Plains is at the northeast margin of the CPRAS and generally shares the same conceptual hydrogeology: unconfined aquifers are hosted in overburden deposits overlying the basalt and bedrock units, while generally confined aquifers are hosted in water-bearing intervals within basalt interflow zones and interbedded Latah Formation sediments (GSI Water Solutions et al., 2015). As discussed in Section 3.4, the West Plains aquifer system appears to be cut off from the larger CPRAS and is an isolated basin surrounded by basement rocks on the south and west (see Figure 8) and by the Spokane River and Latah Creek on the north and east (see Figure 1). As a result, the general groundwater flow direction in the West Plains is toward the east-northeast, as opposed to the west-southwest direction of much of the CPRAS (SCWR, 2013). Groundwater recharge is therefore dependent on local surface recharge areas, and basement highs also create sub-basins within the West Plains that may be isolated from each other (Section 3.4.1, Figure 8).

Well data indicates depth to water in the West Plains varies geographically from tens of feet to several hundred feet below ground surface (bgs) (GSI Water Solutions et al., 2015). In addition to geographic location, variability of observed groundwater elevations also is influenced by the water-bearing zone or zones that wells are completed in. Further discussion of the hydrogeology of each of these hydrogeologic units is provided below.

3.5.1 CRBG Aquifer System

Based on a review of previous studies and water level data from Spokane County, GSI Water Solutions et al. (2015) identified three basic parts of the basalt aquifer system in the West Plains generally corresponding to (from top to bottom) the Wanapum Basalt (Priest Rapids Member), the upper Grande Ronde Basalt (Sentinel Bluffs Member), and the lower Grande Ronde Basalt (Wapshilla Ridge Member). In general, aquifer zones in the CRBG are approximately 1 to 25 feet in thickness and are limited in lateral extent to less than 1 mile (SCWR, 2011; NLW, 2012). The flows also are locally interbedded with sedimentary deposits resulting in multiple “stacked” aquifers that are confined to semi-confined, forming potentially connected aquifer zones within each CRBG unit (NLW, 2012; SCWR, 2013).

Groundwater is hosted primarily in the joints, vesicles, fractures, brecciated flow tops and bottoms, and sedimentary (Latah Formation) interbeds within the interflow zones of the basalt units. Lateral conductivity in these interflow zones is dependent on the thickness of the basalt, location within a flow, and the scale and density of folds and faults. The dense basalt flow interiors, which make up 90 to 95 percent of the typical total flow volume, host limited amounts of groundwater in fully penetrating joints and fractures (GSI Water Solutions et al., 2015) and can act as an aquitard in many cases (Lindholm and Vaccaro, 1988).

Lateral hydraulic conductivity of the flow tops and bottoms ranges between 1 x 10^{-6} to 1,000 feet per day (average 0.1 foot per day) (GSI Water Solutions et al., 2015). In contrast, vertical and horizontal hydraulic conductivities of the dense interiors are 6 to 9 orders of magnitude less (GSI Water Solutions et al., 2015). This implies that lateral groundwater flow in the CRBG units primarily is through the interflow zones and is therefore parallel to these units. Vertical groundwater movement is inferred to be influenced by several factors, including: fractures and joints within the dense flow interiors, at the edges of flows where interflow zones join, and/or through faults, if present. The vertical hydraulic gradient in the West Plains is predominantly downward and ranges from 0.2 to 1.2 (unitless; NLW, 2012). Additionally, modern creek valleys and paleochannels deeply dissect the CRBG, and buried basement ridges influence aquifer extents in the CRBG aquifer system.

3.5.1.1 Wanapum Basalt Aquifer

The uppermost basalt-hosted aquifer zone on the West Plains is located within the lower portion of the Priest Rapids Member of the Wanapum Basalt and locally within sand-rich interbeds of the Latah Formation interbed. Groundwater levels in the Wanapum Basalt aquifer decrease to the east, with potentiometric elevations ranging between 2,350 and 2,450 feet amsl in the western West Plains to approximately 2,300 feet amsl in the eastern part of the West Plains (GSI Water Solutions et al., 2015). Groundwater levels are influenced by modern streams and creek valleys with groundwater flow shown deflecting toward canyons and interrupting lateral flow (SCWR, 2013). The Latah I interbed generally consists of clay with variable sand and gravel and is up to 120 feet thick in the West Plains, functioning primarily as a confining unit separating the upper Wanapum Basalt aquifer zones from the Grande Ronde aquifer zones in some locations (TetraTech, 2007).

3.5.1.2 Grande Ronde Basalt Aquifers

Two aquifer zones are hosted in the Grande Ronde Basalt in the West Plains, one in the Sentinel Bluffs Member and underlying interbed (Latah II) and another below the Wapshilla Ridge Member (GSI Water Solutions et al., 2015). The upper surface of the Wapshilla Ridge Member is densely fractured and eroded, with deposits of the Latah II formation discontinuously overlying the upper surface. The lowermost aquifer zone is largely confined due to the relatively massive and impermeable flow interiors of the Wapshilla Ridge Member flows, as well as silt and clay deposits of the Latah III interbed.

Based on wells screened in the Grande Ronde Basalt, potentiometric elevations in the West Plains have a greater range; upgradient elevations range between 2,200 and 2,300 feet amsl, while downgradient elevations generally are less than 1,800 feet amsl (GSI Water Solutions et al., 2015). Groundwater flow follows the general dip of the upper Grande Ronde surface toward the east-northeast with little to no influence from stream canyons, except at the furthest east zone near the Spokane River (GSI Water Solutions et al., 2015).

3.5.2 Overburden Aquifer System

The overburden aquifer system in the West Plains consists of unconfined groundwater within glacial-outburst flood and alluvial sediments overlying basalt and/or basement rocks, with the thickest deposits found in both present day canyons and ancient paleochannels (TetraTech, 2007; GSI Water Solutions et al., 2015; Osborn, 2021). Elsewhere, alluvial aquifers are thin (less than 10 feet thick) and typically occupy shallow depressions in the surface of the Wanapum Basalt. The distribution of saturated alluvial sediments is discontinuous, with little to no lateral continuity between separate areas (GSI Water Solutions et al., 2015). The irregular elevation of the upper contact of the Wanapum Basalt creates high hydraulic gradients where high-conductivity gravel and sand deposits are juxtaposed with relatively low-permeable basalt.

Hydraulic conductivity of the alluvial sediments is controlled by the variation of coarse-grained (sand and gravel) and fine-grained (silt and clay) sediments. Where present, coarse-grained deposits generally will have higher hydraulic conductivity and transmissivity than fine-grained sediments. Hydraulic conductivity in coarse outburst-flood deposits ranges from hundreds to thousands of feet per day (0.03 to greater than 0.35 centimeters per second [cm/s]), with transmissivity of 10,000 to more than 100,000 square feet per day (900 to more than 9000 square meters per day) (GSI Water Solutions et al., 2015). Values for fine- grained sediments can be three to five orders of magnitude lower than the coarse-grained sediments (GSI Water Solutions et al., 2015).

3.5.3 Paleochannels

As discussed in Section 3.4.3, five northeast- to southwest-trending, sediment-filled paleochannels are present in the West Plains (see Figure 1) and are a significant part of the overburden aquifer system. Depth to water and aquifer thickness varies based on the elevation of the top of the basalt but likely is several tens of feet or more (GSI Water Solutions et al., 2015). In the development of the West Plains Stormwater Action Plan, Osborn et al. (2021) summarized and built upon work by others to assess the physical and hydrogeologic characteristics of two of the paleochannels closest to the project site (Airway Heights and Northeast Paleochannels). Paleochannel boundaries shown on Figure 1 are based on Osborn, et al. (2021), and are subject to revision based on forthcoming investigations.

The hydraulic conductivity property of the sediments within the paleochannels generally are higher than in the surrounding basalt bedrock (GeoEngineers, 2021; NLW, 2012; Osborn et al., 2021). Based on the references reviewed for this report, the interaction between aquifers hosted in paleochannel deposits and CRBG-hosted aquifer is poorly constrained in the West Plains and likely is dependent upon highly variable, location-specific conditions, such as (but not limited to): depth to basalt, groundwater elevation, aquifer characteristics, and lithologic composition of geologic units. Regional studies estimated hydraulic conductivities range between approximately 100 and 6,000 feet per day for glaciofluvial deposits in Spokane County (Bolke and Vaccaro, 1981; CH2M Hill, 1998). The high hydraulic conductivity paleochannels are a potential preferential flow path for both the overburden aquifer systems and CRBG-hosted aquifer zones. Osborn, et al., (2021) and GeoEngineers (2021) interpret the unconfined aquifers within these paleochannels generally act “as a drain resulting in subsurface discharge from the Wanapum Unit into the paleochannel” due to the aquifers’ relatively high permeability and low hydraulic head. Geochemical and groundwater elevation data presented in NLW 2012 and NLW 2014 led the authors to infer that preferential flow from paleochannels allow “younger water to be introduced into the deeper groundwater within the Grande Ronde” (see Section 4.4 for discussion of geochemical data). However, GSI Water Solutions et al. (2015) interpreted hydrographs of water wells as showing limited to “no significant influence on the basalt groundwater system beneath the incision depths of the paleochannels”. Based on review of available references, it is our understanding that the hydrogeologic variability indicates preferential flow paths might exist between the paleochannel aquifers and the CRBG-hosted aquifers at select locations, elevations, and/or basalt flow structure (i.e., flow tops, bottoms).

3.5.3.1 Airway Heights Paleochannel

The Airway Heights paleochannel is the longest paleochannel within the West Plains based on historical information. The eastern edge of the paleochannel is located approximately 1.5 miles west of the Site and the western edge of the paleochannel is adjacent to Fairchild Air Force Base (FAFB). The paleochannel generally trends north-northeast starting near I-90 and extends toward the Spokane River valley, a potential discharge area according to GeoEngineers (2021) and Osborn et al. (2021). The maximum sediment thickness in the Airway Heights paleochannel averages between 100 and 300 feet across its length, increasing from about 50 feet to greater than 300 feet from south to north (Osborn et al., 2021). Based on cross-sections presented in Pritchard (2013), the Airway Heights Paleochannel locally incises through the Wanapum Basalt and into the uppermost Grande Ronde Basalt.

Groundwater flow is thought to flow downgradient toward the north-northwest within the paleochannel (GeoEngineers, 2021; Osborn, et al., 2021). Minimum unconfined aquifer thickness was measured between 89 and 125 feet in water supply wells for the City of Airway Heights (GeoEngineers, 2021) and generally is estimated to be about 100 feet thick south of the City of Airway Heights (Osborn et al., 2021). Hydraulic conductivities from pump tests conducted within the Airway Heights paleochannel water-bearing zone were estimated to range between 490 and 770 feet per day (GeoEngineers, 2021).

3.5.3.2 Northeast Paleochannel

The southern extent of the Northeast Paleochannel potentially is located within the northeastern boundary of the Site (Budinger and Associates, 2001; Derkey et al, 2004; Osborn et al., 2021) and generally extends to the north-northeast, terminating approximately 4 to 5 miles northeast of the Site at a suspected discharge area to the Spokane River Valley (Osborn et al., 2021). This paleochannel is the deepest of the five paleochannels identified in the West Plains: Ecology well logs indicate glaciofluvial deposits are up to 429 feet deep within the paleochannel boundary (Osborn et al., 2021). Based on cross-sections presented in Pritchard (2013), the northeast paleochannel appears to incise through the Wanapum Basalt and into the uppermost Grande Ronde Basalt along most of its length. Unconfined aquifer thicknesses have been locally reported to range between 63 and greater than 98 feet (Osborn et al., 2021), but hydrogeologic parameters generally have not been established for the Northeast Paleochannel.

4. SIA Hydrogeologic Framework

Additional Site-specific data should be collected to better understand the geologic and hydrogeologic framework at the Site. Additional data collection will help provide a better understanding of the geologic contacts, depths, and lithology, the hydrogeologic characteristics (i.e., groundwater flow direction, hydraulic gradient, etc.), and potential pathways that likely attribute fate and transport of potential contaminants of concern. However, to prepare for a future Site-specific geologic and hydrogeologic assessment, Haley & Aldrich reviewed publicly available geologic data from adjacent properties and Site-specific data provided by the Airport Board, including: 23 boring logs, drilling logs, and/or well installation logs from the Site.

Because monitoring well names are similar, appear repetitive, and can be difficult to distinguish, Haley & Aldrich divided Site boring log data into six areas within the Site boundaries. The six areas, area abbreviations (in parentheses below), and area descriptions are summarized below and shown on Figure 2.

- The Land Treatment Area (LA), located near the northwest boundary;
- The West Peripheral Area (W), located near the west-southwest-central boundary;
- Joint Fire Training (EA), located near the southern boundary;
- The Stormwater Recovery Area (SWN), located near the northeastern boundary;
- The Park Drive Waste Disposal Area (PD), located near the east-central boundary; and
- The Southeast Area of Business Park (FGF), located near the east-central boundary.

The Electric Avenue area is a location where firefighting training was conducted jointly between SIA, Air National Guard, and Army National Guard (Joint Training Area) prior to 1999 and the current location of the Air National Guard. Area abbreviations have also been added to monitoring well names to distinguish between redundant well names.

4.1 SITE GEOLOGY AND HYDROGEOLOGY

Based on our review of the available boring logs and geologic maps, the geology at the Site generally consists of sedimentary overburden deposits (mostly sand to silty sand with gravels and a silt zone toward the northwest boundary of the Site) from the ground surface that are underlain by the CRBG at variable depths across the Site. The geologic map used in our review is provided in Appendix A.
The southeastern boundary of the Airway Heights paleochannel parallels the western portion of the Site and is located approximately 1.5 miles west of SIA. The extent of the southern point of the Northeast Paleochannel is unknown but generally exists within the north side of SIA (according to Osborne et al., 2021) and the Marshall paleochannel is located approximately 5 miles south of the Site.

Boring logs for the Land Application area suggest that the overburden consists of an approximate 10-foot-thick silt zone starting at or near the ground surface that is underlain by sand/gravel to silty sandy gravel, with some clay zones approximately 5 feet thick (MW-8 [LA-MW-8] in Appendix B). The overburden within this area ranges from 12 feet to 20 feet thick and is underlain by weathered to competent basalt. Seasonally high groundwater was reported to be less than 10 feet bgs by Cascade

Earth Sciences (CES), 2018. CES concluded that groundwater flow direction in the Land Application area was to the northwest.

Overburden within the Western Peripheral area consists of silty sand to sand/gravel and is approximately 8.5 to at least 25 feet thick toward the south of the area (note: monitoring well MW-17 [W-MW-17] is the deepest boring within this area and bedrock was not encountered during drilling). Consequently, and when compared to the boring logs located near the Electric Avenue area at the Joint Training Area, it appears that the overburden/ basalt contact increases with depth toward the southwest of the Primary Airport Area.

The boring logs from the Joint Fire Training Area indicate that the overburden consists of silty sand and gravel with potential fill material to approximately 16 to 25 feet bgs[2]and is underlain by basalt. ERM, Inc., 1996, reported the Electric Avenue area previously was used as a landfill and that overburden and fill is reported in boring logs to a depth of 24 feet bgs. Depth to water has been observed in this area at between 14 and 20 feet bgs in wells screened in overburden and 19 to 26 feet bgs in wells screened in basalt (ERM, Inc., 1996).

In the Stormwater North area and the Park Drive area, the overburden consists of silty sand to sand/gravel, is approximately 4 to 18.5 feet thick and is underlain by basalt.

The Former Geiger Field area contains one boring, MW-18 [FGF-MW-18], that currently is assumed to be within the investigation boundary of the Site. At MW-18 [FGF-MW-18], the overburden is approximately 11 feet thick, consists of silty gravel and sand, and is underlain by weathered basalt. Northeast of MW-18 [FGF-MW-18] and within the Former Geiger Field area is the Geiger Corrections Facility cleanup site (Facility/ Site No. 663, VCP No. EA0263). Shallow aquifer wells are reported to have a depth to water of 2.15 to 12.57 feet bgs with a flow direction to the northeast; deeper aquifer wells are reported to have a depth to water of 10.30 to 38.50 feet bgs with a flow direction of east to northwest (GHD, 2023).

In summary, the overburden thickness can range between 4 feet and 32 feet across the Site and primarily consists of silt, silty sand to sand, and gravels (excluding the potential fill material identified at MW-13A [EA-MW-13A]). The depth to basalt under the overburden generally is deeper in the southwest of the Site and shallower in the Stormwater North area to the northeast.

4.2 WRIA 54 GEOLOGIC CROSS-SECTIONS

Haley & Aldrich reviewed the West Plains Hydrogeologic Data Base report cross-sections (specifically Cross Sections R-R’ through V-V’ near the Site’s footprint) prepared for the WRIA 54 Phase IV Implementation Project (WRIA Project) to assess the general depths of Site geologic units and compare them to Site boring logs. The cross-sections used in our review are provided in Appendix C).

Based on our review, the overburden thicknesses from the WRIA Project generally are in agreement with Site boring logs. The WRIA cross-sections indicate that overburden is less than 40 feet thick and overlies the Wanapum Basalt formation of the CRBG, indicating that the basalt encountered during drilling at the Site likely is the Wanapum Basalt formation. Furthermore, the “Latah I” formation likely is

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[2] One exception is at monitoring well MW-13A [EA-MW-13A] where fill may extend to 32 feet bgs. MW-13A [EA-MW-13A] boring log indicates “trace charcoal and leaves” between 17.5 feet and 32 feet bgs, indicating that fill likely is present).

between 100 feet and 200 feet bgs overlaying the Grand Ronde basalt formation. Based on the WRIA Project, the top of the Grand Ronde basalt likely is greater than 200 feet bgs at the Site and the thicknesses is approximately 200 feet (based on Cross- Sections R-R’, S-S’, and T-T’). According to the WRIA Project, the “Latah II” formation underlies the Grand Ronde basalt unit below the Site footprint and is approximately 50 feet thick overlaying the Basement Rock.

4.3 STORMWATER RUNOFF AND PREFERENTIAL FLOW

Haley & Aldrich reviewed the West Plains Stormwater Action Plan (stormwater plan) (Osborn et al., 2021) to assess potential transport mechanisms, and potential recharge/discharge areas of the West Plains. The surface flow paths in the West Plains are influenced by the relatively flat topography, with a slight slope from the southwest toward the northeast, and varies locally based on locations of basement ridges and the CRBG surface/near-surface topography.

According to the stormwater plan, precipitation in the West Plains ranges from less than 10 inches per year to more than 22 inches per year and much of the precipitation occurs as snow. The wet season is defined as November through March (Osborn et al., 2021) and the majority of precipitation falls on frozen ground or as snow resulting in rapid runoff and minimal infiltration to groundwater.

Approximately 85 percent of West Plains precipitation is lost to evaporation, evapotranspiration, and runoff (Osborn et al., 2021). Groundwater around the Site generally is recharged by precipitation or stormwater runoff and groundwater flow typically occurs within glaciofluvial deposits (i.e., paleochannels or overburden overlying basalt), individual basalt flows (transmitted through fractured and vesicular interflow zones near the top of each flow), and/or within the basement rock (within fractured and/or weathered zones) (Osborn et al., 2021).

Site-specific stormwater flow pathways and recharge/discharge areas were interpreted from SIA’s Stormwater Pollution Prevention Plan (SWPPP; Valley Science and Engineering, 2022). Based on the SWPPP, stormwater at the Site is collected in two primary collection areas: the Alpha Collection Area and the 3-21 Collection Area. A third minor collection area, referred to as Perimeter Drainage area, also drains to the northeast. All three of these collection areas discharge to the northeast of the airport property into a stormwater recovery area (for infiltration and/or evaporation). Additional data collection will result in a better understanding of stormwater discharge as a potential contributor to potential contaminant fate and transport at the Site.

Stormwater runoff near the northeastern corner of the Site generally flows and discharges into drainage ditches and nearby shallow ponds and depressional wetlands ponds without continuous drainage systems (Osborn et al., 2021). Surface water discharged into this area likely evaporates or infiltrates through preferential pathways within the overburden and/or basalt.

4.4 GEOCHEMICAL DATING AND LOCALIZED GROUNDWATER LEVELS

Between 2010 and 2014, NLW installed and collected groundwater samples from wells in the West Plains for the Spokane County Conservation District (NLW, 2012; NLW, 2014). The intent of this work was to develop a groundwater flow model of the hydrogeologic system in the West Plains and lower Hangman Creek watersheds and evaluate potential limitations on long-term water supply. Using stable and radioactive isotope data from analyzed groundwater samples, the source and age of groundwater recharge, as well as the degree of mixing between aquifers, can be inferred. At a high-level, ‘old’ water indicates a longer residence time and potential limitations on groundwater recharge under pumping conditions. ‘Young’ water indicates a shorter residence time and may be a less limited resource. Additionally, the presence of hydrogen isotope and tritium indicates the presence of groundwater that likely recharged within the last 70 years. GSI Water Solutions et al. (2015) reviewed and summarized this age-dating analysis by area and the two closest study areas to the Site (Marshall Creek Area [located to the southeast of the Site] and the Central West Plains Area [between FAFB and SIA]) are summarized below.

4.4.1 Marshall Creek Area

According to GSI Water Solutions et al. (2015), the Marshall Creek Area comprises the southeastern portion of the West Plains, encompassing Marshall Creek Canyon and adjacent areas. The basement highs associated with Needman Hill (Needman Hill Ridge area; Figure 8) bound much of the western side of the Marshall Creek area. The eastern boundary follows Latah Creek valley at the eastern boundary of the West Plains.

Five Marshall Creek area wells were evaluated, including two wells installed within alluvial overburden, with open-well intervals approximately 60 to 78 feet and 230 to 240 feet bgs, respectively. The other three wells were installed within the CRBG units, Wanapum, and/or Grande Ronde, with open-well intervals ranging between 100 and 440 feet bgs. The bottom of the wells installed within the CRBG units ranged between 137 feet and 440 feet bgs. Out of these five wells, two water samples were collected and analyzed for age-dating using Carbon-14 and/or tritium analyses: one from the overburden aquifer and one from groundwater hosted in the Grand Ronde Formation. Analytical results indicate that the overburden groundwater estimated age was approximately 3,470 years and the Grand Ronde groundwater estimated age was approximately 10,670 years (GSI Water Solutions et al., 2015; NLW, 2014). The presence of tritium in groundwater samples from the basalt-hosted aquifer zones indicates that the physical age of the ‘old’ water likely is significantly greater than the apparent age of the sample and that the aquifer experiences some mixing of ‘younger’ water (NLW, 2012; NLW, 2014).

4.4.2 Central West Plains Area

The Central West Plains area comprises the geographic area generally bounded to the west by FAFB, to the south-southwest by basement highlands around Medical Lake and Four Lakes (Figure 1 and Figure 8), to the southeast and east by the basement rock associated with Needham Hill, to the west by the SIA, and to the north by US-2 (GSI Water Solutions et al., 2015). According to GSI Water Solutions et al., this area hosts (or has hosted) production wells for three primary municipalities and consists of several monitoring wells that monitor shallow and deep basalt zones.

During this study, 21 Central West Plains Area wells with long-term water level records were evaluated within this area (with approximately 11 of the monitoring wells located at Craig Road Landfill west of the Site). This area includes one well installed within the overburden aquifer, 20 wells installed within Wanapum and/or Grand Ronde aquifer zones, and one well installed within the Basement aquifer unit (Four Lakes School). The bottom of the well installed within the overburden aquifer is approximately 27 feet bgs, and the bottom of the wells installed within CRBG aquifer zones were installed between 82 feet bgs and 1,404 feet bgs. The bottom of the well installed within the Basement aquifer unit was installed at approximately 200 feet bgs. Based on our review, samples from three wells were collected and analyzed for age-dating; two from the Wanapum/Grand Ronde and one with a well depth and unknown open-well interval. Analytical results indicate that the water within CRBG aquifer zones ranged between 1,490 and 10,670 years. The wide variability in estimated groundwater age may be due to the mixing of younger water via preferential flow paths and/or multi-aquifer wells into the CRBG aquifer zone (NLW, 2012; NLW, 2014).

In summary, groundwater age dating in the West Plains suggests that the rate of recharge to the CRBG aquifer system is relatively slow, and groundwater present more than several hundred feet deep displays geochemical characteristics indicative of residence time in the subsurface of hundreds to thousands of years (Osborn et al., 2021). The time required to recharge CRBG aquifer system likely is dependent on preferential flow paths (i.e., fractures, vesicles) and is greater than the time required to recharge the surficial overburden aquifer system. The presence of tritium in ‘old’ groundwater samples from wells in both the Marshall Creek Area and the Central West Plaines Area indicates that even the deep aquifers experience some influence from ‘younger’ water sources (NLW, 2012).

5. Summary

The Site is located along the eastern boundary of Washington State within the southeastern boundary of the West Plains, west of the City of Spokane, Washington (Figure 1). The topography of the West Plains is a relatively flat plateau with deep surface water canyons and rolling hills. The geologic framework of the West Plains includes a Precambrian crystalline igneous and metamorphic basement rock, overlain by members of the CRBG (specifically the Wanapum and Grande Ronde basalt) with associated interbeds (including sedimentary interbed deposits), overlain by Pleistocene alluvial and Missoula flood deposits and eolian deposits. The West Plains top of bedrock elevation varies across the area and forms buried ridges in the subsurface that influence groundwater flow and create aquifer compartmentalization (Figure 8).

The landscape within the West Plains generally consists of mixed semi-arid, agricultural, and urban/semi-urban landscapes, and the landscape at the Site includes stormwater infrastructure, impermeable surfaces caused by shallow to surficial bedrock, and coarse-grained alluvial deposits that infilled paleochannels.

The hydrogeology of the West Plains is uniquely disconnected from the Palouse Slope due to the presence of basement rock boundaries (Figure 8). The groundwater within the West Plains generally is found within the Wanapum and Grand Ronde basalt units, and within a much smaller extent, the Pleistocene alluvial sediments (overburden), with the underlying Precambrian basement acting as an aquitard of the West Plains aquifer system. The aquifers within the overburden are unconfined aquifers overlying the basalt, and the bedrock aquifers generally are confined with water-bearing intervals within interflow zones and interbedded Latah Formation sediments (GSI Water Solutions et al., 2015).

Depth to groundwater in the West Plains varies from several feet to several hundred feet (GSI Water Solutions et al., 2015) depending on the well location and water-bearing zone screened. GSI Water Solutions et al. (2015) identified four aquifers within the West Plains, an upper alluvial aquifer and three aquifers within the CRBG basalt units (the Wanapum Basalt, upper Grande Ronde Basalt, and lower Grande Ronde Basalt). Five northeast- to southwest-trending, sediment-filled paleochannels are found in the West Plains and are a significant part of the overburden aquifer system. The hydraulic conductivity and connectivity of paleochannel alluvial aquifers to CRBG-hosted aquifers has a high degree of variability based on elevation, location, and underlying basalt flow structure.

Additional data is needed to provide an accurate Site-specific geologic and hydrogeologic framework to better assess transport mechanisms at the Site. Based on Haley & Aldrich's review of available information, the overburden thickness can range between 4 feet and 32 feet across the Site and mostly consists of silt, silty sand to sand, and gravels (excluding the potential fill material at MW-13A). The depth to basalt under the overburden generally is deeper within the southwestern boundary of the Site and shallower in areas around the Stormwater North area to the northeast. Due to the incomplete survey data for the Site monitoring wells the following hydrogeologic data gaps exist at this time:

- Site-specific groundwater elevations,
- Site-specific groundwater flow direction(s), and
- Site-specific hydraulic gradient(s).

Surface water discharged into the Stormwater Recovery Area likely evaporates or infiltrates through preferential pathways within the overburden and/or basalt. The SIA SWPPP indicates that stormwater from the airport is diverted into three basins, all of which are routed for discharge at the northeast side of the Site. Based on the age of the groundwater within the aquifers (NLW, 2014), the rate of recharge to the West Plains CRBG aquifer system is relatively slow and groundwater more than a few hundred feet deep displays geochemical characteristics indicative of hundreds to thousands of years residence time in the subsurface (Osborn et al., 2021). The time required to recharge CRBG aquifer system likely is dependent on preferential flow paths (i.e., fractures, vesicles, etc.) and is greater than the time required to recharge the surficial overburden aquifer system.

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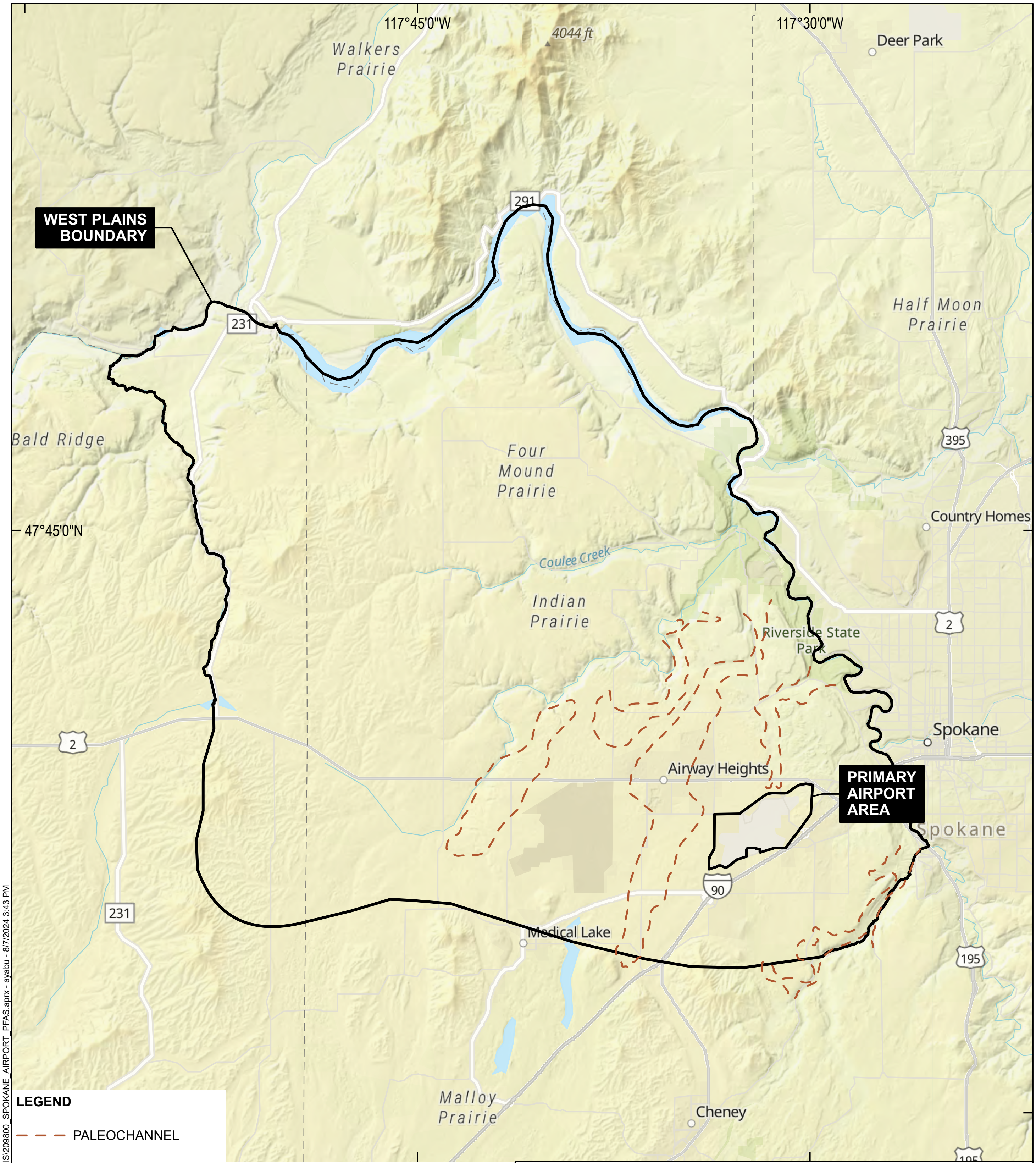
FIGURES



NOTES
1. WEST PLAINS BOUNDARY SOURCE: MCCOLLUMN & PRITCHARD, 2012
2. PALEOCHANNEL BOUNDARIES TAKEN FROM OSBORN ET. AL., 2021 AND ARE PRELIMINARY AND SUBECT TO CHANGE AS A RESULT OF FORTHCOMING INVESTIGATION RESULTS.
3. MAP SOURCE: ESRI
SITE COORDINATES: 47°37'27"N, 117°31'46"W

HALEY ALDRICH

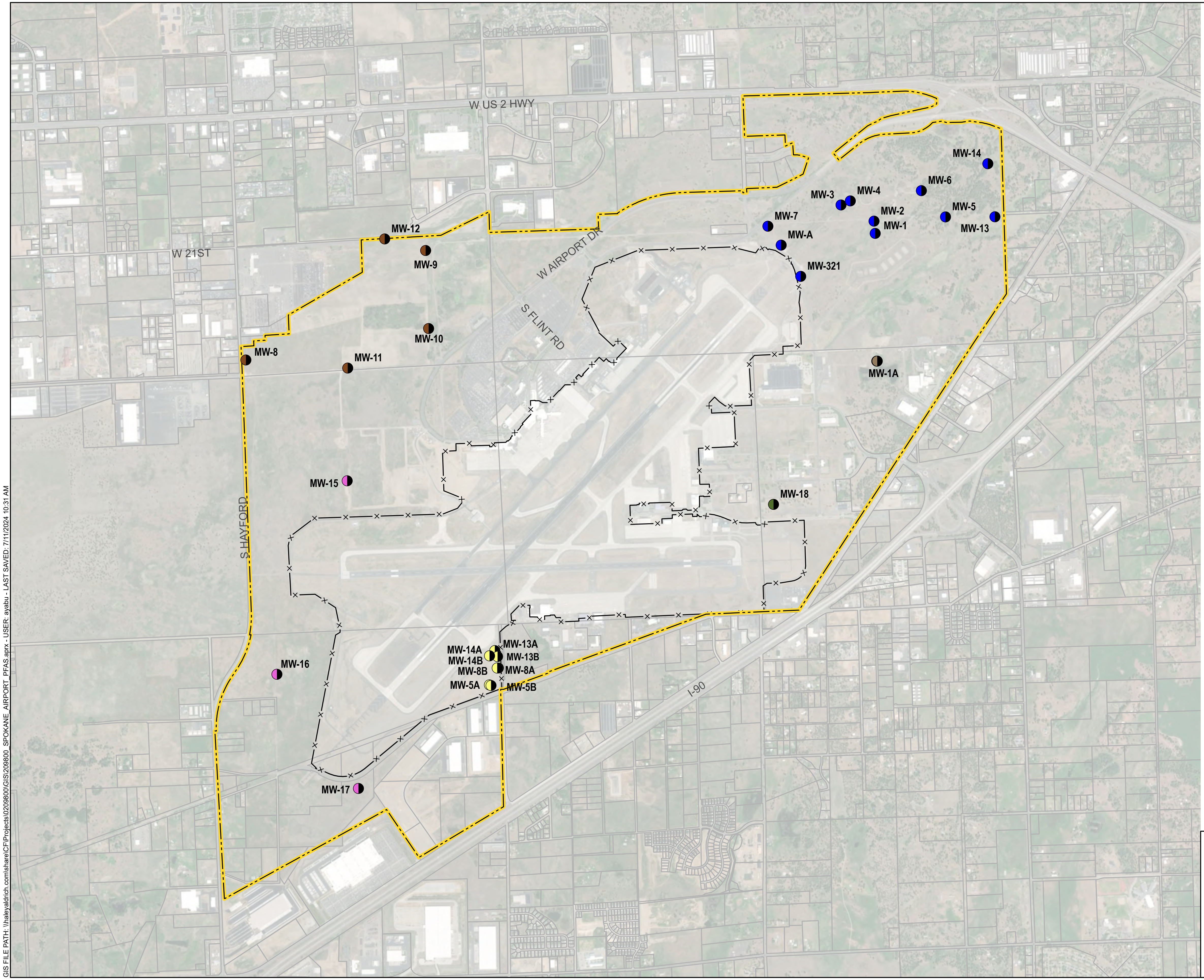
SPOKANE INTERNATIONAL AIRPORT PFAS SUPPORT
SPOKANE, WASHINGTON

REGIONAL MAP

APPROXIMATE SCALE: 1 IN = 6 MILES
AUGUST 2024

FIGURE 1

GIS: \\haleyaldrich.com\share\CF\Projects\0209800\GIS\209800_SPOKANE_AIRPORT_PFAS.aprx - ayabu - 8/7/2024 3:43 PM



LEGEND

MONITORING WELL

◐ JOINT FIRE TRAINING AREA

◐ LAND TREATMENT AREA

◐ PARK DRIVE WASTE DISPOSAL AREA

◐ SOUTHEAST AREA OF BUSINESS PARK

◐ STORMWATER RECOVERY AREA

◐ WEST PERIPHERAL AREA

—×— SIA AOA FENCELINE

▭ PRIMARY AIRPORT AREA

▭ PARCEL BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. SIA = SPOKANE INTERNATIONAL AIRPORT
3. AOA = AIR OPERATIONS AREA
4. AERIAL IMAGERY SOURCE: ESRI

N

0 2,000 4,000

SCALE IN FEET

HALEY ALDRICH

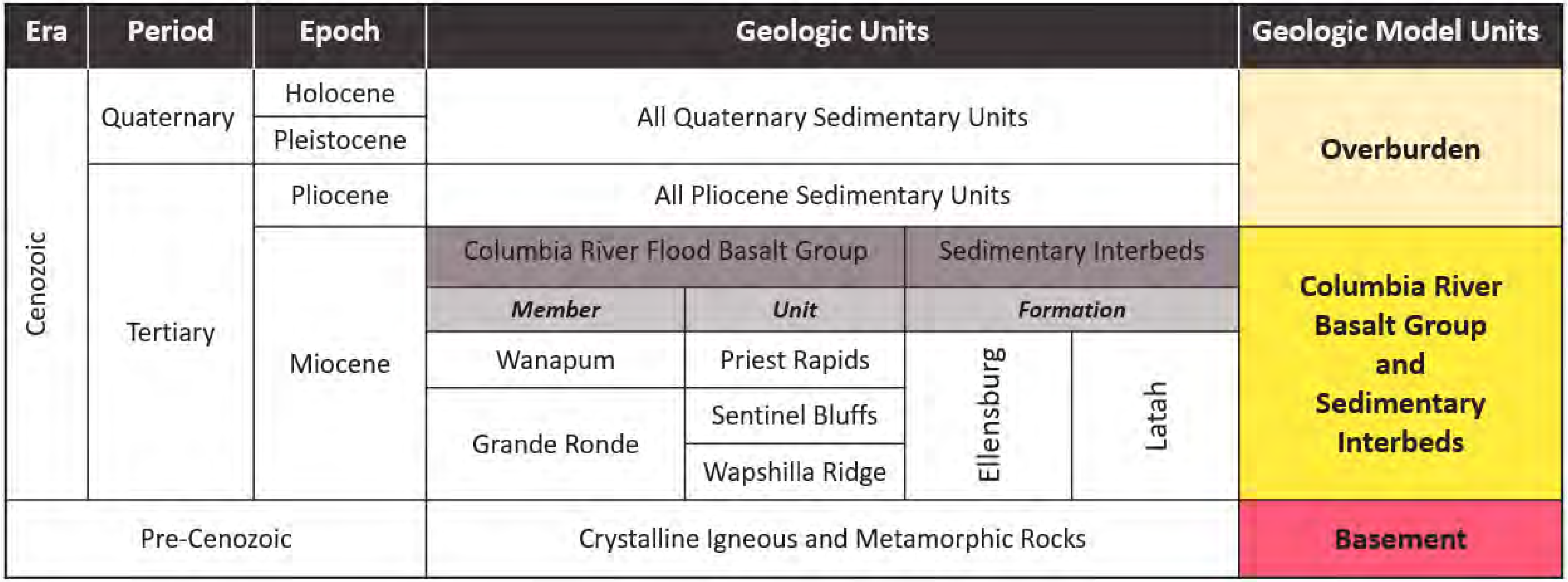
SPOKANE INTERNATIONAL AIRPORT PFAS SUPPORT
SPOKANE, WASHINGTON

SITE PLAN

AUGUST 2024

FIGURE 2

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0209800\GIS\209800_SPOKANE_AIRPORT_PFAS.aprx - USER: ayabu - LAST SAVED: 7/11/2024 10:31 AM



<table>
<tr><th>Era</th><th>Period</th><th>Epoch</th><th colspan="4">Geologic Units</th><th>Geologic Model Units</th></tr>
<tr><td rowspan="8">Cenozoic</td><td rowspan="2">Quaternary</td><td>Holocene</td><td colspan="4" rowspan="2">All Quaternary Sedimentary Units</td><td rowspan="3">Overburden</td></tr>
<tr><td>Pleistocene</td></tr>
<tr><td rowspan="6">Tertiary</td><td>Pliocene</td><td colspan="4">All Pliocene Sedimentary Units</td></tr>
<tr><td rowspan="5">Miocene</td><td colspan="2">Columbia River Flood Basalt Group</td><td colspan="2">Sedimentary Interbeds</td><td rowspan="5">Columbia River Basalt Group and Sedimentary Interbeds</td></tr>
<tr><td><i>Member</i></td><td><i>Unit</i></td><td colspan="2"><i>Formation</i></td></tr>
<tr><td>Wanapum</td><td>Priest Rapids</td><td rowspan="3">Ellensburg</td><td rowspan="3">Latah</td></tr>
<tr><td rowspan="2">Grande Ronde</td><td>Sentinel Bluffs</td></tr>
<tr><td>Wapshilla Ridge</td></tr>
<tr><td colspan="3">Pre-Cenozoic</td><td colspan="4">Crystalline Igneous and Metamorphic Rocks</td><td>Basement</td></tr>
</table>

FIGURE 3

Idealized Stratigraphy of the West Plains

August 2024

Notes:

1. Modified from Burns et. Al., 2010 and Reidel and Tolan, 2013b.

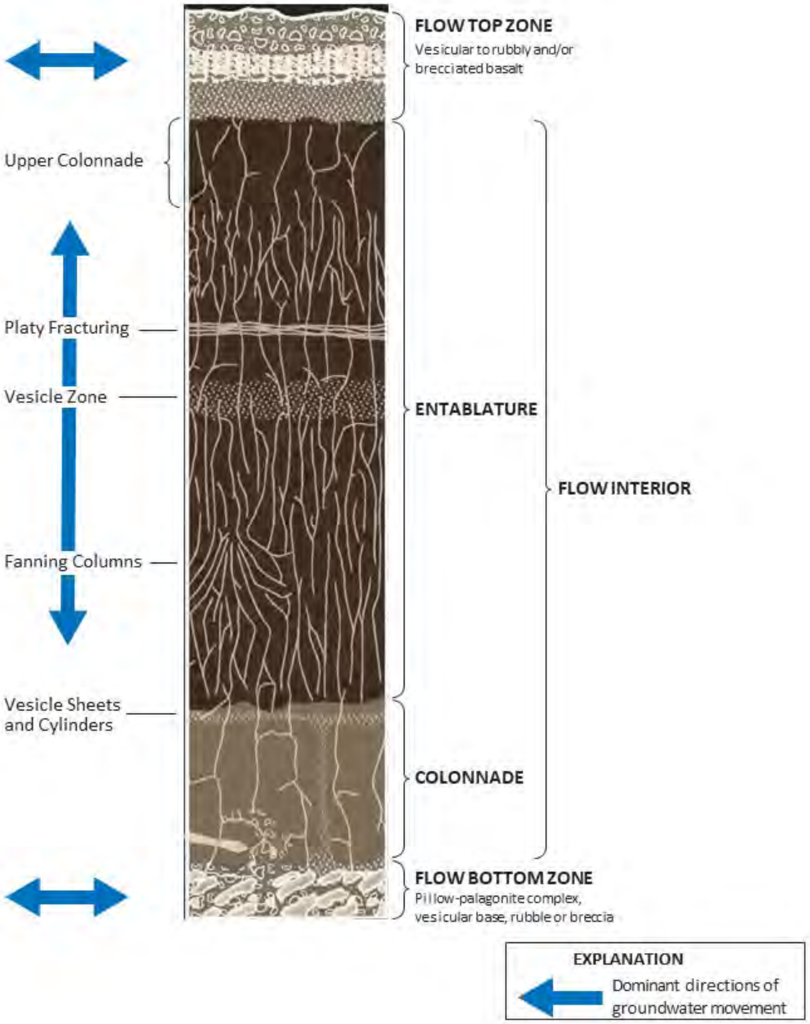


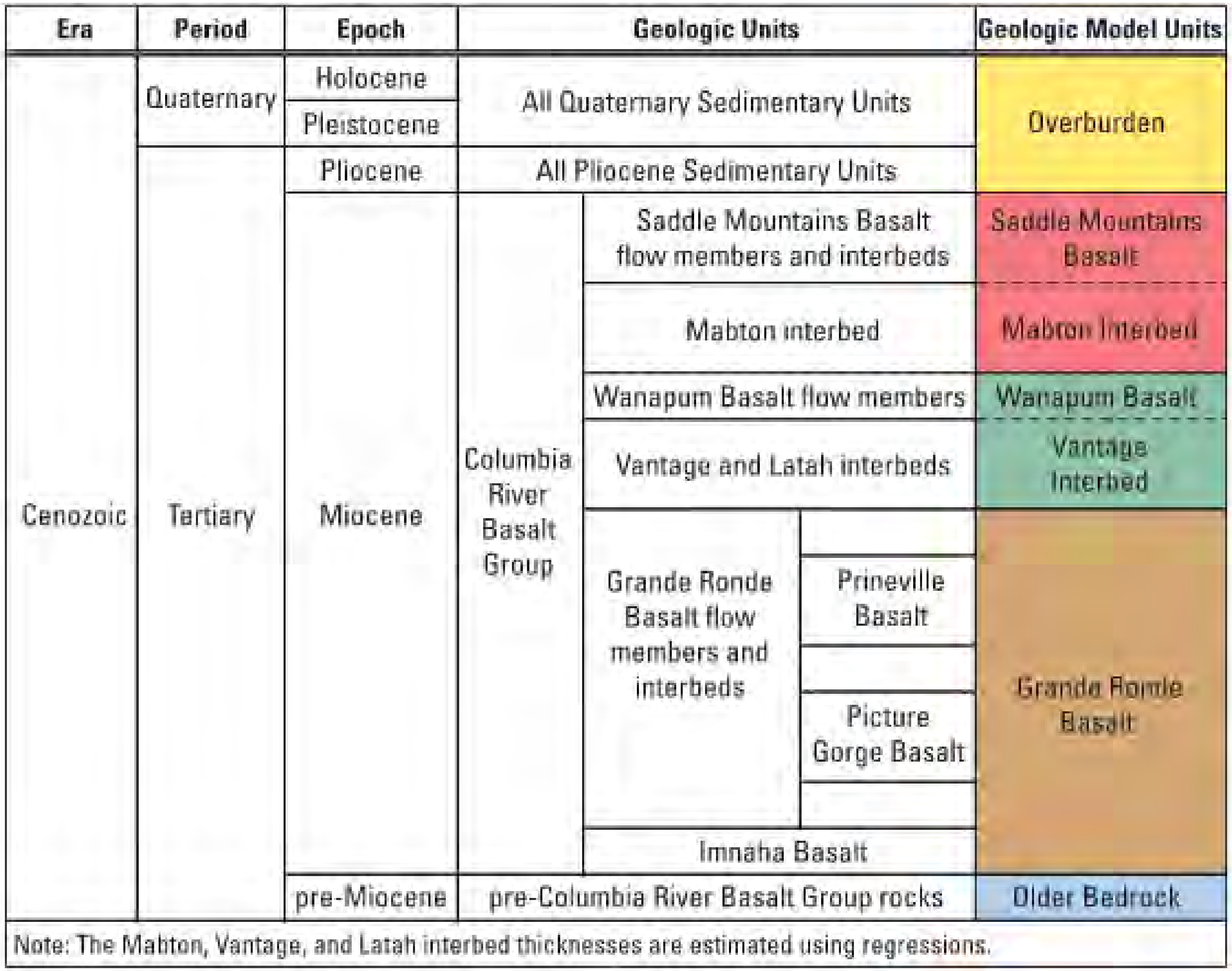
FIGURE 4

Kahle et al., 2011 - Idealized Cross Section within the Columbia River Basalt Group

August 2024

Notes:

1. USGS- United States Geologic Society



Era	Period	Epoch	Geologic Units			Geologic Model Units
Cenozoic	Quaternary	Holocene	All Quaternary Sedimentary Units			Overburden
		Pleistocene				
	Tertiary	Pliocene	All Pliocene Sedimentary Units			
		Miocene	Columbia River Basalt Group	Saddle Mountains Basalt flow members and interbeds		Saddle Mountains Basalt
				Mabton interbed		Mabton Interbed
				Wanapum Basalt flow members		Wanapum Basalt
				Vantage and Latah interbeds		Vantage Interbed
				Grande Ronde Basalt flow members and interbeds		Grande Ronde Basalt
					Prineville Basalt	
					Picture Gorge Basalt	
				Imnaha Basalt		
		pre-Miocene	pre-Columbia River Basalt Group rocks			Older Bedrock

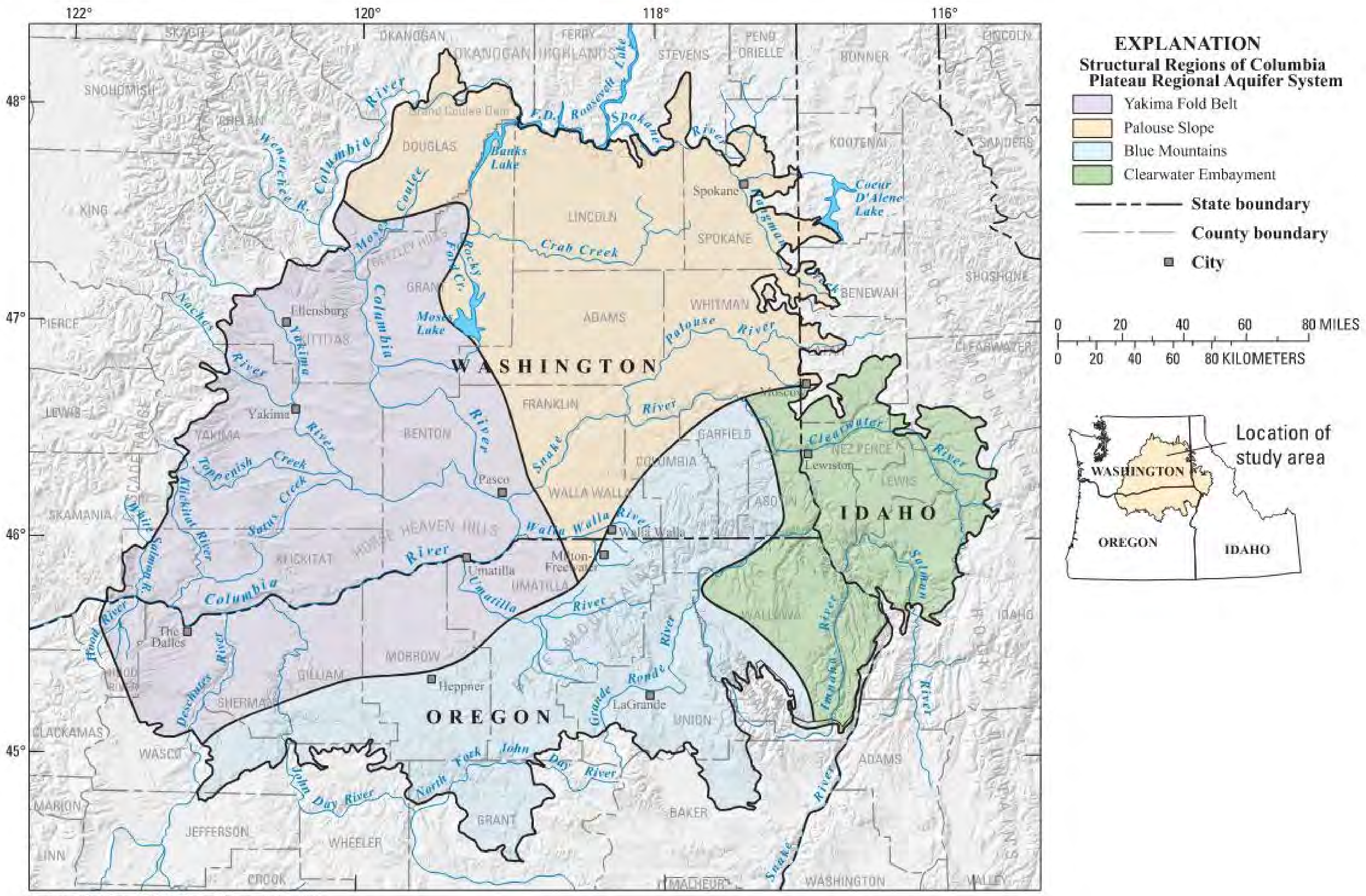
Note: The Mabton, Vantage, and Latah interbed thicknesses are estimated using regressions.

FIGURE 5

USGS Burns et al., 2010- CPRAS Geologic Units and Timeline

.

August 2024



Base modified from U.S. Geological Survey digital data, 1:2,000,000, 1972

FIGURE 6

USGS Kahle et al., 2011- Structural Regions of CPRAS

August 2024

HALEY ALDRICH

Notes:

1. USGS- United States Geologic Society
2. CPRAS- Columbia Plateau Regional Aquifer System

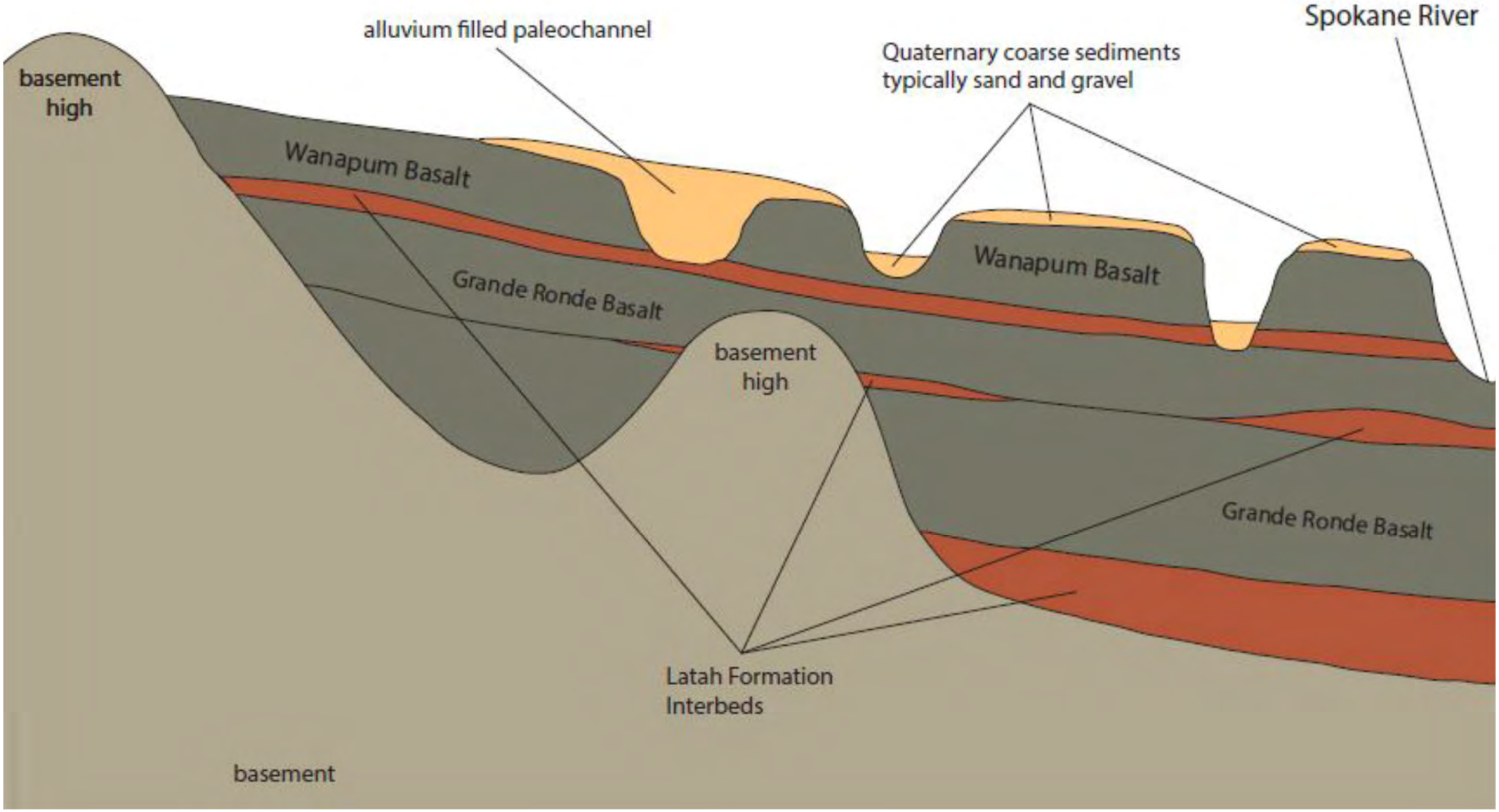


FIGURE 7

GSI Water Solutions, Inc. et al. 2015 - Idealized cross-section from west to east across the West Plains.

Notes:

1. GSI- Groundwater Solutions Inc.

August 2024

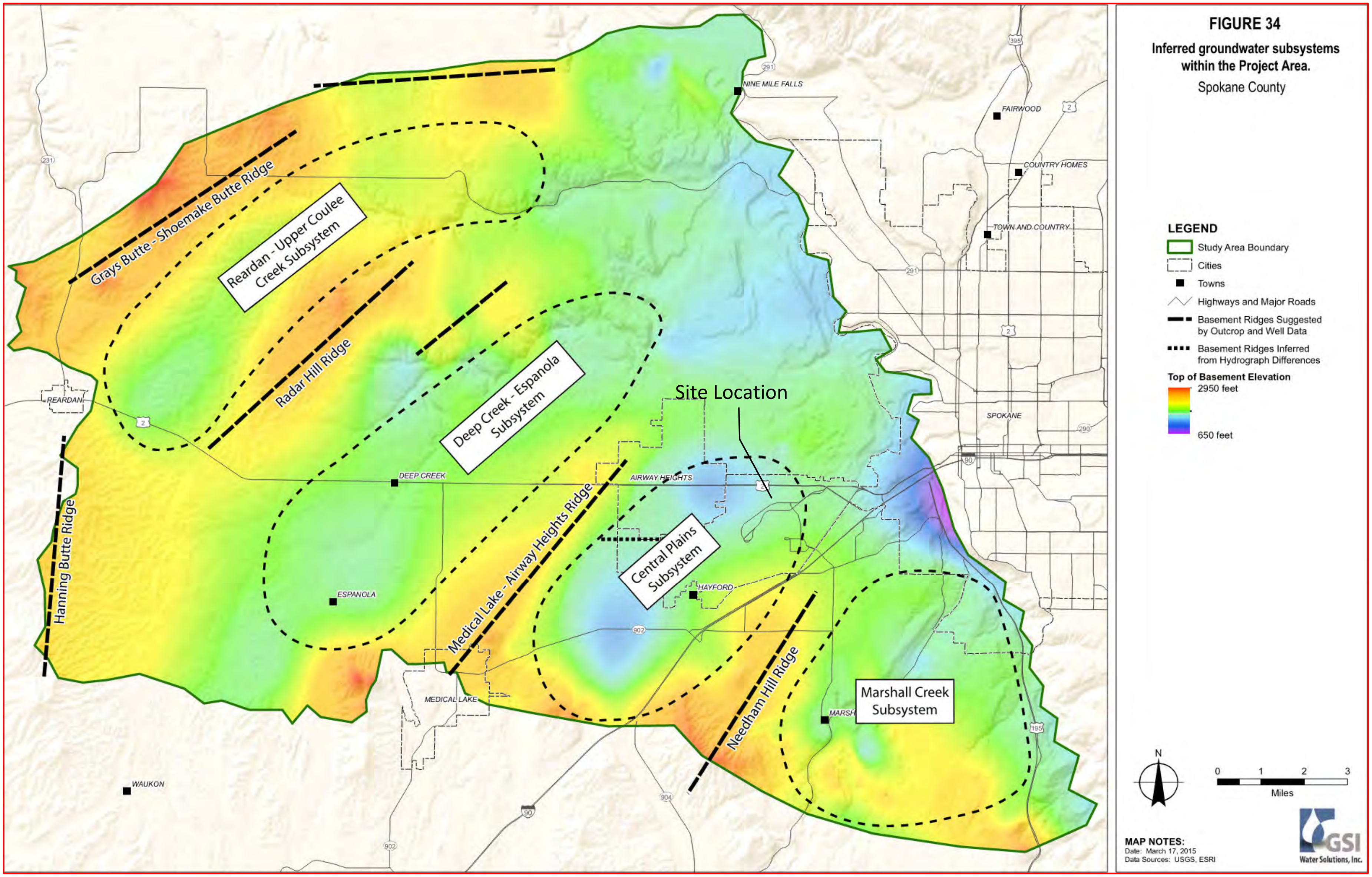


FIGURE 8

GSI Water Solutions, Inc. et al 2015 – Inferred Groundwater Subsystems within the West Plains.

August 2024

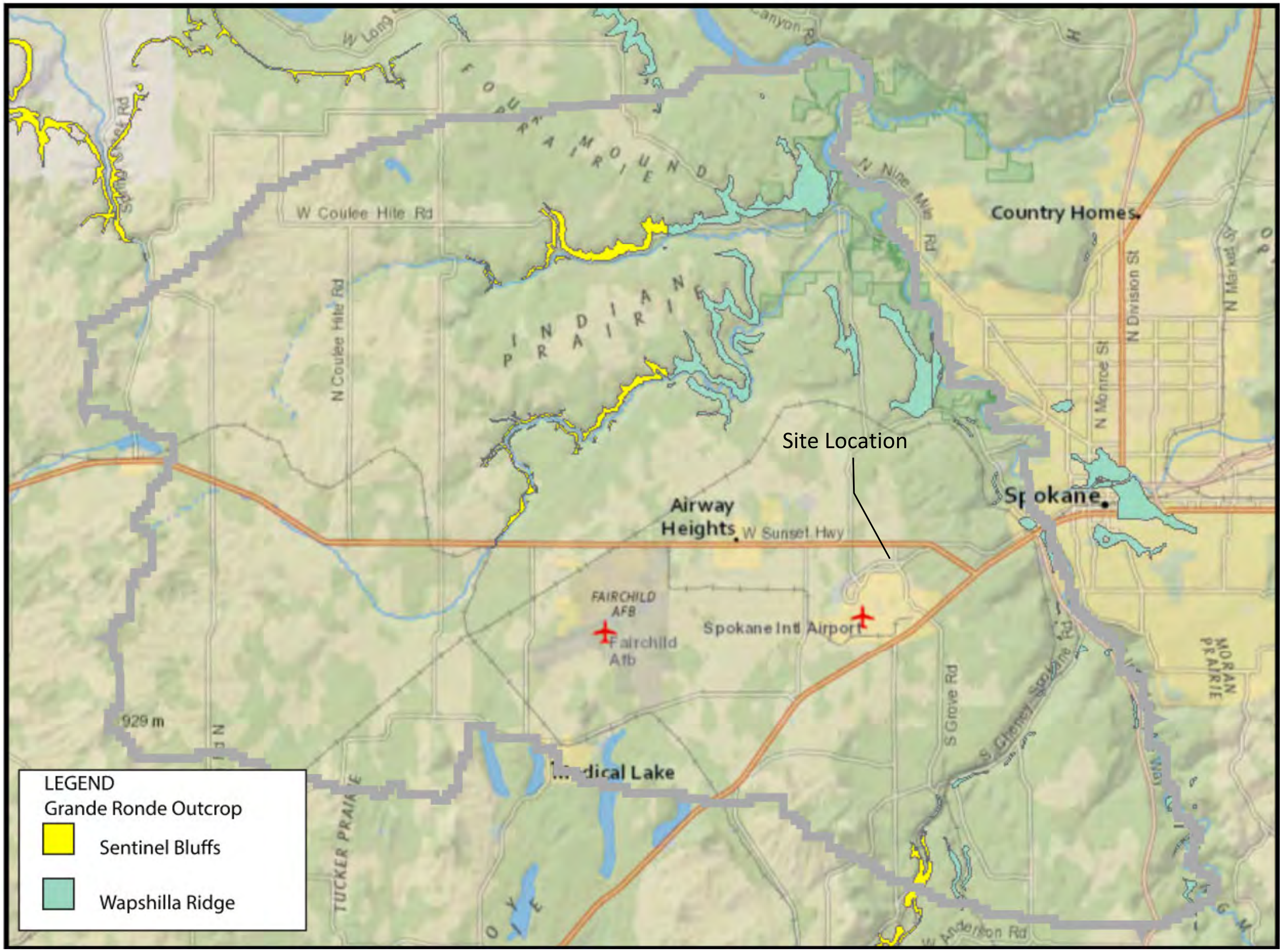
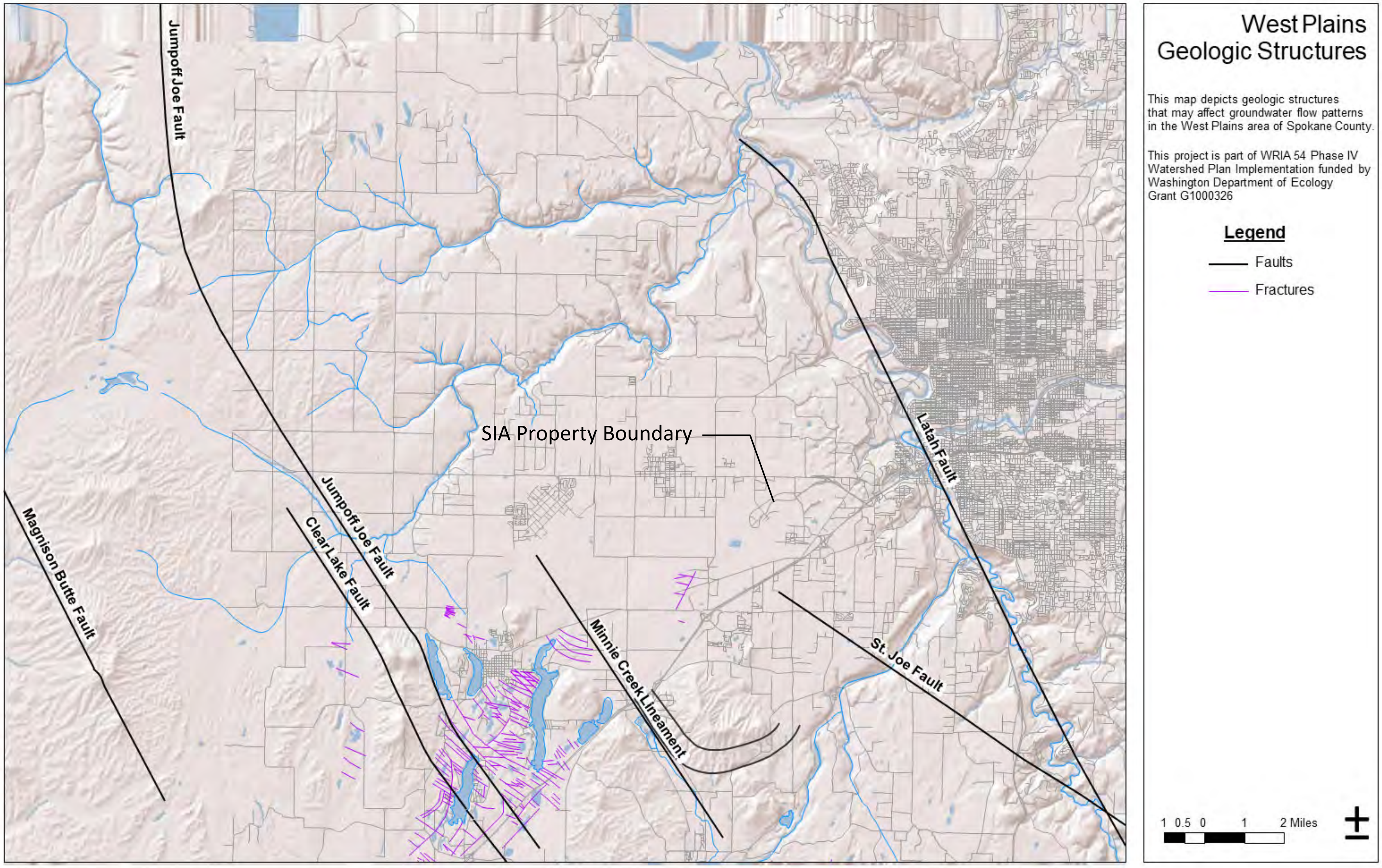


FIGURE 9

GSI Water Solutions, Inc., et. al. 2015 –Map showing Grande Ronde outcrop in Project Area

August 2024



West Plains Geologic Structures

This map depicts geologic structures that may affect groundwater flow patterns in the West Plains area of Spokane County.

This project is part of WRIA 54 Phase IV Watershed Plan Implementation funded by Washington Department of Ecology Grant G1000326

FIGURE 10

McCollum and Pritchard 2012- Geologic structures of the West Plains

August 2024

APPENDIX A

Washington State Department of Natural Resources Geologic Map of the Airway Heights 7.5-Minute Quadrangle, Spokane County, Washington

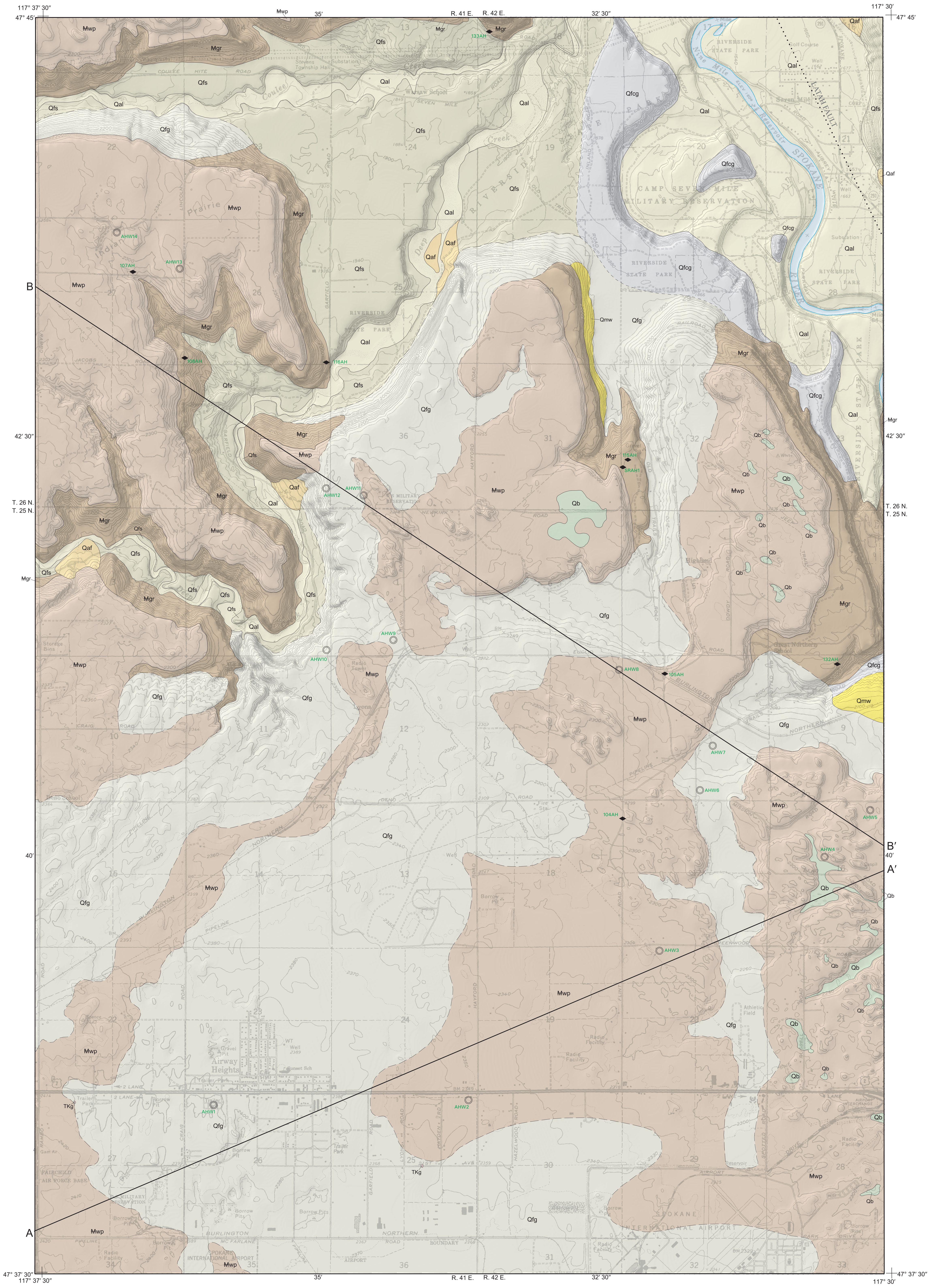
WASHINGTON STATE DEPARTMENT OF
Natural Resources
Doug Sutherland - Commissioner of Public Lands
Division of Geology and Earth Resources
Ron Teissere - State Geologist

WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES
OPEN FILE REPORT 2004-1

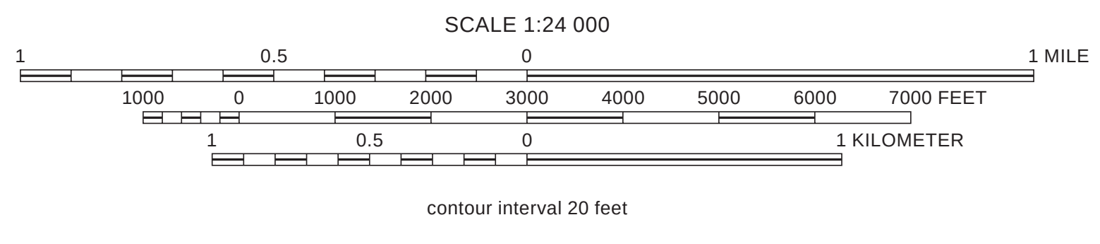
Geologic Map of the Airway Heights 7.5-minute Quadrangle, Spokane County, Washington

by Robert E. Derkey, Michael M. Hamilton, and Dale F. Stradling

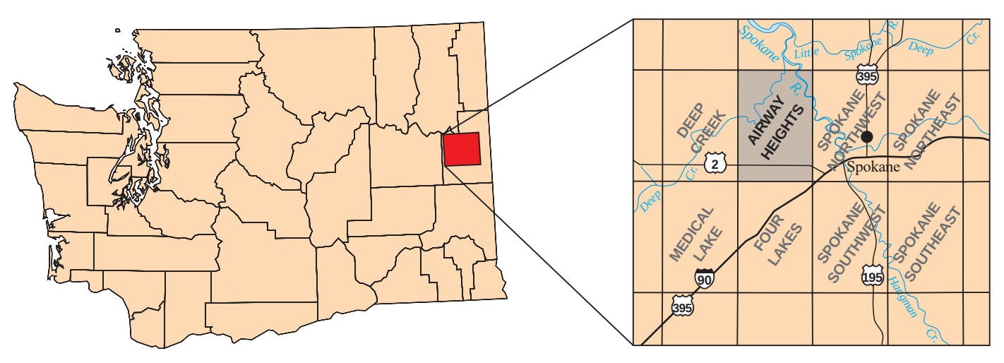
2004



Lambert conformal conic projection
North American Datum of 1927; to place on North American Datum of 1983, move the projection lines 15 meters north and 80 meters east as shown by crosshair corner ticks
Base map from scanned and rectified U.S. Geological Survey 7.5-minute Airway Heights quadrangle, 1973, photorevised 1986
Shaded relief generated from U.S. Geological Survey 10-meter Digital Elevation Model
Digital cartography by Charles G. Caruthers and J. Eric Schuster
Editing and production by Karen D. Meyers



contour interval 20 feet



INTRODUCTION

Previous geologic map coverage of the Airway Heights 7.5-minute quadrangle was reconnaissance and lacked sufficient detail to be of service to developers and planners in the area. We undertook detailed field mapping of the quadrangle in 1999 and completed it in 2001. Our field mapping and air photo interpretation was drawn on a U.S. Geological Survey topographical map of the quadrangle and then digitized and overlaid on digital orthophotos from the Washington State Department of Natural Resources (1995 edition). Digital contours furnished by the Spokane County geographic information system (GIS) and the orthophotos were then used as supplemental base maps to add to and refine geologic unit contacts on the final version of the map.

The first published geologic map of the area was by Pardee and Bryan (1926). Griggs (1966) completed a 1:125,000-scale geologic map of the western half of the Spokane 1- by 2-degree quadrangle. He later extended his mapping eastward to complete a 1:250,000-scale map of the entire Spokane 1- by 2-degree quadrangle (Griggs, 1973). Joseph (1990) compiled a 1:100,000-scale map of the Spokane quadrangle that incorporated more detailed interpretations of Pleistocene glacial features based on Kiver and others (1979) and basalt stratigraphy based on Swanson and others (1979). In 1993 and 1994, Wendy Gerstel and others of the Washington State Department of Natural Resources mapped the Quaternary deposits related to the Spokane aquifer recharge and aquifer sensitive areas at 1:24,000 scale; this unpublished mapping has been available to Spokane County officials since 1996 through the county's GIS. Deobald (1995) completed a master's thesis on the hydrogeology of the West Plains.

DESCRIPTION OF MAP UNITS

Quaternary Sedimentary Deposits

Qal **Alluvium (Holocene)**—Silt, sand, and gravel deposits in present-day stream channels, on flood plains, and on terraces; consists of reworked glacial flood deposits (units Qfcg, Qfg, and Qfs) and reworked loess; may include small alluvial fans and minor mass-wasting deposits that extend onto the flood plain from tributaries.

Qaf **Alluvial fan deposits (Holocene)**—Gravel, sand, and silt deposited in fans at the base of steep drainages; very poorly sorted; most lack a large drainage source; minimal soil development.

Qb **Bog deposits (Holocene and Pleistocene)**—Peat with lesser amounts of silt, ash, marl (bog lime), and gyttja (freshwater mud with abundant organic matter); located predominantly in Channeled Scabland depressions on basalt bedrock (Milne and others, 1975).

Qmw **Mass-wasting deposits (Holocene and late Pleistocene)**—Landslide debris with lesser amounts of debris-flow and rock-fall deposits; consists mostly of a mixture of basalt blocks and Latah Formation sediments; basalt blocks range in size from several feet to hundreds of feet in diameter. Most mass-wasting events occurred during or shortly after Pleistocene catastrophic flood events, but some mass wasting continued to the present; mass-wasting events that occurred during glacial flooding incorporated flood materials as scattered sand and pebble lenses interspersed with the mass-wasting deposits.

Qgl **Glaciolacustrine deposits of glacial Lake Columbia (Pleistocene) (cross sections only)**—Based on exposures in the adjacent Nine Mile Falls quadrangle (Derkey and others, 2003), consists of silt and fine sand interbedded with clay and silt lakebeds; composed predominantly of quartz, feldspar, and mica grains; very light gray to pinkish or yellowish gray.

The following units are deposits from outburst floods of glacial Lake Missoula. They are a composite of numerous flood events and do not represent deposits from any single flood event.

Qfs **Glacial flood deposits, predominantly sand (Pleistocene)**—Medium-fine- to coarse-grained sand and granules with sparse pebbles, cobbles, and boulders; may contain beds and lenses of gravel; composed mainly of granitic and metamorphic detritus from sources to the east and of local basalt; gray, yellowish gray, or light brown; subangular to subrounded; poorly to moderately well sorted; medium bedded to massive; appears speckled in some exposures because of the mixture of light and dark fragments; distribution uneven and thickness variable due to irregular underlying topography and varying degrees of erosion; appears to have been deposited when glacial Lake Missoula outburst floods flowed into a high stand of glacial Lake Columbia.

Qfg **Glacial flood deposits, predominantly gravel (Pleistocene)**—Thick-bedded to massive mixture of boulders, cobbles, pebbles, granules, and sand; contains beds and lenses of sand and silt; gray, yellowish gray, or light brown; poorly to moderately sorted; both matrix and clast supported; locally composed of boulders in a matrix of mostly pebbles and coarse sand; boulders and cobbles consist predominantly of locally derived basalt; found mainly outside of the principal flood channels, which approximate the present courses of the Spokane and Little Spokane Rivers.

Qfcg **Glacial flood-channel deposits, predominantly gravel (Pleistocene)**—Thick-bedded to massive mixture of boulders, cobbles, pebbles, granules, and sand; may contain beds and lenses of sand and silt; gray, yellowish gray, or light brown; poorly to moderately sorted; both matrix and clast supported; locally composed of boulders and cobbles in a matrix of mostly pebbles and coarse sand; derived from granitic and metamorphic rocks similar to those exposed both locally and to the northeast and east in Idaho. This unit differs from flood gravel (unit Qfg) in that it fills deep, ancestral channels of the Spokane and Little Spokane Rivers, which now form the Spokane Valley–Rathdrum Prairie aquifer. The flood deposits filling the channels are known to be several hundred feet thick. Boundaries between this unit and unit Qfg are based on location of these channels rather than clast-size differences.

Pre-Quaternary Igneous and Sedimentary Rocks

Mwp **Priest Rapids Member of the Wanapum Basalt, Columbia River Basalt Group (middle Miocene)**—Dark gray to black, fine-grained, dense basalt consisting of plagioclase (20–30%), pyroxene (10–20%), and olivine (1–2%) in a mostly glass matrix (40–60%). Exposures in the northern part of the map area are less than 100 ft thick and the contact with the underlying Grande Ronde Basalt occurs between 2,200 and 2,300 ft elevation in most of the quadrangle. However, the contact with the underlying Grande Ronde Basalt or Latah Formation extends below 2,200 ft elevation in the southeast corner of the quadrangle. This suggests that a channel existed and was filled with the Priest Rapids Member prior to the basalt spreading out over the terrain at 2,200 ft elevation and higher. Basalt is of the Rosalia chemical type (Table 1), which has higher titanium and lower magnesium and chromium than other flows of Wanapum Basalt (Steve Reidel, Pacific Northwest National Laboratory, oral commun., 1998). This unit is between 14.5 and 15.3 m.y. old and has reversed magnetic polarity (Reidel and others, 1989).

Mgr **Grande Ronde Basalt, magnetostratigraphic units R_2 and N_2, Columbia River Basalt Group (middle Miocene)**—Dark gray to dark greenish gray, fine-grained basalt consisting of pale green augite and pigeonite grains (10–40%) and plagioclase laths and sparse phenocrysts (10–30%) in a matrix of black to dark brown glass (30–70%) and opaque minerals; locally vesicular with plagioclase laths tangential to vesicle boundaries; some vesicles contain botryoidal carbonate and red amorphous secondary minerals; thickness is quite variable due to irregular underlying topography, variable thickness of water-saturated Latah Formation (unit Ml) interbeds, and the invasive nature of at least some of the Grande Ronde Basalt flows in the area; identified in the map area on the basis of chemical analyses (Table 1); between 15.6 and 16.5 m.y. old (Reidel and others, 1989).

Ml **Latah Formation (middle Miocene) (cross sections only)**—Based on numerous exposures in the Spokane area, consists of lacustrine and fluvial deposits of finely laminated siltstone, claystone, and minor sandstone; light gray to yellowish gray and light tan; commonly weathers brownish yellow with stains, spots, and seams of limonite; poorly indurated; unconformably overlies pre-Miocene rocks or is interbedded with Grande Ronde Basalt (unit Mgr); easily eroded and commonly blanketed by colluvium, talus, and residual soils; floral assemblages indicate a Miocene age (Knowlton, 1926; Griggs, 1976).

TKg **Hornblende biotite granitic rock (Tertiary to Cretaceous)**—Medium-grained granitic rock; contains biotite crystals up to 0.2 in., hornblende, and minor zircon; light gray with some light-pink feldspars; porphyritic in part, with feldspar crystals up to 0.5 in.; only two small exposures in the quadrangle.

GEOLOGIC SYMBOLS

—— — — - - -	Contact—Long dashed where approximately located; short dashed where inferred or indefinite
· · · · · · · · · · · ·	Fault—Concealed
AHW11 ◎	Water well—Numbers correspond to well numbers on cross sections
104AH ◆	Basalt geochemistry sample location—Numbers correspond to sample numbers in Table 1

ACKNOWLEDGMENTS

Eugene Kiver of Eastern Washington University, Geology Department, accompanied us on numerous trips to examine Quaternary deposits in the area. Bea Lackaff of the Spokane County Water Quality Management Program digitized the unpublished geologic mapping of Wendy Gerstel and others into Spokane County's GIS. Steve Reidel of Pacific Northwest National Laboratory (Richland, Wash.) provided assistance during a two-day visit in the field to examine Columbia River Basalt Group stratigraphy and reviewed an earlier version of the map.

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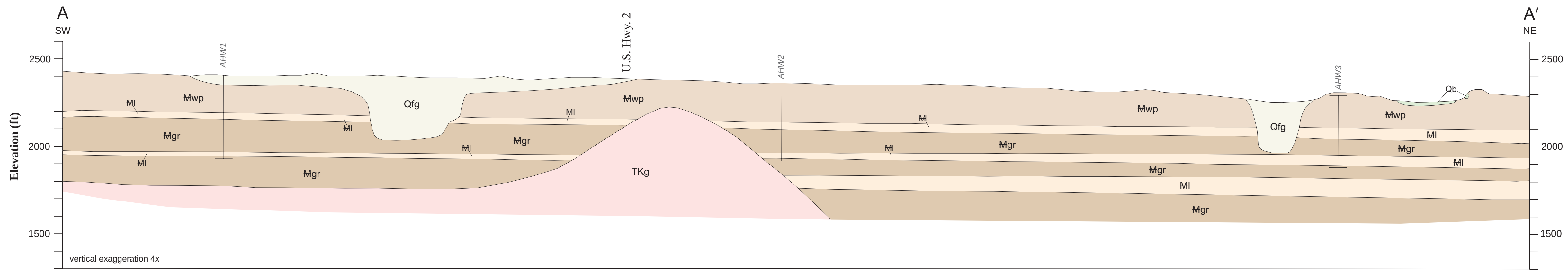


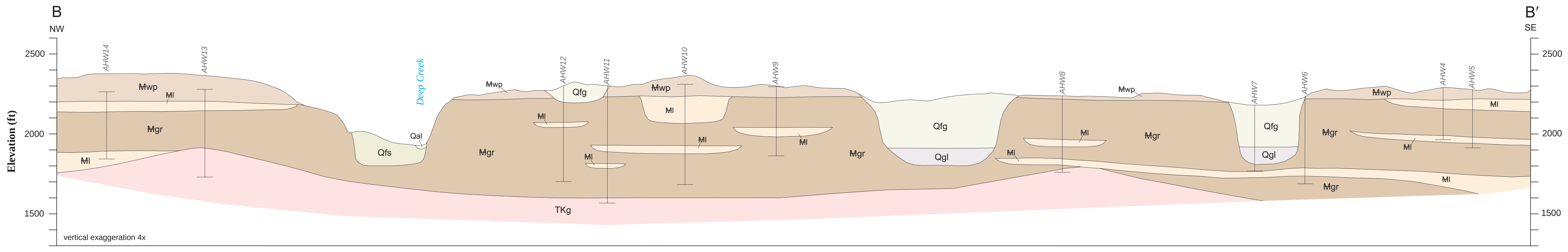


Table 1. Geochemical analyses of Columbia River Basalt Group basalt performed by x-ray fluorescence at the Washington State University GeoAnalytical Lab. Instrumental precision is described in detail in Johnson and others (1999). Total Fe is expressed as FeO

MAJOR ELEMENTS—UNNORMALIZED (in weight percent)

Sample no.	SiO_2	Al_2O_3	TiO_2	FeO	MnO	CaO	MgO	K_2O	Na_2O	P_2O_5	Total
Priest Rapids Member of the Wanapum Basalt (unit Mwp)											
104AH	50.96	14.01	3.976	12.57	0.225	9.17	3.29	1.30	3.04	0.886	99.42
105AH	50.24	12.82	3.637	14.89	0.248	8.57	4.61	1.32	2.76	0.798	99.89
107AH	50.60	12.92	3.663	14.39	0.228	8.71	4.29	1.28	2.75	0.802	99.63
Grande Ronde Basalt (unit Mgr)											
108AH	54.23	14.22	1.850	10.89	0.193	8.86	4.78	1.29	2.83	0.304	99.45
115AH	53.85	13.91	1.890	11.47	0.210	8.65	4.75	1.26	2.97	0.374	99.34
116AH	54.11	14.04	1.875	11.33	0.206	8.75	4.77	1.30	2.91	0.372	99.66
132AH	53.58	14.22	1.840	10.82	0.194	8.90	4.79	1.27	2.72	0.301	98.64
133AH	54.05	13.16	2.429	13.10	0.214	7.09	3.33	1.84	3.09	0.424	98.73
SRAH1	53.8	14.17	1.842	11.19	0.193	8.92	4.69	1.29	3.12	0.299	99.52

TRACE ELEMENTS (in parts per million)

Sample no.	Ni	Cr	Sc	V	Ba	Rb	Sr	Zr	Y	Nb	Ga	Cu	Zn	Pb	La	Ce	Th
Priest Rapids Member of the Wanapum Basalt (unit Mwp)																	
104AH	14	35	48	460	641	28	317	231	56	20.2	24	26	165	9	28	68	3
105AH	16	30	34	429	558	30	282	215	50	18.2	21	25	151	5	25	54	2
107AH	17	34	45	430	571	31	294	214	51	19.3	26	25	156	6	35	67	5
Grande Ronde Basalt (unit Mgr)																	
108AH	12	50	35	322	502	29	309	152	34	11.1	18	34	108	11	23	34	2
115AH	12	47	36	283	488	29	304	160	35	11.9	22	34	119	7	11	44	2
116AH	13	47	34	303	510	30	309	158	36	11.2	21	33	117	8	3	27	4
132AH	14	57	41	332	547	29	313	154	35	12.4	21	24	107	7	14	42	5
133AH	4	20	42	365	718	44	324	186	39	13.2	19	0	128	11	28	48	6
SRAH1	22	57	39	324	509	31	318	160	35	13	18	35	112	5	14	39	5

APPENDIX B
Boring Logs and Well Construction

ECOVA Corporation

Well Installation Log

Client Army Corps of Engineers
Site Air Natl. Guard (Task 7)
Job Number 801126
Field Geologist R.W. Goodfellow

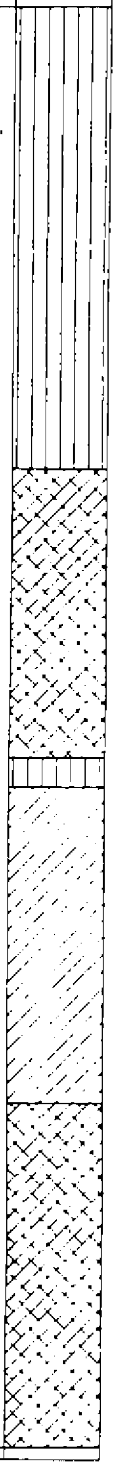
Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 96 Feet
Water Depth 36 Feet

Well Number MW-5A
Date Drilled 4-30-90
Coordinates 240023.4591N
2452092.2401E
Casing Elevation 2390.45
Sheet 1 of 2

General: 50 feet of 6"steel casing, pressure grout.

Depth (Feet)	Blow Counts	Sample No	Recover	Organic* Vapor (ppm)	% LEL	% O_2	Sample Description
5				2			SAND (SM) – Fine- to coarse-grained, brown, loose, basalt fragments.
10							SAND (SM) – Fine- to coarse-grained, dark brown, loose, minor gravel, some wood fragments, damp
15							WEATHERED BASALT – Gray to brown, dry, loose
20							
25							SAND (SM) – Fine- to coarse-grained, brown, damp CLAY WITH SILTY AND SAND (CL) – Brown, semi-plastic, damp.
30							
35							∇ Static water level at 36 feet. WEATHERED BASALT – Black, mixed with brown clay, dry.
40							Water yielding zone at 40 feet. WEATHERED BASALT – Black, water.
45							
50				1			

Graphic Log



* Background = 2 ppm

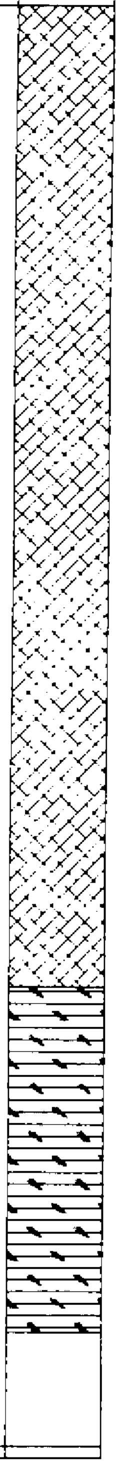
ECOVA Corporation
Well Installation Log

Client: Army Corps of Engineers
Site: Air Natl. Guard (Task 7)
Job Number: 801126
Field Geologist: R.W. Goodfellow
Drilling Company: Fogle Pump & Supply
Boring Method: Air Rotary
Borehole Depth: 96 Feet
Water Depth: 36 Feet
Well Number: MW-5A
Date Drilled: 4-30-90
Coordinates: 240023.4591N
2452092.2401E
Casing Elevation: 2390.45
Sheet 2 of 2

General: 50 feet of 6" steel casing, pressure grout.

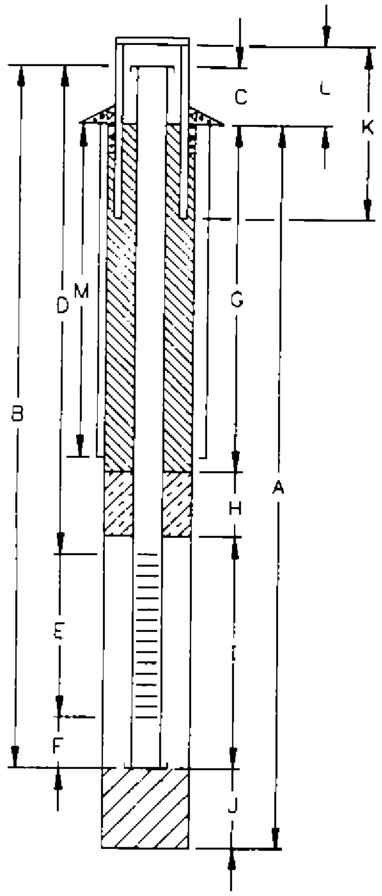
Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	% LEL	% O_2	Sample Description
55							**WEATHERED** BASALT – Orange and black cuttings, **water yielding** zone at 57 feet.
60							
65							
70							
75							WEATHERED BASALT
80							
85							**BASALT** – Fresh, minor orange cuttings, ~ 30 gpm
90							
95							Bottom of Hole – 96 Feet
100							

Graphic Log



* Background = 2 ppm

WELL COMPLETION MW-5A



TOP OF CASING ELEVATION 2390.45'

A	BORING DEPTH	96	FT.
	BORING DIAMETER	6	IN.
B	WELL DEPTH	96	FT
C	WELL STICKUP	0	FT.
D	BLANK INTERVAL	84	FT.
	BLANK DIAMETER	2	IN.
E	SCREEN INTERVAL	81-91'	FT.
	SCREEN DIAMETER	2	IN.
	TYPE/SLOT SIZE	0.01	
F	SEDIMENT TRAP	3	FT.
G	ANNULAR SEAL	69	FT.
	MATERIAL:	GROUT	
H.	BENTONITE SEAL	5	FT.
I	SANDPACK	19	FT.
	TYPE/SIZE:	20/40	
J	BOTOM SEAL/PACK	2	FT.
	MATERIAL:	SAND	
K	WELL COVER	0	FT.
L	STICKUP	0	FT.
M	CONDUCTOR CASING	51	FT.

NOT TO SCALE

DRILLING TIMES:

START 0745 4/30/90 FINISH 1207 4/30/90

STANDBY or DOWN TIME:

METHOD OF DECON. PRIOR TO DRILLING:

DEVELOPMENT

METHOD OF DEVELOPMENT: DISPLACEMENT PUMPING

PUMP TIME 0830 TIME 1230 DATE 5/29/90

PUMPED 4 BARRELS IN 4 HOURS

TURBIDITY AFTER DEVELOPMENT: X CLEAR ____ MOD. TURBID ____ SL. TURBID ____ TURBID

ODOR IN WATER ?

WATER DISCHARGED TO: ____ GROUND SURFACE ____ STORAGE TANK ____ STORM SEWERS ____ TANK TRUCK 4 DRUMS

DEPTH OF WATER AFTER DEVELOPMENT: 30 5

MATERIALS USED

4 1/2	SACKS of 20/40	SAND
8	SACKS of PORTLAND CEMENT	
	SACKS of PREMIX CONCRETE	
	GALLONS of GROUT USED	
	GROUT COMPOSITION #6 BENTONITE	
1	SACKS of BENTONITE PELLETS	
	BUCKETS of BENTONITE PELLETS	
	YARDS CEMENT - SAND USED	
4	CENTRALIZERS at 18, 46, 74, AND 92 FEET	BGS

WELL COVER USED:
____ Above Grade
X At Grade
____ Other
X Lockable

801126-A-MW3AW

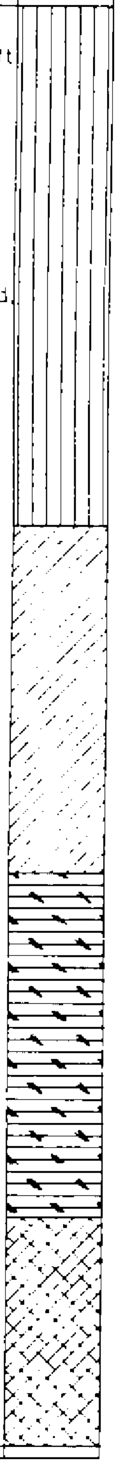
ECOVA Corporation
Well Installation Log

Well Number MW-5B
Date Drilled 5-2-90
Client Army Corps of Engineers
Drilling Company Fogle Pump & Supply
Coordinates 240023.3014 N
2452104.0267E
Site Air Natl Guard (Task 7)
Boring Method Air Rotary
Job Number 801126
Borehole Depth 60 Feet
Casing Elevation 2390.48
Field Geologist R.W. Goodfellow
Water Depth 26 Feet
Sheet 1 of 2

General:

Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	% LEL	% O_2	Sample Description
							SAND (SM) – Fine- to coarse-grained, minor basalt **pebbles**, loose.
5							
10							**SAND WITH GRAVEL** (SM) – Fine- to coarse-grained, **gravel** is composed of basalt chips, brown, loose
15							
20							
25							**SILTY CLAY** (CL) – Brown, semi-plastic, damp ▽ **Static** water level at 26 feet
30							
35							**BASALT** – Fresh, damp.
40							
45							**WEATHERED** BASALT.
50							

Graphic Log



* Background = 2 ppm

ECOVA Corporation
Well Installation Log

Client Army Corps of Engineers
Site Air Natl. Guard (Task 7)
Job Number 801126
Field Geologist R.W. Goodfellow

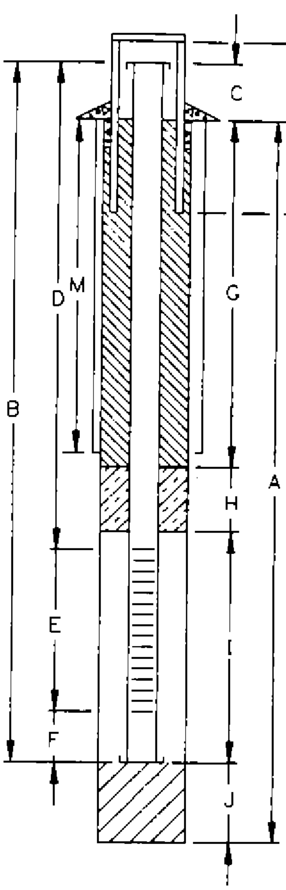
Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 60 Feet
Water Depth 26 Feet

Well Number MW-5B
Date Drilled 5-2-90
Coordinates 240023.3014 N
2452104.0267E
Casing Elevation 2390.48
Sheet 2 of 2

Depth (Feet)	Blow Counts	Sample No	Recover	Organic* Vapor (ppm)	% LEL	% O_2	General: Sample Description	Graphic Log
							WEATHERED BASALT – To bottom of hole. **Water** yielding zone at ~30 gpm	▨
55								▨
60							Bottom of Hole – 60 Feet	▨
65								
70								
75								
80								
85								
90								
95								
100								

* Background = 2 ppm

WELL COMPLETION MW-5B



TOP OF CASING ELEVATION 2390.48'

A BORING DEPTH 60 FT.
BORING DIAMETER 6 IN.

B WELL DEPTH 60 FT.

C WELL STICKUP 0 FT.

D BLANK INTERVAL 26 FT.
BLANK DIAMETER 2 IN.

E SCREEN INTERVAL 23-43' FT.
SCREEN DIAMETER 2 IN.
TYPE/SLOT SIZE 0.01

F SEDIMENT TRAP 14 FT.

G ANNULAR SEAL 14 FT.
MATERIAL: GROUT

H. BENTONITE SEAL 3 FT.

I SANDPACK 40 FT.
TYPE/SIZE: 20/40

J BOTOM SEAL/PACK 3 FT.
MATERIAL: SAND

K WELL COVER 0 FT.

L STICKUP 0 FT.

M CONDUCTOR CASING ______ FT.

NOT TO SCALE

DRILLING TIMES:
START 1340 5/2/90 FINISH 5/2/90
STANDBY or DOWN TIME:

METHOD OF DECON PRIOR TO DRILLING.

DEVELOPMENT

METHOD OF DEVELOPMENT

PUMP TIME 0730 TO 1230 DATE 5/25/90

TURBIDITY AFTER DEVELOPMENT:
____ CLEAR
x SL. TURBID
____ MOD TURBID
____ TURBID

ODOR IN WATER ?

WATER DISCHARGED TO:
____ GROUND SURFACE
____ STORM SEWERS
4 DRUMS
____ STORAGE TANK
____ TANK TRUCK

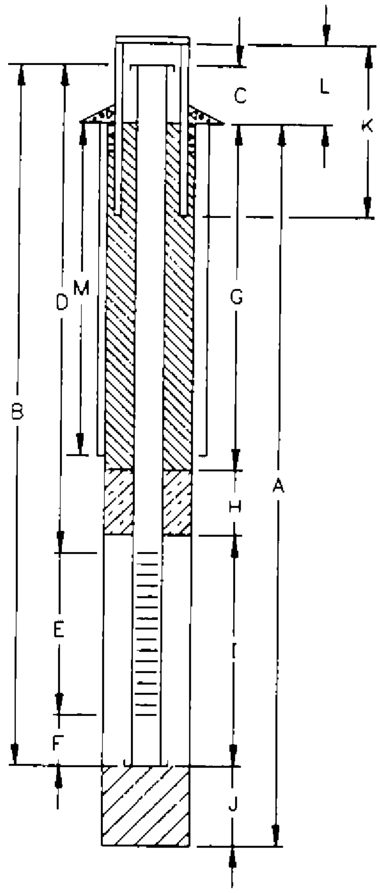
DEPTH OF WATER AFTER DEVELOPMENT 29'

MATERIALS USED

4 1/2 SACKS of 20/40 SAND
6 SACKS of PORTLAND CEMENT
____ SACKS of PREMIX CONCRETE
____ GALLONS of GROUT USED
____ GROUT COMPOSITION #6 BENTONITE
1 1/2 SACKS of BENTONITE PELLETS
____ BUCKETS of BENTONITE PELLETS
____ YARDS CEMENT - SAND USED
2 CENTRALIZERS at TOP AND BOTTOM SCREEN BGS

WELL COVER USED:
____ Above Grade
x At Grade
____ Other
x Lockable

WELL COMPLETION MW-7B



TOP OF CASING ELEVATION 2380.08'

A BORING DEPTH 43 FT.
BORING DIAMETER 6 IN.
B WELL DEPTH 35 FT
C WELL STICKUP 0 FT.
D BLANK INTERVAL 14 FT.
BLANK DIAMETER 2 IN.
E SCREEN INTERVAL 7.5-27.5 FT.
SCREEN DIAMETER 2 IN.
TYPE/SLOT SIZE 0.01
F SEDIMENT TRAP 2 FT.
G ANNULAR SEAL 0 FT.
MATERIAL. ____
H. BENTONITE SEAL 3 FT.
I SANDPACK 23'6" FT.
TYPE/SIZE: 20/40
J BOTOM SEAL/PACK 1'6" FT.
MATERIAL: SAND
K WELL COVER 0 FT.
L STICKUP 0 FT.
M CONDUCTOR CASING ____ FT.

NOT TO SCALE

DRILLING TIMES:

START 1100 4/18/90 FINISH 1530 4/18/90

STANDBY or DOWN TIME:

DRILLING SLOW DUE TO CLAY ENCOUNTERED IN BORING.
CLAY PLUGGED UP DELIVERY PIPE TO CYCLONE.

METHOD OF DECON. PRIOR TO DRILLING:

DEVELOPMENT

METHOD OF DEVELOPMENT:

PUMP TIME 1100 TO 1500 DATE 5/23/90

TURBIDITY AFTER DEVELOPMENT:	____ CLEAR	____ MOD. TURBID	
	____ SL. TURBID	X TURBID	

ODOR IN WATER ?

WATER DISCHARGED TO:	____ GROUND SURFACE	____ STORAGE TANK
	____ STORM SEWERS	____ TANK TRUCK
	X DRUMS	

DEPTH OF WATER AFTER DEVELOPMENT 18.0

MATERIALS USED

7 SACKS of 20/40 SAND
____ SACKS of ____
____ SACKS of PREMIX CONCRETE
____ GALLONS of GROUT USED
____ GROUT COMPOSITION ____
1 SACK of BENTONITE PELLETS
____ BUCKETS of BENTONITE PELLETS
____ YARDS CEMENT - SAND USED
2 CENTRALIZERS at TOP AND BOTTOM OF SCREEN BGS

WELL COVER USED:
____ Above Grade
X At Grade
____ Other
X Lockable

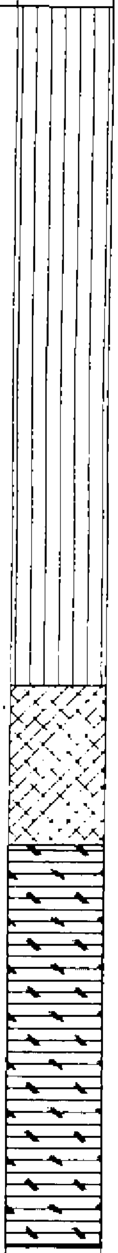
ECOVA Corporation
Well Installation Log

Well Number MW-7B
Date Drilled 4-18-90
Client Army Corps of Engineers
Site Air Natl. Guard (Task 7)
Job Number 801126
Field Geologist K. May
Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 43 Feet
Water Depth 18.0 Feet
Coordinates 240763.7185 N
2452205.5566E
Casing Elevation 2380.08
Sheet 1 of 1

General: 24 feet of 6" steel casing.

Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	% LEL	% O_2	Sample Description
5				1.0			SAND WITH GRAVEL (SM) – Medium- to coarse-grained, brown, minor black basalt chips, loose At 6 feet encountered boulder, pulled 8 feet of casing and set 20 foot length.
10							
15							SAND, SILT, AND GRAVEL (BASALT) – Loose, trace amount of gravel with granitic(?) composition. ∇ Static water level at 18 feet. SAND (SM) – Coarse-grained, dark gray, loose, wet, petroleum odor.
20				20			WEATHERED BASALT(?) – Reddish brown, more water.
25				15			Reddish brown, moist
30							BASALT.
35							
40							Bottom of Hole – 43 Feet
45							
50							

Graphic Log



* Background = 1.0 ppm

ECOVA Corporation

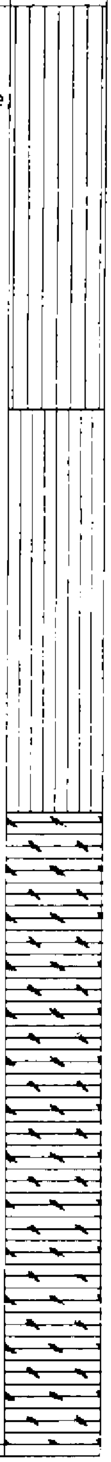
Well Installation Log

Client Army Corps of Engineers
Site Air Natl Guard (Task 7)
Job Number 801126
Field Geologist R.W. Goodfellow

Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 86 Feet
Water Depth 19 Feet

Well Number MW-8A
Date Drilled 4/26/90 4/27/90
Coordinates 240632 6323 N
2452389 1722E
Casing Elevation 2379 73
Sheet 1 of 2

General: 48 feet of 6" casing



Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	% LEL	% O_2	Sample Description
5							SAND (SM) – Fine- to coarse-grained, brown, loose, minor basalt fragments, dry
10							
15							SILTY CLAY (ML) – Brown, loose, with coarse basalt sand.
20							∇ Static water level at 19 feet. Same as above.
25							
30							BASALT – Moderately fresh, dry.
35							Same as above, damp.
40							
45							
50				0.0			BASALT – Wet.

* Background = 5.0 ppm

ECOVA Corporation

Well Installation Log

Client Army Corps of Engineers
Site Air Natl Guard (Task 7)
Job Number 801126
Field Geologist R.W. Goodfellow

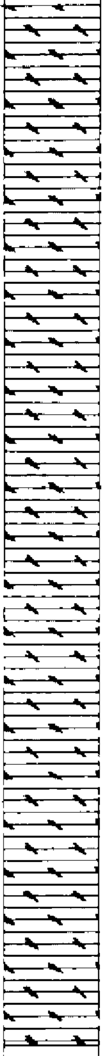
Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 86 Feet
Water Depth 19 Feet

Well Number MW-8A
Date Drilled 4/26/90 4/27/90
Coordinates 240632 6323N 2452389 1722E
Casing Elevation 2378 73
Sheet 2 of 2

General: 48 feet of 6" casing

Depth (Feet)	Blow Counts	Sample No	Recover	Organic* Vapor (ppm)	% LEL	% O_2	Sample Description
55							
							Water yielding zone at 57 feet.
60							
65							
							BASALT – Fresh, water flow ~ 50 gpm
70							
							BASALT – Minor orange mottling, water flow ~50 gpm
75							
80							Same as above
85							
							Bottom of Hole – 86 Feet
90							
95							
100							

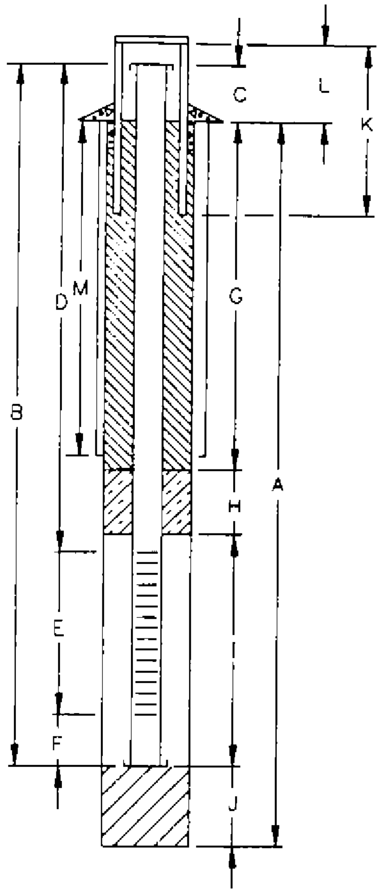
Graphic Log



6

* Background = ____ppm

WELL COMPLETION MW-8A



TOP OF CASING ELEVATION 2378.73'

A BORING DEPTH 86 FT.
BORING DIAMETER 6 IN.
B WELL DEPTH 85'6" FT.
C WELL STICKUP 0 FT.
D BLANK INTERVAL 70 FT.
BLANK DIAMETER 2 IN.
E SCREEN INTERVAL 66.5–76.5 FT.
SCREEN DIAMETER 2 IN.
TYPE/SLOT SIZE 0.01
F SEDIMENT TRAP 5 FT.
G ANNULAR SEAL 54 FT.
MATERIAL. GROUT
H BENTONITE SEAL 5'6" FT.
I SANDPACK 22'6" FT.
TYPE/SIZE: 20/40
J BOTOM SEAL/PACK 3' FT.
MATERIAL SAND
K WELL COVER ____ FT
L STICKUP 0 FT.
M CONDUCTOR CASING 48 FT.

NOT TO SCALE

DRILLING TIMES:
START 1440 4/25/90 FINISH 1025 4/27/90
STANDBY or DOWN TIME:

METHOD OF DECON PRIOR TO DRILLING:

DEVELOPMENT

METHOD OF DEVELOPMENT

PUMP TIME 0800 TO 1200 DATE 5/24/90

PUMPED 6 BARRELS IN 4 HOURS.

TURBIDITY AFTER DEVELOPMENT: X CLEAR ____ MOD TURBID ____ SL. TURBID ____ TURBID

ODOR IN WATER ?

WATER DISCHARGED TO: ____ GROUND SURFACE ____ STORAGE TANK ____ STORM SEWERS ____ TANK TRUCK X DRUMS

DEPTH OF WATER AFTER DEVELOPMENT: 20.0'

MATERIALS USED

4 SACKS of 20/40 SAND
8 SACKS of PORTLAND CEMENT
____ SACKS of PREMIX CONCRETE
____ GALLONS of GROUT USED
____ GROUT COMPOSITION #6 BENTONITE
1 SACKS of BENTONITE PELLETS
____ BUCKETS of BENTONITE PELLETS
____ YARDS CEMENT – SAND USED
4 CENTRALIZERS EVERY 25' BGS

WELL COVER USED.
____ Above Grade
X At Grade
____ Other
X Lockable

801126–A–MW3AW

6

RESOURCE PROTECTION WELL REPORT

START CARD NO. 57709

PROJECT NAME: SPOKANE AIRPORT BURN PIT

WELL INDENTIFICATION NO. MW13[illegible]A

[illegible]RILLING METHOD: 4 1/4" HOLLOW STEM AUGER & AIR ROTARY

DRILLER: WILL HAYES (2035)

FIRM: RUEN DRILLING, INC (RUEN CDI 1759M)

SIGNATURE:

CONSULTING FIRM: LANDAU ASSOCIATES INC.

REPRESENTATIVE: DEB SWNELL

County

LOCATION: T 24N, R 42E, SEC. 6 1/4 NE 1/4 NE

DISTANCE: (W) 112 FT. FROM N/S SECTION LINE

(S) 450 FT. FROM E/W SECTION LINE

DATUM: USGS monument 250' SOUTH OF RUNWAY

WATER LEVEL ELEVATION: (23') 2,357.1'

INSTALLED: 12/18/92

DEVELOPED: 12/22/92

AS-BUILT	WELL DATA		FORMATION DESCRIPTION	
See attached sheet		GM	Dark brown silty to sandy GRAVEL (med. dense, moist)	5
		SW	Dark brown gravelly medium to very coarse SAND (loose, moist)	10
		GM	Dark brown silty sandy GRAVEL (loose, moist)	15
		ML	Medium brown fine sandy SILT with trace charcoal and leaves (very stiff, damp)	20 25 30
		BASALT TO 42'	Weathered Basalt with small angular pebbles mixed with clay	35

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RUEN DRILLING, INC.
BOX 267
CLARK FORK, ID 83811
(208) 266-1151

SCALE: 1" = 5'

PAGE 1 OF 2

END OF HOLE 42'

ECY 050-12

LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907 FAX (206) 778-6409

As-built
Well Completion Form

Project: SPOKANE AIRPORT BURNPIT
Project No.: 207001.33
Well(s) No.: MW 13 A
Drilling Co.: RUEN DRILLING IN
Installation Start Date: 12/18/92 Hour: 1000
Installation Finish Date: 12/22/92 Hour: 1000 monumal
Well Type: ☒ Single ☐ Nested ☐ Clustered

WATER DISCHARGE MONITORING

Date:		Time:		PID(ppm)	
Date:		Time:		PID(ppm)	
Date:		Time:		PID(ppm)	
Date:		Time:		PID(ppm)	
Date:		Time:		PID(ppm)	

EQUIPMENT USED

☒ Hollow Stem Auger 4 1/4"
☐ Cable Tool
☐ Air Rotary
☐ Other

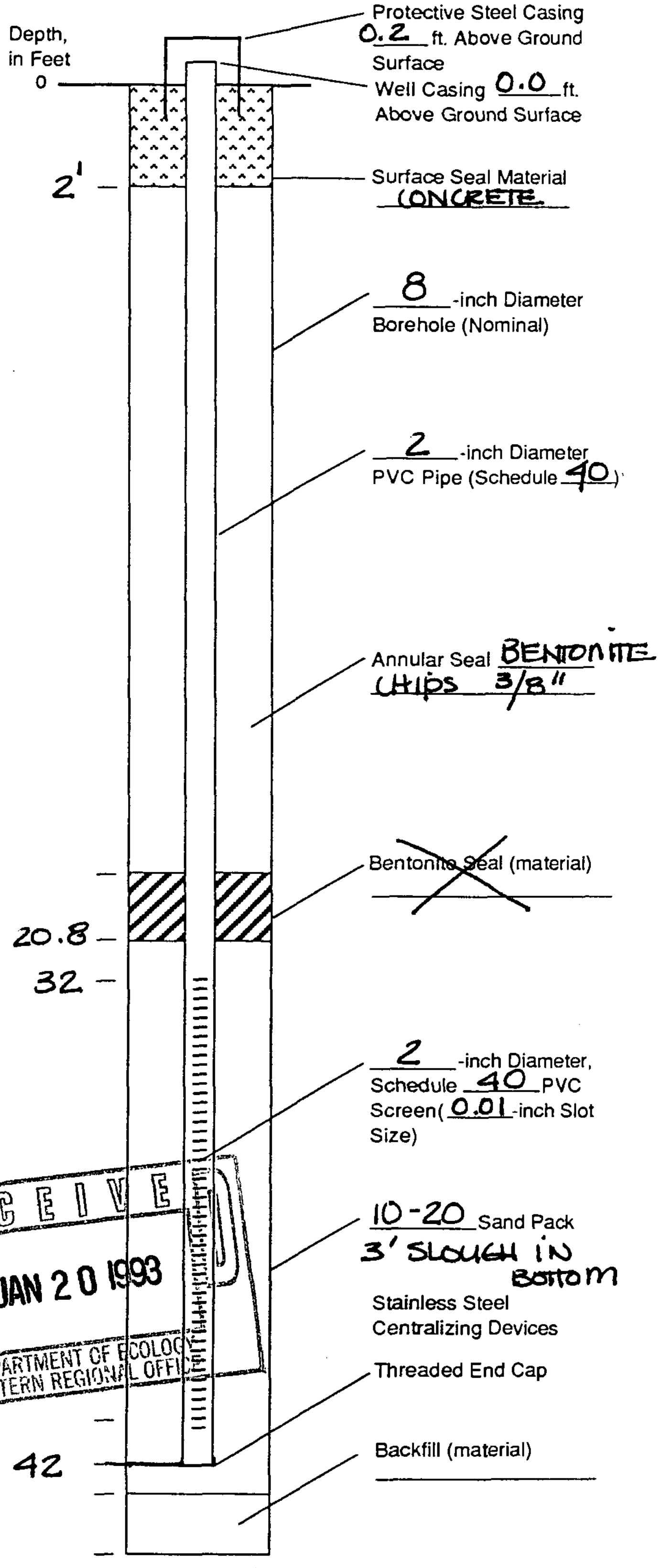
MATERIALS USED

2 Sacks of 10 - 20 Sand
Sacks of Concrete/Cement
3 Sacks of Grout Mix Used
15 Sacks of ~~Powdered~~ Bentonite Chips
Pounds of Bentonite Pellets/Chips
40 Feet of Inch PVC Blank Casing
10 Feet of Inch PVC Slotted Screen

DEVELOPMENT

Method of Development: BAILER 1 1/2" SS
Begin Date: 12/21/92 Time: 0800 BAIL 25 GALLONS
Finish Date: 12/22/92 Time: 1330 (≤ 10 GALLONS)
Yield: Time From: To: Date:
Estimate of Total Water Removed During Development: 35 [✓ Gallons]
Description of Turbidity at End of Development: ☐ Clear ☒ Slightly Cloudy ☐ Mod. Turbid ☐ Very Cloudy
Odor of Water: NONE
Water Discharged To: GROUND
Depth to Water After Development: 23.0 [✓ Feet]

3/91



Protective Steel Casing 0.2 ft. Above Ground Surface
Well Casing 0.0 ft. Above Ground Surface
Surface Seal Material CONCRETE
8 -inch Diameter Borehole (Nominal)
2 -inch Diameter PVC Pipe (Schedule 40)
Annular Seal BENTONITE CHIPS 3/8"
~~Bentonite Seal~~ (material)
2 -inch Diameter, Schedule 40 PVC Screen(0.01 -inch Slot Size)
10-20 Sand Pack
3' SLOUGH IN BOTTOM
Stainless Steel Centralizing Devices
Threaded End Cap
Backfill (material)

Depth of Boring 42 feet

PAGE 2 OF 2

RESOURCE PROTECTION WELL REPORT

START CARD NO. 57709

PROJECT NAME: SPOKANE AIRPORT BURNPIT
WELL INDENTIFICATION NO. MW13B
DRILLING METHOD: 4 1/4" HOLLOW STEM AUGER
DRILLER: WILL HAYES (2035)
FIRM: RUEN DRILLING (RUENCDI175QM)
SIGNATURE:
CONSULTING FIRM: LANDAU ASSOCIATES INC.
REPRESENTATIVE: DEB SUNELL

County
LOCATION: T 24N, R 42E, SEC. 6 1/4 NE 1/4 NE
DISTANCE: (W) 112 FT. FROM N/S SECTION LINE
(S) 450 FT. FROM E/W SECTION LINE
DATUM: USGS MONUMENT 250' SOUTH OF RUNWAY
WATER LEVEL ELEVATION: (14.7) 2,366.7'
INSTALLED: 12/17/92
DEVELOPED: 12/21/92

AS-BUILT	WELL DATA	FORMATION DESCRIPTION	
see attached sheet			
	GM	DARK brown silty to sandy GRAVEL (med. dense, moist)	5.0
	SW	Dark brown Gravelly medium to very coarse SAND (loose, moist)	10.0
	GM	Dark brown silty sandy GRAVEL (loose, moist)	15.0
	ML	Medium brown fine sandy SILT w/ trace charcoal and leaves (very stiff, damp)	20.0
		END OF HOLE 20 FT.	
			25.0
			30.0
			35.0

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(208) 266-1151

SCALE: 1"= 5'

PAGE 1 OF 2

ECY 050-12

LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907 FAX (206) 778-6409

As-built
Well Completion Form

Project: SPOKANE AIRPORT BURNPIT
Project No.: 207001.33
Well(s) No.: MW 13 B
Drilling Co.: RUEN DRILLING INC.
Installation Start Date: 12/17/92 Hour:
Installation Finish Date: 12/22/92 Hour:
Well Type: ☒ Single ☐ Nested ☐ Clustered

WATER DISCHARGE MONITORING

Date: ______ Time: ______ PID(ppm) ______
Date: ______ Time: ______ PID(ppm) ______
Date: ______ Time: ______ PID(ppm) ______
Date: ______ Time: ______ PID(ppm) ______
Date: ______ Time: ______ PID(ppm) ______

EQUIPMENT USED

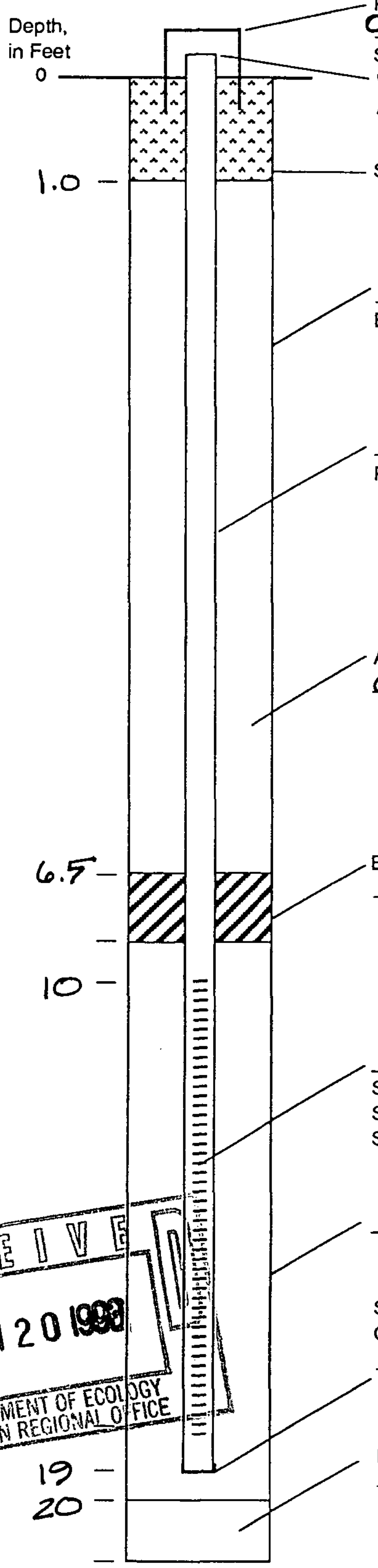
- ☐ Hollow Stem Auger
- ☐ Cable Tool
- ☐ Air Rotary
- ☐ Other

MATERIALS USED

4.5 Sacks of 10-20 Sand
2 Sacks of ______ Concrete/Cement
______ Sacks of ______ Grout Mix Used
2 Sacks of ~~Powdered~~ Bentonite CHIPS
______ Pounds of Bentonite Pellets/Chips
10 Feet of ______ Inch PVC Blank Casing
10 Feet of ______ Inch PVC Slotted Screen

DEVELOPMENT

Method of Development: HONDA PUMP
Begin Date: 12/18/92 Time: PURGE 25 Gall
Finish Date: 12/21/92 Time: PURGE 10 GAL.
Yield: Time From: To: Date:
Estimate of Total Water Removed During Development: 35 [✓ Gallons]
Description of Turbidity at End of Development: ☐ Clear ☒ Slightly Cloudy ☐ Mod. Turbid ☐ Very Cloudy
Odor of Water: NONE
Water Discharged To: GROUND
Depth to Water After Development: 14.7 [✓ Feet]



Protective Steel Casing 0.2 ft. Above Ground Surface
Well Casing 0.0 ft. Above Ground Surface
Surface Seal Material CONCRETE
8 -inch Diameter Borehole (Nominal)
2 -inch Diameter PVC Pipe (Schedule 40)
Annular Seal BENTONITE chips 3/8"
~~Bentonite Seal (material)~~
2 -inch Diameter, Schedule 40 PVC Screen(0.01 -inch Slot Size)
10-20 Sand Pack
Stainless Steel Centralizing Devices
Threaded End Cap
Backfill (material) ______
Depth of Boring 20 feet

PAGE 2 OF 2

RESOURCE PROTECTION WELL REPORT

START CARD NO. 77709

PROJECT NAME: SPOKANE AIRPORT BURNPIT
WELL INDENTIFICATION NO. MW14A
DRILLING METHOD: ~~4~~4¼" HOLLOW STEM AUGER & AIR ROTARY
DRILLER: WILL HAYES (2035)
FIRM: RUEN DRILLING (RUENCDI175 DM)
SIGNATURE:
CONSULTING FIRM: LANDAU ASSOCIATES INC.
REPRESENTATIVE: DEB SUNELL

County
LOCATION: T 24 N, R 42E, SEC. 6 ¼ NE ¼ NE
DISTANCE: (W) 165 FT. FROM N/S SECTION LINE
(S) 555 FT. FROM E/W SECTION LINE
DATUM: USGS MONUMENT 250' SOUTH OF RUNWAY
WATER LEVEL ELEVATION: N/A
INSTALLED: 12/22/92
DEVELOPED: NOT YET

AS-BUILT	WELL DATA	FORMATION DESCRIPTION	
See attached sheet	SW	Brown to Grey silty and fine to coarse SAND with trace Gravel (loose, moist)	5
			10
CL	Red-brown CLAY with trace Gravel (stiff, wet)		15
SW	Dark Grey medium to coarse SAND with Gravel (medium dense, wet)		
	CL	Brown CLAY with trace Gravels to brown sandy CLAY with silt and trace Organics (stiff, wet)	20
	CL\ML	Light brown sandy silty CLAY to clayey Sandy SILT (stiff, moist)	25
	BASALT		30
			35

RUEN DRILLING, INC.
BOX 267
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(2[illegible]) 266-1151

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SCALE: 1" = 5'

PAGE 1 OF 2

END OF HOLE 35'

ECY 050-12

LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907 FAX (206) 778-6409

As-built
Well Completion Form

Project: SAS - BURN PIT
Project No.: 207001.33
Well(s) No.: MW 14A
Drilling Co.: BUEN DRILLING INC.
Installation Start Date: 12/22/92 Hour: 1000
Installation Finish Date: 12/22/92 Hour: 1330
Well Type: ☒ Single ☐ Nested ☐ Clustered

WATER DISCHARGE MONITORING

Date: ____ Time: ____ PID(ppm) ____
Date: ____ Time: ____ PID(ppm) ____
Date: ____ Time: ____ PID(ppm) ____
Date: ____ Time: ____ PID(ppm) ____
Date: ____ Time: ____ PID(ppm) ____

EQUIPMENT USED

☒ Hollow Stem Auger 4¼"
☐ Cable Tool
☐ Air Rotary
☐ Other ____

MATERIALS USED

[illegible]5 Sacks of 10 - 20 Sand
2 Sacks of ____ Concrete/Cement
____ Sacks of ____ Grout Mix Used
[illegible]9 Sacks of ~~Powdered~~ Bentonite CHips
____ Pounds of Bentonite Pellets/Chips
25 Feet of 2" Inch PVC Blank Casing
10 Feet of 2" Inch PVC Slotted Screen

DEVELOPMENT

Method of Development:

Begin Date: Time:
Finish Date: Time:

Yield: Time From: To: Date:

Estimate of Total Water Removed During Development: Gallons

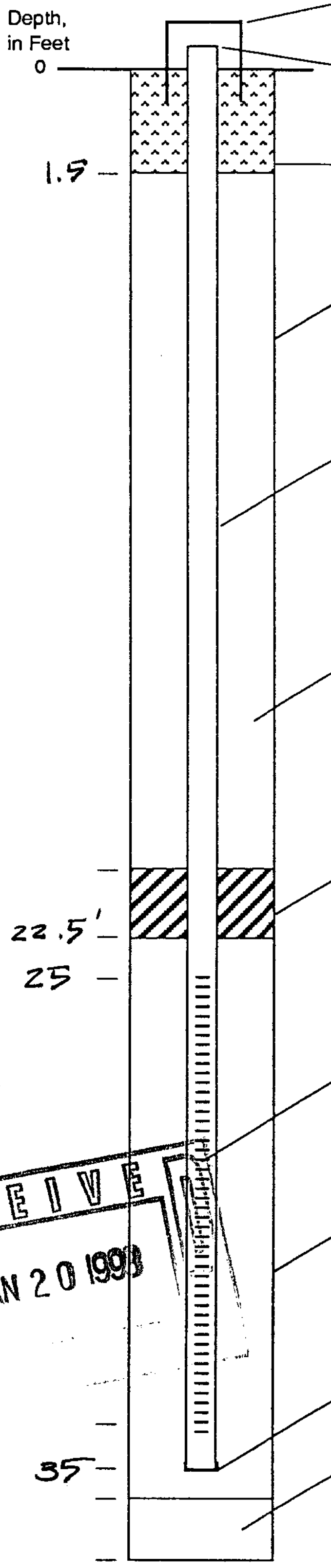
Description of Turbidity at End of Development: ☐ Clear ☐ Slightly Cloudy ☐ Mod. Turbid ☐ Very Cloudy

Odor of Water: NONE

Water Discharged To:

Depth to Water After Development: Feet

3/91



Protective Steel Casing 1.5 ft. Above Ground Surface
Well Casing 1.0 ft. Above Ground Surface
Surface Seal Material CONCRETE
8 -inch Diameter Borehole (Nominal)
2 -inch Diameter PVC Pipe (Schedule 40)
Annular Seal BENTONITE CHips 3/8"
~~Bento~~nite Seal (material) ____
2 -inch Diameter, Schedule 40 PVC Screen(001 -inch Slot Size)
10 - 20 Sand Pack
~~Stainless Steel Centralizing Devices~~
Threaded End Cap
~~Backfill (material)~~ ____

Depth of Boring 35 feet

PAGE 2 OF 2

RESOURCE PROTECTION WELL REPORT

START CARD NO. 57709

PROJECT NAME: SPOKANE AIRPORT BURNPIT
WELL INDENTIFICATION NO. MW14B
DRILLING METHOD: 4¼" HOLLOW STEM AUGER
DRILLER: WILL HAYES (2039)
FIRM: RUEN DRILLING (RUENCDI 1750M)
SIGNATURE:
CONSULTING FIRM: LANDAU ASSOCIATES INC.
REPRESENTATIVE: DEB SCHNELL

County
LOCATION: T 24N, R 42E, SEC. 6 1/4 NE 1/4 NE
DISTANCE: (W) 165 FT. FROM N/S SECTION LINE
(S) 555 FT. FROM E/W SECTION LINE
DATUM: USGS MONUMENT 250' SOUTH OF RUNWAY
WATER LEVEL ELEVATION: (18.5) 2,362.9
INSTALLED: 12/21/92
DEVELOPED: 12/22/92

AS-BUILT	WELL DATA	FORMATION DESCRIPTION
see attached sheet	SW	Brown to grey silty and fine to coarse SAND with trace Gravel (loose moist)
CL	Red-brown CLAY with trace Gravel (stiff, wet)	
SW	Dark Grey medium to coarse SAND with Gravel (medium dense, wet)	
CL	Brown CLAY with trace Gravels to brown sandy CLAY with silt and trace Organics (stiff, wet)	
		END OF HOLE 20.5'

5
10
15
20
25
30
35

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SCALE: 1" = 5'

PAGE 1 OF 2

ECY 050-12

LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907 FAX (206) 778-6409

As-built
Well Completion Form

Project: SAS - BURNPIT
Project No.: 207001.33
Well(s) No.: MW14B
Drilling Co.: RUEN DRILLING INC.
Installation Start Date: 12/21/92 Hour: 1515
Installation Finish Date: 12/21/92 Hour: 1015
Well Type: ☒ Single ☐ Nested ☐ Clustered
120 monument

WATER DISCHARGE MONITORING

Date: ______ Time: ______ PID(ppm) ______
Date: ______ Time: ______ PID(ppm) ______
Date: ______ Time: ______ PID(ppm) ______
Date: ______ Time: ______ PID(ppm) ______
Date: ______ Time: ______ PID(ppm) ______

EQUIPMENT USED

- ☐ Hollow Stem Auger
- ☐ Cable Tool
- ☐ Air Rotary
- ☐ Other ______

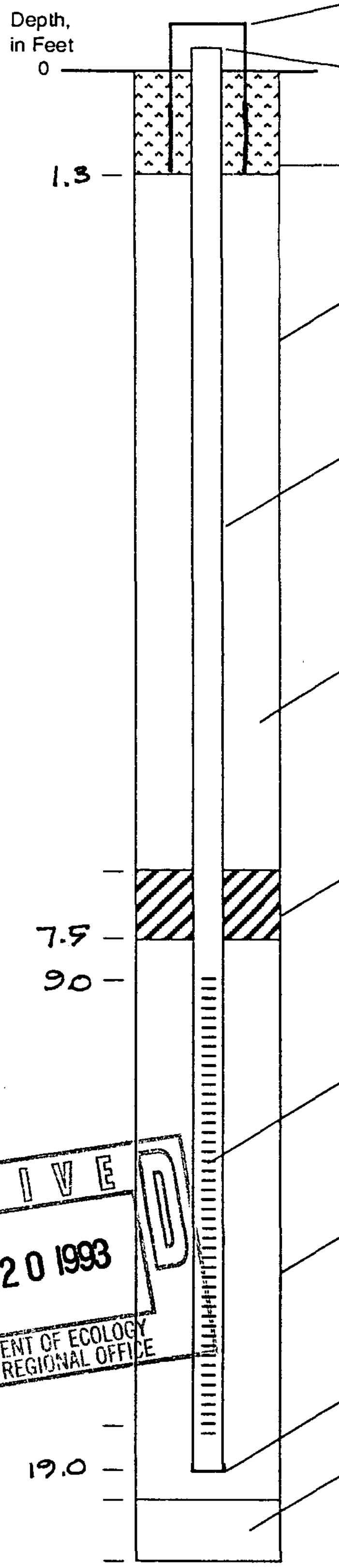
MATERIALS USED

5 Sacks of 10 - 20 Sand
2 Sacks of ______ Concrete/Cement
______ Sacks of ______ Grout Mix Used
3 Sacks of Powdered Bentonite Chips
______ Pounds of Bentonite Pellets/Chips
10 Feet of 2 Inch PVC Blank Casing
10 Feet of 2 Inch PVC Slotted Screen

DEVELOPMENT

Method of Development: BAILER 1½" SS
Begin Date: 12/22/92 Time: 20 GALS SLIGHT SILTY
Finish Date: Time:
Yield: Time From: To: Date:
Estimate of Total Water Removed During Development: 20 [✓ Gallons]
Description of Turbidity at End of Development: ☐ Clear ☒ Slightly Cloudy ☐ Mod. Turbid ☐ Very Cloudy
Odor of Water: NONE
Water Discharged To: GROUND
Depth to Water After Development: 18.49 TOP PVC [✓ Feet]

3/91



Protective Steel Casing 1.5 ft. Above Ground Surface
Well Casing 1.0 ft. Above Ground Surface
Surface Seal Material CONCRETE
8 -inch Diameter Borehole (Nominal)
2 -inch Diameter PVC Pipe (Schedule ______)
Annular Seal BENTONITE CHIPS 3/8"
0 ~~Bentonite~~ Seal (material) ______
2 -inch Diameter, Schedule 40 PVC Screen(0.01 -inch Slot Size)
10 - 20 Sand Pack
0 ~~Stainless Steel Centralizing Devices~~
Threaded End Cap
Backfill (material) 10 - 20 SAND

Depth of Boring 20.5 feet

PAGE 2 OF 2

SES Project Number: 0270-001

Spokane International Airports, New Wells PFOA-PFOS Assessment

Boring Number: MW-18 Well Tag: BKP-261

Equipment Type/ model #: Mobile G-2400

Location NAD 83 47.619878 N, -117.517124 W

Auger type/diameter: 8-inch Hollow Stem

Contractor: Geologic Drill, LLC

Sampling method: 2-inch SPT

Sheet 1 of 1

Hammer Weight: 140 Lbs

Free Fall: 30"

Above-Grade Monument

Location of Boring: South of W. Electric Avenue.

Time 1300

Surface conditions/ Topsoil Depth: Grass-covered.

Date 7/30/18

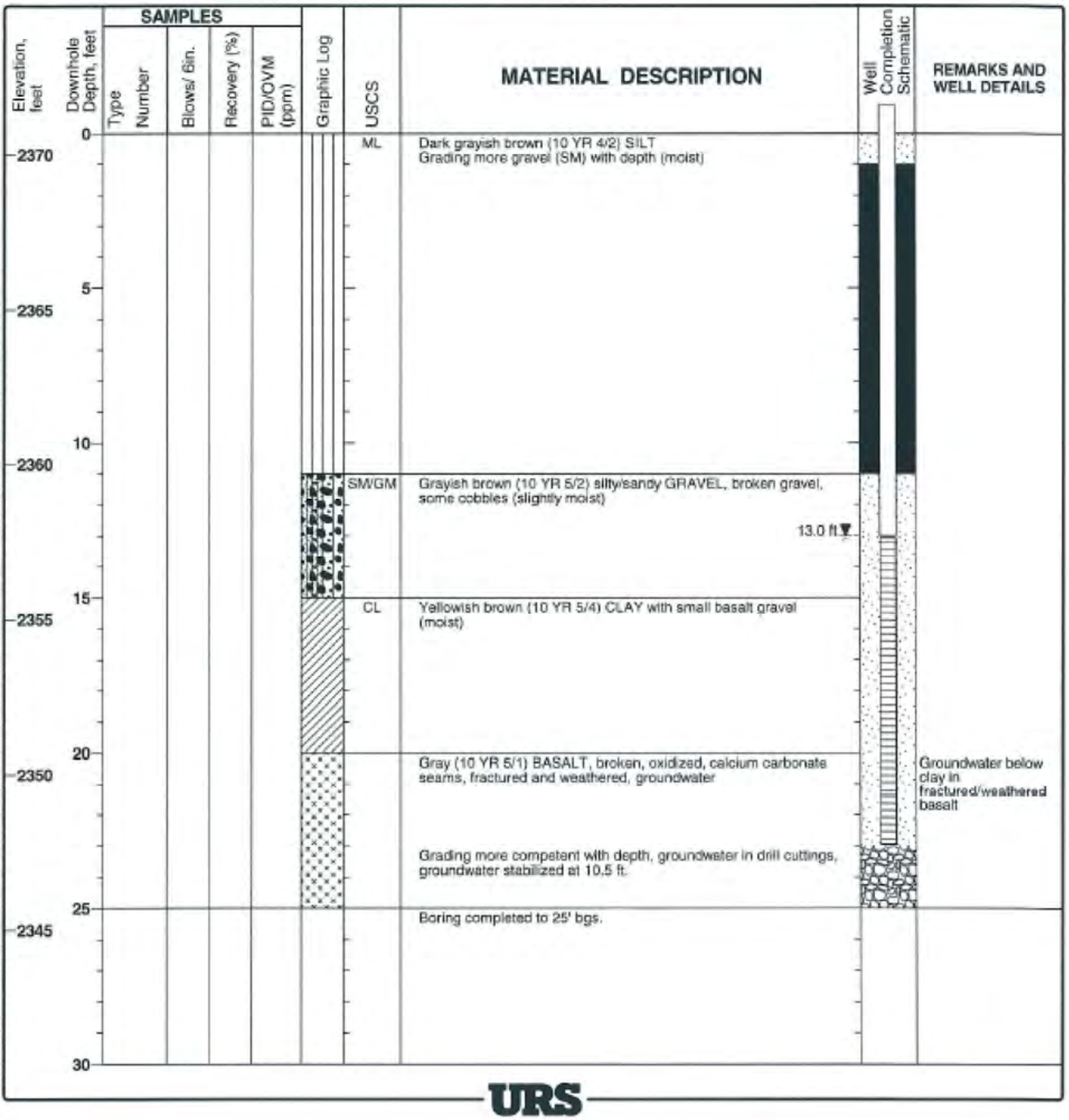
Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
		0	▒	GM	Brown silty Gravel with sand. Loose, Dry. With organics.
		1	▒		
		2	▒		
		3	▒		
		4	▒		
3-7-9	60%	5	▒	GM	Grey- brown silty GRAVEL with sand, Loose, Dry.
		6	▒		
		7	▒		
		8	░		
		9	░		
10-12-15	70%	10	░	SP	Grey- brown SAND, Loose, Wet. Becomes weathered Basalt
		11	▓	Rx	Weathered Basalt. Refusal at 13.0 feet bgs.
		12			
		13			
		14			
		15			
		16			
		17			
		18			
		19			Completed well depth is 12.0- feet bgs.
		20			Well constructed with 5-feet of 20-slot screen.
		21			Boring Completed at 13.0-feet BGS. Groundwater encountered at 10.0 feet bgs.

Project: SIA Land Application Study Area
Project Location: Spokane International Airport
Project Number: 36310160

Log of Boring MW-8

Sheet 1 of 1

Date(s) Drilled	11/29/12	Logged By	JEL	Checked By	GDP
Drilling Method	Air Rotaty	Drilling Contractor	H2O Well Drilling	Total Depth of Borehole	25 feet bgs
Drill Rig Type	Star 30k-DH	Drill Bit Size/Type	6 in. Tubex	Ground Surface Elevation	2370.7 feet bgs
Groundwater Level	2360.75 feet	Sampling Method	Cuttings	Hammer Data	NA
Borehole Backfill	NA	Location	Northing 246693.59, Easting 2447195.34		



USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
ML	Dark grayish brown (10 YR 4/2) SILT Grading more gravel (SM) with depth (moist)	
SM/GM	Grayish brown (10 YR 5/2) silty/sandy GRAVEL, broken gravel, some cobbles (slightly moist)	
CL	Yellowish brown (10 YR 5/4) CLAY with small basalt gravel (moist)	
	Gray (10 YR 5/1) BASALT, broken, oxidized, calcium carbonate seams, fractured and weathered, groundwater	Groundwater below clay in fractured/weathered basalt
	Grading more competent with depth, groundwater in drill cuttings, groundwater stabilized at 10.5 ft.	
	Boring completed to 25' bgs.	

URS

RESOURCE PROTECTION WELL REPORT

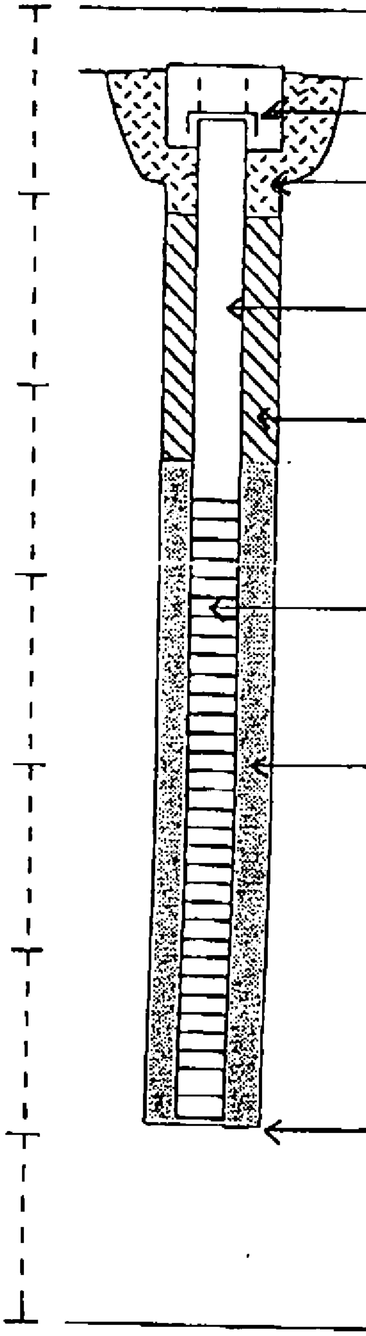
START CARD NO. R06492

PROJECT NAME: ANG-Spokane
WELL IDENTIFICATION NO. ACQ 745 MW-9
DRILLING METHOD: HSA
DRILLER: RODNEY LABROSSE
FIRM: Cascade Drilling, Inc.
SIGNATURE:
CONSULTING FIRM: ERM WEST
REPRESENTATIVE: MIKE ARNOLD

COUNTY: SPOKANE
LOCATION: NW¼ NW¼ Sec 5 Twn 24N R 42E
STREET ADDRESS OF WELL: 1 mi. West of Electric Ave & Geiger Ave
WATER LEVEL ELEVATION: 7
GROUND SURFACE ELEVATION: N/A
INSTALLED: 11-23-96
DEVELOPED: yes

6558

AS-BUILT



WELL DATA

WELL COVER

CONCRETE SURFACE SEAL DEPTH = 1/ft

PVC BLANK 2 "x 7'

BACKFILL Portland slurry to 1 ft.
TYPE: Bent chips to 3

PVC SCREEN 2 "x 10'
SLOT SIZE: 010

GRAVEL PACK TO 5' ft.
MATERIAL: 2/12

WELL DEPTH 17' "
↕ Sand
18.5

FORMATION DESCRIPTION

0 - 3 ft.
Brown silts

3 - 18.5 ft.
sandy silts & gravels w/ some cobbles

- ft.

RECEIVED
DEC 2 3 1996
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

SCALE: 1" = ____ PAGE ____ OF ____

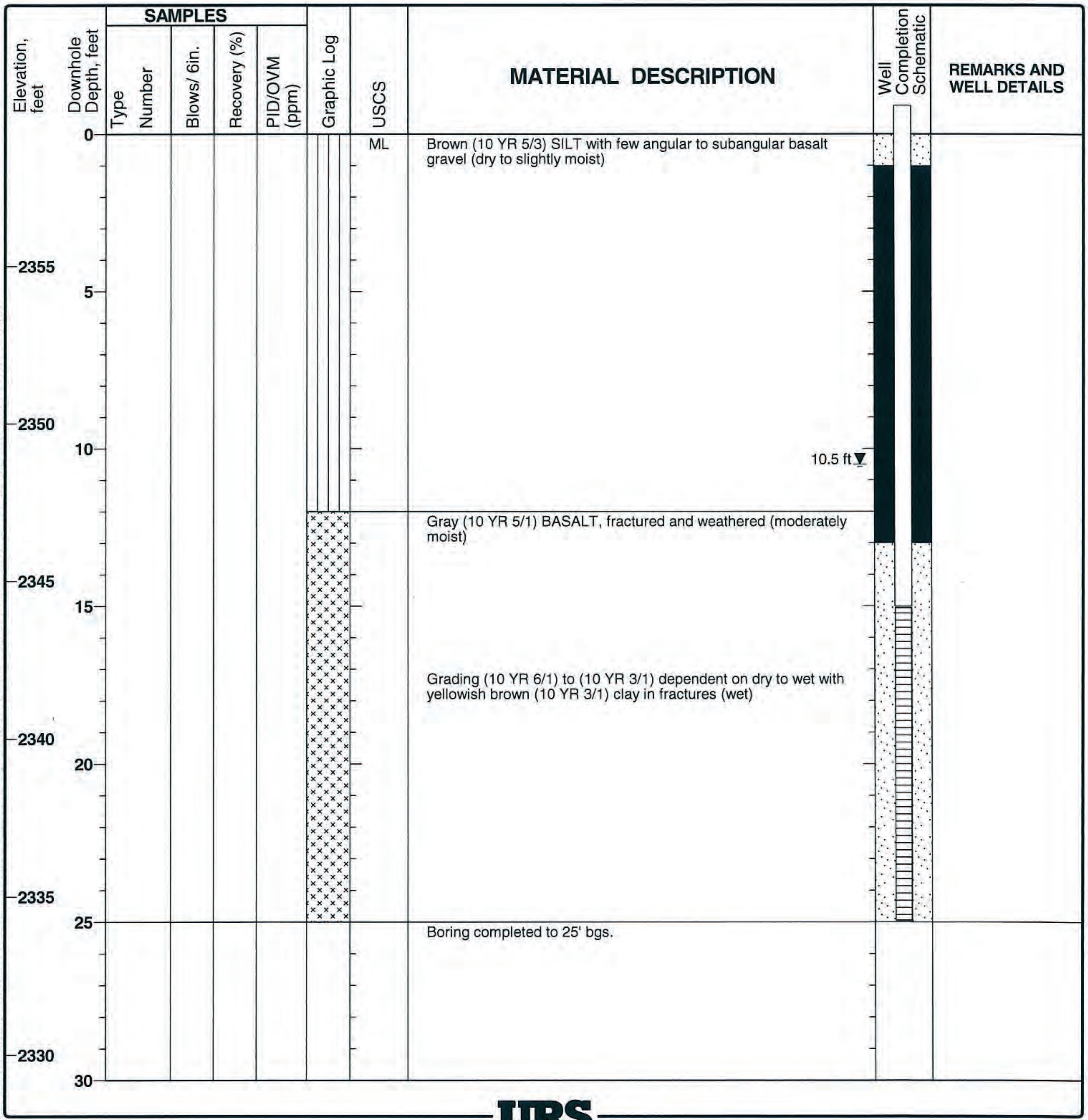
ECY 050-12 (Rev. 11/09)

Project: SIA Land Application Study Area
Project Location: Spokane International Airport
Project Number: 36310160

Log of Boring MW-10

Sheet 1 of 1

Date(s) Drilled	**11/28/12**	Logged By	**JEL**	Checked By	**GDP**
Drilling Method	**Air Rotaty**	Drilling Contractor	**H2O Well Drilling**	Total Depth of Borehole	**25 feet bgs**
Drill Rig Type	**Star 30k-DH**	Drill Bit Size/Type	**6 in. Tubex**	Ground Surface Elevation	**2359.2 feet bgs**
Groundwater Level	**2351.13 feet**	Sampling Method	**Cuttings**	Hammer Data	**NA**
Borehole Backfill	**NA**	Location	**Northing 247338.63, Easting 2450941.31**		



USCS	MATERIAL DESCRIPTION
ML	Brown (10 YR 5/3) SILT with few angular to subangular basalt gravel (dry to slightly moist)
	Gray (10 YR 5/1) BASALT, fractured and weathered (moderately moist)
	Grading (10 YR 6/1) to (10 YR 3/1) dependent on dry to wet with yellowish brown (10 YR 3/1) clay in fractures (wet)
	Boring completed to 25' bgs.

ENV2 WITH WELL T:\ONEWORLD\36310160 SIA LAND APPLICATION STUDY AREA\36310160LOGS.GPJ URSSEA3B.GLB URSSEA3.GDT 1/4/13

PROJECT: SIA Land Application Site Monitoring Well Installation

CASCADE EARTH SCIENCES
A Valmont Industries Company

PROJECT NUMBER: 2014230009

MONITORING WELL NUMBER: MW-11
PAGE: 1 OF 1

BORING LOCATION: N246527.94 E2449283.08

LOGGED BY: BJK

CHECKED BY: DRW

PERMIT NO. BIO-784

DRILLED BY: Fogle Pump and Supply

START DATE: 8/21/2014

COMPLETION DATE: 8/23/2014

DRILLING EQUIPMENT: Sandvik T25KW Air Roatary

SAMPLING EQUIPMENT: Cuttings

WELL CONSTRUCTION DATA (MEASURED FROM TOP OF CASING)

TOTAL DEPTH: 19'

WELL DEPTH: 19'

BOREHOLE DIA.(IN): 6"

CASING MATERIAL AND DIA. (IN): 2" Schedule 40 PVC

CASING STICK-UP +/-: +2.79'

FILTER PACK INT. 7'-19'

SIZE: 10/20 CSSI

SANITARY SEAL INT. 3'-7'

TYPE: 3/8" Bentonite chips

GROUT INT. None

TYPE: None

SURFACE SEAL INT: 0-3'

TYPE: Concrete

WELL SCREEN INT: 9'-19'

SLOT SIZE (IN): 0.020

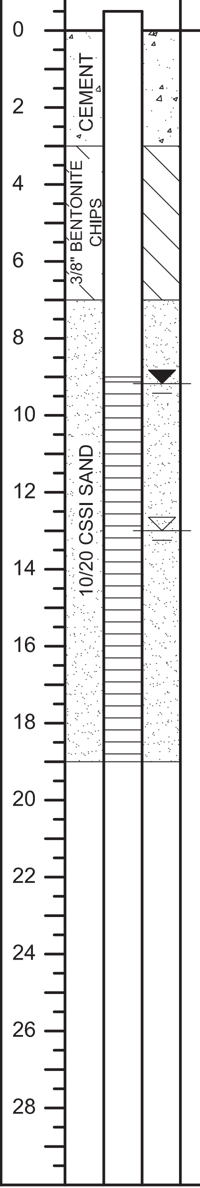
WATER LEVEL/DATE (MEASURED BELOW T.O.C.) H2O @ 9.3' BGS - 8/21/14 @ 0830

GROUND SURFACE ELEV. (FT MSL): 2367.8

TOP OF CASING ELEV. (FT MSL): 2370.59

COMMENT:

GROUP SYMBOL	INTERVAL (FT. B.G.S.)	DESCRIPTION OF LITHOLOGY	BLOW COUNT	RECOVERY	TYPE	NUMBER
ML	5'	**SANDY SILT:** Brown (2.5Y 3/3), dry, sand-silt mix, no gravels.				
SP	10'	**SAND AND GRAVEL:** Brown (2.5Y 4/2), damp, poorly graded sand with gravel.				
SM	15'	**SILTY SAND:** Brown (10Y 2/2), with yellow pockets (10YR 8/8), damp/wet, silty sand with gravels.				
Basalt	17'-20'	**BASALT:** Brown, wet, fractured basalt.				
		Total Depth = 20'				



REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)

Ground surface

Start at 0740

Final water level = 9.3' BGS.

Encountered water at 13' BGS.

Driller feel different layer at 15' BGS.

Basalt at 17' BGS.

Terminate drilling at 20'
End at 0746

When 6" casing was removed borehole collapsed a little. 2" schedule 40 pvc casing set to depth of 19' BGS.

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data, except for T.O.C. and ground surface elevation, is accurate to +/- 0.5 feet.

S:\[Working Drafting]\2014230009 Spokane Airport\DWGs\2014230009 MW-11 LOG.dwg 11/6/2014 RKB

CASCADE EARTH SCIENCES
A Valmont Industries Company

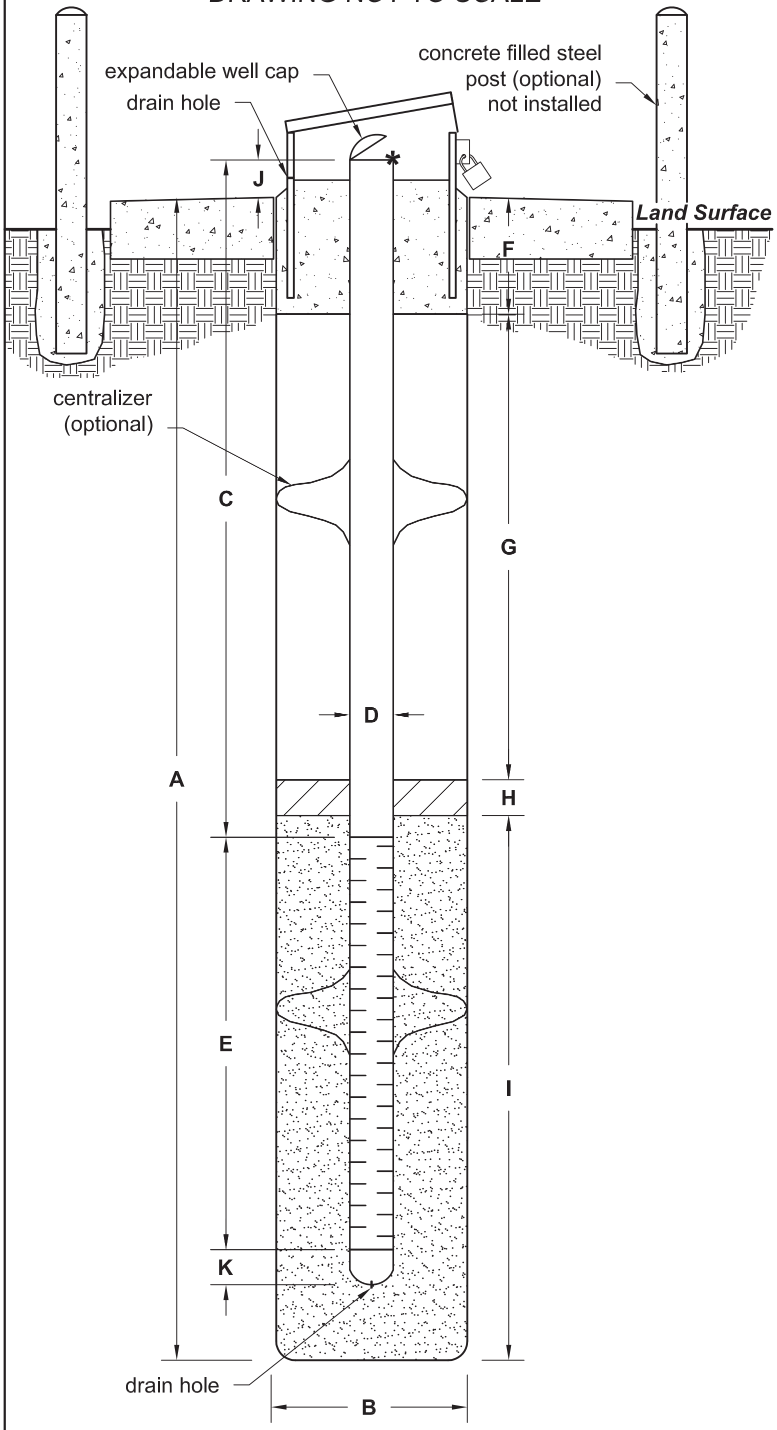
MONITORING WELL CONSTRUCTION DETAILS

PROJECT NAME SIA Land Application Site Monitoring Well Installation
PROJECT NUMBER 2014230009
DATE INSTALLED 8/21/2014
WELL PERMIT NO. BIO-784
LOCATION N246527.94, E2449283.08 (Washington State Plane North)
NOTES:

BORING/WELL NO. MW-11
TOP OF CASING ELEV. AT MARK 2370.59
GROUND SURFACE ELEV. 2367.8
DATUM NAVD88

WELL SCHEMATIC

DRAWING NOT TO SCALE



NOTE: Depths and intervals are measured from ground surface.

BORING INFORMATION

A. Total Depth 19 ft.

B. Borehole Diameter 6 in.

Drilling method Sandvik T25KW Air Rotary

WELL CONSTRUCTION

C. Total Casing length 21.79 ft.

Material Schedule 40 PVC

D. Well Casing Diameter (I.D.) 2 in.

E. Well Screen

Screen length 10 ft.

Screen interval from 9 ft. to 19 ft.

Slot size 0.020 in.

F. Surface Seal from 0 ft. to 3 ft.

Seal materials Concrete

G. Grout from - ft. to - ft.

Grout material -

H. Bentonite Sanitary Seal from 3 ft. to 9 ft.

Seal materials 3/8" Bentonite Chips

I. Filter Pack from 7 ft. to 19 ft.

Pack material 10/20 CSSI sand

J. Well Casing height (above grade) 2.79 ft.

K. Well Sump length 0 ft.

Well tail piece length 3 in.

Centralizers located at 9 ft.

NOTES: -

PROJECT: SIA Land Application Site Monitoring Well Installation	**CES** CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2014230009	MONITORING WELL NUMBER: MW-12 PAGE: 1 OF 1
BORING LOCATION: N249177.19 E2450041.46		LOGGED BY: BJK CHECKED BY: DRW	PERMIT NO. BIO-785
DRILLED BY: Fogle Pump and Supply		START DATE: 8/21/2014	COMPLETION DATE: 8/23/2014
DRILLING EQUIPMENT: Sandvik T25KW Air Roatary		SAMPLING EQUIPMENT: Cuttings	

WELL CONSTRUCTION DATA (MEASURED FROM TOP OF CASING)

TOTAL DEPTH: 26'	WELL DEPTH: 26'	BOREHOLE DIA.(IN): 6"	CASING MATERIAL AND DIA. (IN): 2" Schedule 40 PVC	CASING STICK-UP +/-: +2.65'

FILTER PACK INT. 5'-26' SIZE: 10/20 CSSI

SANITARY SEAL INT. 3'-5' TYPE: 3/8" Bentonite chips

GROUT INT. None TYPE: None

SURFACE SEAL INT: 0-3' TYPE: Concrete

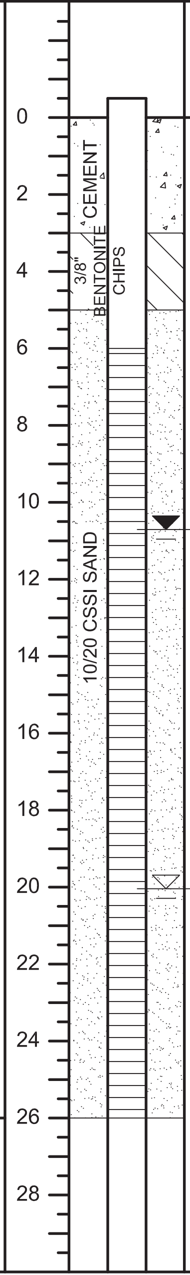
WELL SCREEN INT: 6'-26' SLOT SIZE (IN): 0.020

WATER LEVEL/DATE (MEASURED BELOW T.O.C.) h2o @ 11.15' BGS - 8/21/14 @ 1120
h2o @ 10.7' BGS - 8/21/14 @ 1200

GROUND SURFACE ELEV. (FT MSL): 2349.8

TOP OF CASING ELEV. (FT MSL): 2352.45

COMMENT:



GROUP SYMBOL	INTERVAL (FT. B.G.S.)	DESCRIPTION OF LITHOLOGY	SAMPLE BLOW COUNT	SAMPLE RECOVERY	SAMPLE TYPE	SAMPLE NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
							Ground surface Start at 0740
GW	5'	**SANDY GRAVEL:** Brown, dry, well graded sands and gravels with fine silt.					
	10'	**SANDY GRAVEL:** Brown, dry, well graded sands and gravels with fine silt.					Final water level = 10.7' BGS
	13'-17'	**BOULDER**					Basalt at 13' BGS. Pause drilling at 0917 to cut 6" casing so driller can advance head. Drilling resumed at 0933.
ML	17'	**SANDY SILT:** Brown (2.5Y 3/3), with orange (10YR 5/8), and gray (Gley1 4/10GY) lenses and gravels, damp, sandy silt.					
	20'	**SANDY SILT:** Brown, wet, sandy silt with gravels.					Encountered water at 20' BGS.
Basalt	23'	**BASALT:** wet, fractured basalt.					Basalt at 23' BGS.
		Total Depth = 26'					Terminate drilling at 26' End at 0945

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data, except for T.O.C. and ground surface elevation, is accurate to +/- 0.5 feet.

S:\[Working Drafting]\2014230009 Spokane Airport\DWGs\2014230009 MW-12 LOG.dwg 11/6/2014 RKB

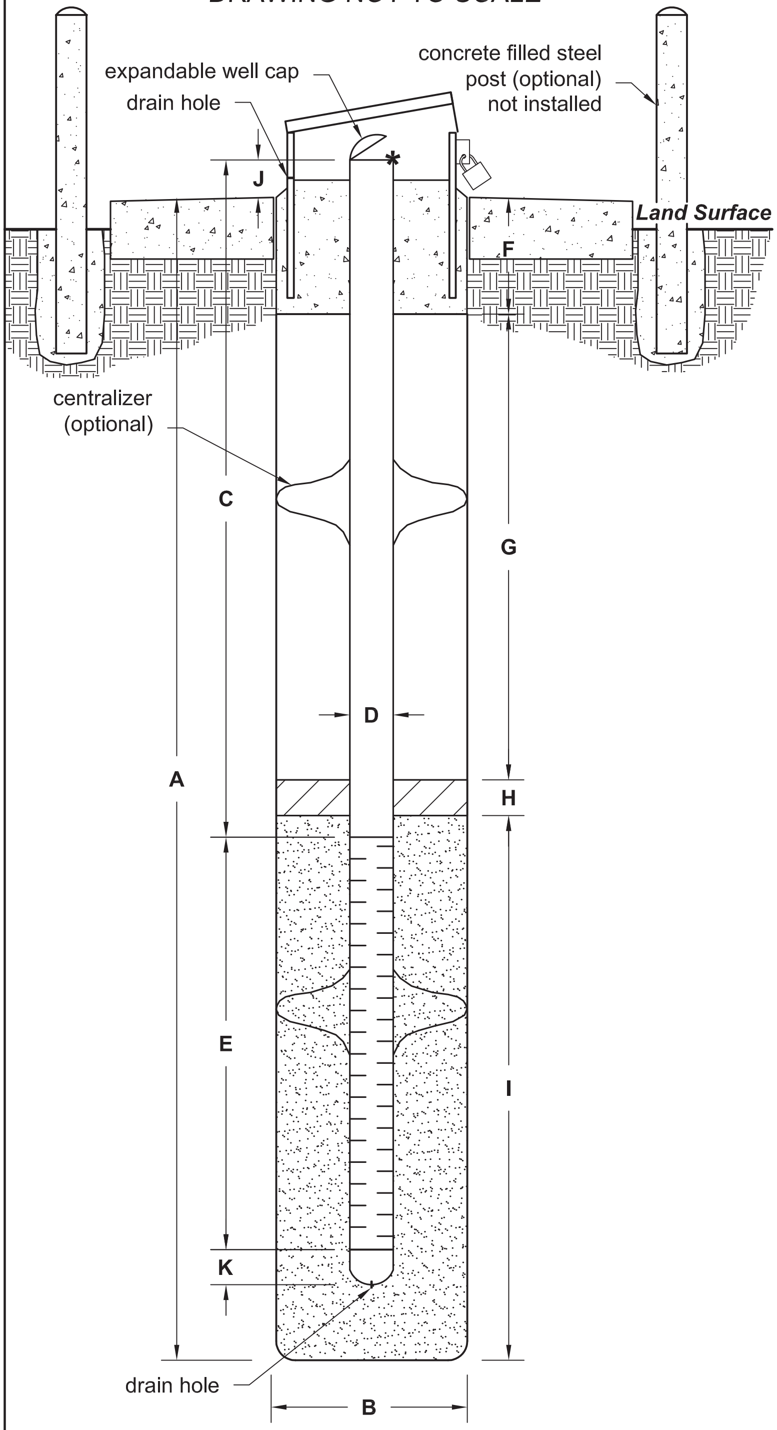
CASCADE EARTH SCIENCES
A Valmont Industries Company

MONITORING WELL CONSTRUCTION DETAILS

PROJECT NAME SIA Land Application Site Monitoring Well Installation
BORING/WELL NO. MW-12
PROJECT NUMBER 2014230009
TOP OF CASING ELEV. AT MARK 2352.45
DATE INSTALLED 8/21/2014
GROUND SURFACE ELEV. 2349.8
WELL PERMIT NO. BIO-785
DATUM NAVD88
LOCATION N249177.19, E2450041.46 (Washington State Plane North)
NOTES:

WELL SCHEMATIC

DRAWING NOT TO SCALE



NOTE: Depths and intervals are measured from ground surface.

BORING INFORMATION

A. Total Depth 26 ft.

B. Borehole Diameter 6 in.

Drilling method Sandvik T25KW Air Rotary

WELL CONSTRUCTION

C. Total Casing length 28.65 ft.

Material Schedule 40 PVC

D. Well Casing Diameter (I.D.) 2 in.

E. Well Screen

Screen length 20 ft.

Screen interval from 6 ft. to 26 ft.

Slot size 0.020 in.

F. Surface Seal from 0 ft. to 3 ft.

Seal materials Concrete

G. Grout from - ft. to - ft.

Grout material -

H. Bentonite Sanitary Seal from 3 ft. to 5 ft.

Seal materials 3/8" Bentonite Chips

I. Filter Pack from 5 ft. to 26 ft.

Pack material 10/20 CSSI sand

J. Well Casing height (above grade) 2.65 ft.

K. Well Sump length 0 ft.

Well tail piece length 3 in.

Centralizers located at 11 and 21 ft.

NOTES: -

S:\[Working Drafting]\2014230009 Spokane Airport\DWGs\2014230009 MW-12 LOG.dwg 11/5/2014 RKB

ECOVA Corporation
Well Installation Log

Well Number MW-1A
Date Drilled 5-10-90
Client Army Corps of Engineers
Site SP Site (Task 6)
Job Number 801126
Field Geologist R.M. Weber
Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 83 Feet
Water Depth 13 Feet
Coordinates 246670.5625 N
2460128.4101 E
Casing Elevation 2319.00'
Sheet 1 of 2

General: 50 feet 6" steel casing, pressure grout.

Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	% LEL	% O_2	Sample Description
							SILTY SAND (SM) – Fine- to coarse-grained sand, brown, with black basalt cuttings, damp.
5							BASALT – Fresh, light gray, dry.
10							Basalt – Fresh, dark gray, dry. Hard drilling. ▽ Static water level at 13 Feet.
15							BASALT – Alternating light and dark gray, dry.
20							
25							Dry, hard drilling.
30							BASALT – Gray, with white and orange fragments, easier drilling, damp.
35							WEATHERED BASALT – Same as above with minor clay, sand, and gravel.
40							Water yielding zone at 40 feet. BASALT – Fractured, weathered, orange and white fragments, some clays, sand and gravel.
45							BASALT – Dark gray.
50				3			

Graphic Log

1990 ECOVA Corporation

801126-A-MW1A

* Background = 0 ppm

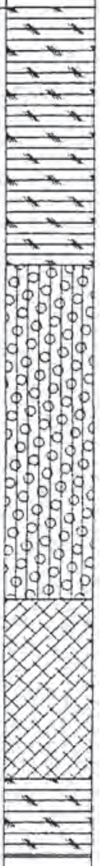
ECOVA Corporation
Well Installation Log

Well Number MW-1A
Date Drilled 5-10-90
Client Army Corps of Engineers
Site SP Site (Task 6)
Job Number 801126
Field Geologist R.M. Weber
Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 83 Feet
Water Depth 13 Feet
Coordinates 246670.5625N
2460128.4101E
Casing Elevation 2319.00
Sheet 2 of 2

General: 50 feet 6" steel casing, pressure grout.

Depth (Feet)	Blow Counts	Sample No.	Recover	Organics* Vapor (ppm)	% LEL	% O_2	Sample Description
							BASALT – Black, no water, good seal on conductor casing.
55							
							BASALT – Black, with dark gray clay, damp.
60							
							SILT AND CLAY WITH GRAVEL (GM/GC) – Black, damp.
							Color change to dark brown.
65							
							Color change to brown with increase in white and orange fragments, predominatly clay.
70							
							WEATHERED BASALT – Black-gray, with orange and white clasts, soft drilling, damp.
75							Water yielding zone at 75 feet.
							WEATHERED BASALT – Black-gray, with abundant orange and white fragments, soft drilling.
80							
							BASALT – Dark gray, hard.
							Bottom of Hole – 83 Feet
85							
90							
95							
100							

Graphic Log

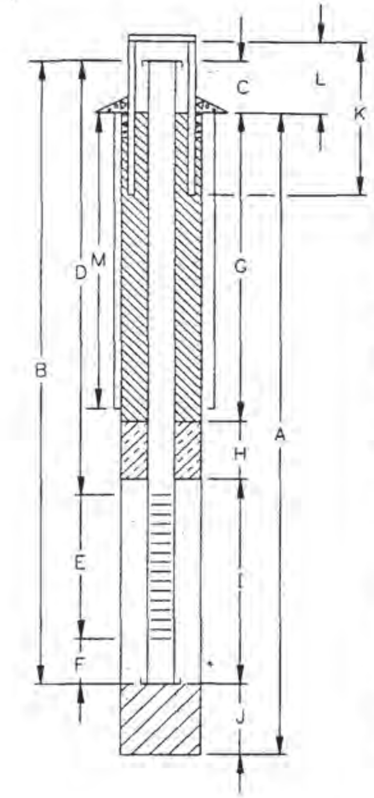


1990 ECOVA Corporation

801126-A-MW1A

* Background = ____ppm

WELL COMPLETION MW-1A



TOP OF CASING ELEVATION 2319.00'

A BORING DEPTH 83 FT.
BORING DIAMETER 6 IN.
B WELL DEPTH 79.3 FT.
C WELL STICKUP 1 FT.
D BLANK INTERVAL 66 FT.
BLANK DIAMETER 2 IN.
E SCREEN INTERVAL 65-75' FT.
SCREEN DIAMETER 2 IN.
TYPE/SLOT SIZE 0.01
F SEDIMENT TRAP 5 FT.
G ANNULAR SEAL 54 FT.
MATERIAL: GROUT
H. BENTONITE SEAL 6 FT.
I SANDPACK 18 FT.
TYPE/SIZE: 20/40
J BOTOM SEAL/PACK 2 FT.
MATERIAL: SAND
K WELL COVER ______ FT.
L STICKUP ______ FT.
M CONDUCTOR CASING 50 FT.

NOT TO SCALE

DRILLING TIMES:
START 0800 - 5/10/90 FINISH 1100 - 5/11/90
STANDBY or DOWN TIME:

METHOD OF DECON. PRIOR TO DRILLING:

DEVELOPMENT

METHOD OF DEVELOPMENT: DISPLACEMENT PUMPING @ 70 CYCLES/SEC

PUMP TIME 0305 TO 0500 DATE 5/17/90

TURBIDITY AFTER DEVELOPMENT: X CLEAR ______ MOD. TURBID ______ SL. TURBID ______ TURBID

ODOR IN WATER ?

WATER DISCHARGED TO: ______ GROUND SURFACE ______ STORM SEWERS 3 DRUMS ______ STORAGE TANK ______ TANK TRUCK

DEPTH OF WATER AFTER DEVELOPMENT: 6'

MATERIALS USED

4 1/2 SACKS of 20/40 SAND
7 SACKS of PORTLAND CEMENT
______ SACKS of PREMIX CONCRETE
______ GALLONS of GROUT USED
______ GROUT COMPOSITION #6 BENTONITE
1 SACKS of BENTONITE PELLETS
______ BUCKETS of BENTONITE PELLETS
______ YARDS CEMENT - SAND USED
3 CENTRALIZERS at 31, 59, AND 78.5' BGS

WELL COVER USED:
X Above Grade
______ At Grade
______ Other
X Lockable

FEB 6 1991

ECOVA Corporation

Well Installation Log

Well Number MW-1B
Date Drilled 5-8-90
Coordinates 246670.3593N
2460138.2368E
Casing Elevation 2318.63
Sheet 1 of 2

Client: Army Corps of Engineers
Site SP Site (Task 6)
Job Number 801126
Field Geologist R.M. Weber

Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 65.5 Feet
Water Depth 5 Feet

General: 6" steel casing to 5 feet.

Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	% LEL	% O_2	Sample Description
							SILTY SAND (SM) – Fine- to coarse-grained sand, brown, black basalt gravel.
5							∇ Static water level at 5 feet. BASALT – Fresh, gray, dry.
10							BASALT – Fresh, dark gray – water at 12 feet. Water yielding zone at 12 feet.
15							BASALT – Light gray, cuttings are fine and powdery, very hard, dry.
20							
25							
30							BASALT – Dark gray, softer drilling, damp.
35							
40							Water yielding zone at 30 feet. WEATHERED BASALT – Dark gray, orange, and white fragments, minor clay and sand, soft.
45							
50							

Graphic Log

* Background = 0 ppm

ECOVA Corporation
Well Installation Log

Client Army Corps of Engineers
Site SP Site (Task 6)
Job Number 801126
Field Geologist R.M. Weber

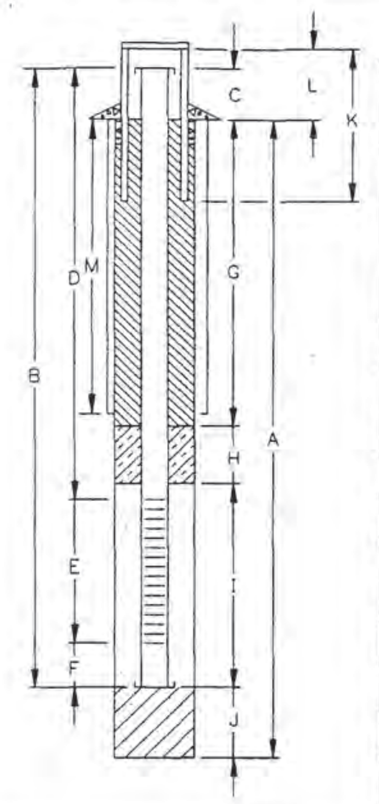
Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 65.5 Feet
Water Depth 12/39 Feet

Well Number MW-1B
Date Drilled 5-8-90
Coordinates 246670.3593N
2460138.2368E
Casing Elevation 2318.63
Sheet 2 of 2

Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	% LEL	% O_2	General: Sample Description	Graphic Log
							BASALT - Dark gray, hard.	
55								
60								
65							Bottom of Hole - 65.5 Feet	
70								
75								
80								
85								
90								
95								
100								

* Background = 0 ppm

WELL COMPLETION MW-1B



TOP OF CASING ELEVATION 2318.63 FT.

A BORING DEPTH 65.5 FT.
BORING DIAMETER 6 IN.
B WELL DEPTH 50.0 FT.
C WELL STICKUP 0.5' FT.
D BLANK INTERVAL 66 FT.
BLANK DIAMETER 2 IN.
E SCREEN INTERVAL 2.5-32.5' 35-45' FT.
SCREEN DIAMETER 2 IN.
TYPE/SLOT SIZE 0.01
F SEDIMENT TRAP 5 FT.
G ANNULAR SEAL ____ FT.
MATERIAL: GROUT
H. BENTONITE SEAL ____ FT.
I SANDPACK ____ FT.
TYPE/SIZE: 20/40
J BOTOM SEAL/PACK 2 FT.
MATERIAL: SAND
K WELL COVER ____ FT.
L STICKUP ____ FT.
M CONDUCTOR CASING ____ FT.

NOT TO SCALE

DRILLING TIMES:
START 1245 5/8/90 FINISH 1504 5/8/90
STANDBY or DOWN TIME:

METHOD OF DECON. PRIOR TO DRILLING:

DEVELOPMENT

METHOD OF DEVELOPMENT: DISPLACEMENT PUMPING 60 CYCLES/SEC

START TIME 0820 TO 0120 DATE 5/17/90

TURBIDITY AFTER DEVELOPMENT: ____ CLEAR __X__ SL. TURBID ____ MOD. TURBID ____ TURBID

ODOR IN WATER ? NONE

WATER DISCHARGED TO: ____ GROUND SURFACE ____ STORM SEWERS __X__ DRUMS ____ STORAGE TANK ____ TANK TRUCK

DEPTH OF WATER AFTER DEVELOPMENT: 6 FEET

MATERIALS USED

9.5 SACKS of 20/40 SAND
4.5 SACKS of PORTLAND CEMENT
____ SACKS of PREMIX CONCRETE
____ GALLONS of GROUT USED
____ GROUT COMPOSITION #6 BENTONITE
____ SACKS of BENTONITE PELLETS
____ BUCKETS of BENTONITE PELLETS
____ YARDS CEMENT - SAND USED
2 CENTRALIZERS at 15' AND 36' BGS

WELL COVER USED:
__x__ Above Grade
____ At Grade
____ Other
__x__ Lockable

FEB 6 1991

801126-A-MW1BW

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. R69102

(SUBMIT ONE WELL REPORT PER WELL INSTALLED) 284357

Construction/Decommission *(select one)*
☑ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number*

Type of Well *(select one)*
☑ Resource Protection
☐ Geotech Soil Boring

Consulting Firm Budinger and Associates, Inc.
Unique Ecology Well ID Tag No. ALR 119 (MW-1)

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☑ Driller ☐ Engineer ☐ Trainee Name (Print) Ethan Hageman
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 2853

If trainee, licensed driller's Signature and License No. 2853

Property Owner Spokane International Airport
Site Address
City Airway Heights County Spokane
Location NE 1/4-1/4 SW 1/4 Sec 28 Twn 25 R 42 Select One ☒ EWM ☐ WWM
Lat/Long (s, t, r still REQUIRED) Lat Deg 47 Lat Min/Sec 38' 5.6"
Long Deg 117 Long Min/Sec 30' 27.7"
Tax Parcel No.
Cased or Uncased Diameter 8" Static Level 12.2'
Work/Decommission Start Date 11/8/07
Work/Decommission Completed Date 11/26/07

Construction/Design	Well Data	Formation Description
	Monument: 6" dia., 6' long steel set in concrete to 3' below grade with locking lid and bollards	Road Fill: Gravel and Sand with Cobbles
	Riser: 2" schedule 40 pvc set to 8.5' with locking expansion plug	Sand with Silt
	Screen: 2" schedule 40 pvc (0.010" slot) set from 8.5' to 14.5' with end cap	5'
	Seal: Bentonite from 3' to 6.5'	10'
	Filter pack: #20-40 silica sand from 6.5' to 14.5'	Basalt
		15'
		End of Boring @ 15'

8 JAN -2 A8:47
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FISCAL & BUDGET

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WELL DRILLING UNIT

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EASTERN REGIONAL OFFICE

SCALE: 1"=
PAGE 1 OF 1

ECY 050-12 (Rev. 2/03)

Ecology is an Equal Opportunity Employer.

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Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. R69102

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

284358

Construction/Decommission *(select one)*
☑ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well *(select one)*
☑ Resource Protection
☐ Geotech Soil Boring

Consulting Firm Budinger and Associates, Inc.
Unique Ecology Well ID Tag No. ALR 120 (MW-2)

Property Owner Spokane International Airport
Site Address ______
City Airway Heights County Spokane
Location NE 1/4-1/4 SW 1/4 Sec 28 Twn 25 R 42 Select One ☒ EWM ☐ WWM
Lat/Long (s, t, r still REQUIRED) Lat Deg 47 Lat Min/Sec 38' 8.3"
Long Deg 117 Long Min/Sec 30' 28.5"
Tax Parcel No. ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☑ Driller ☐ Engineer ☐ Trainee Name (Print) Ethan Hagerman
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 2853

If trainee, licensed driller's ______
Signature and License No. 2853

Cased or Uncased Diameter 8" Static Level 12.5'
Work/Decommission Start Date 11/8/07
Work/Decommission Completed Date 11/26/07

Construction/Design	Well Data	Formation Description
	Monument: 6" dia., 6' long steel set in concrete to 3' below grade with locking lid and bollards Riser: 2" schedule 40 pvc set to 9.5' with locking expansion plug Screen: 2" schedule 40 pvc (0.010" slot) set from 9.5' to 14.7' with end cap Seal: Bentonite from 3' to 7' Filter pack: #20-40 silica sand from 7' to 15'	Road Fill: Gravel and Sand with Cobbles Sand with Silt 5' 10' Basalt 15' End of Boring @ 15'

DEPT. OF ECOLOGY
FISCAL & BUDGET
JAN -2 A8 :48

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WELL DRILLING UNIT

SCALE: 1"= ______

PAGE 1 OF 1

ECY 050-12 (Rev. 2/03)

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RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. R69102

(SUBMIT ONE WELL REPORT PER WELL INSTALLED) 284359

Construction/Decommission *(select one)*
☑ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well *(select one)*
☑ Resource Protection
☐ Geotech Soil Boring

Consulting Firm Budinger and Associates, Inc.

Unique Ecology Well ID Tag No. ALR 121 (MW-3)

Property Owner Spokane International Airport

Site Address ______

City Airway Heights County Spokane

Location SE 1/4-1/4 NW 1/4 Sec 28 Twn 25 R 42 Select One ☒ EWM ☐ WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☑ Driller ☐ Engineer ☐ Trainee Name (Print) Ethan Hageman

Driller/Engineer /Trainee Signature

Driller or Trainee License No. 2853

If trainee, licensed driller's Signature and License No. 2853

Lat/Long (s, t, r still REQUIRED) Lat Deg 47 Lat Min/Sec 38' 11.5"

Long Deg 117 Long Min/Sec 30' 37.8"

Tax Parcel No. ______

Cased or Uncased Diameter 8" Static Level 7.5'

Work/Decommission Start Date 11/8/07

Work/Decommission Completed Date 11/26/07

Construction/Design	Well Data	Formation Description	
	Monument: 6" dia., 6' long steel set in concrete to 3' below grade with locking lid and bollards Riser: 2" schedule 40 pvc set to 6.5' with locking expansion plug Screen: 2" schedule 40 pvc (0.010" slot) set from 6.5' to 8.4' with end cap Seal: Bentonite from 3' to 4.5' Filter pack: #20-40 silica sand from 4.5' to 8.5'	Silt with Sand Sand with Silt Basalt End of Boring @ 8.5'	5' 10' 15'

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SCALE: 1"= ______ PAGE 1 OF 1

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RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. R69102

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

284360

Construction/Decommission *(select one)*
☑ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well *(select one)*
☑ Resource Protection
☐ Geotech Soil Boring

Consulting Firm Budinger and Associates, Inc.

Unique Ecology Well ID Tag No. ALR 122 (MW-4)

Property Owner Spokane International Airport
Site Address ______
City Airway Heights County Spokane
Location SE 1/4-1/4 NW 1/4 Sec 28 Twn 25 R 42 Select One ☒ EWM ☐ WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☑ Driller ☐ Engineer ☐ Trainee Name (Print) Ethan Hageman
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 2853

If trainee, licensed driller's Signature and License No. 2853

Lat/Long (s, t, r still REQUIRED) Lat Deg 47 Lat Min/Sec 38' 12.4"
Long Deg 117 Long Min/Sec 30' 34.6"
Tax Parcel No. ______
Cased or Uncased Diameter 8" Static Level 8'
Work/Decommission Start Date 11/8/07
Work/Decommission Completed Date 11/26/07

Construction/Design	Well Data	Formation Description
	Monument: 6" dia., 6' long steel set in concrete to 3' below grade with locking lid and bollards Riser: 2" schedule 40 pvc set to 7.5' with locking expansion plug Screen: 2" schedule 40 pvc (0.010" slot) set from 7.5' to 12.4' with end cap Seal: Bentonite from 3' to 5.5' Filter pack: #20-40 silica sand from 5.5' to 12.5'	Silt with Sand Sand with Silt 5' 10' Basalt End of Boring @ 12.5' 15'

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ECY 050-12 (Rev. 2/03)

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Project: SIA Stormwater	**BORING NO. MW-5**
Project Location: North end of Runway 21	
Project Number: 36310018	Sheet 1 of 1

Location: N 47° 38' 8.2" W 117° 30' 6.6"	Date(s) Drilled	27-May-09	Logged By	J. Sugalski
	Drill Bit Size/ Type	Air Rotary	Total Borehole Depth	20
	Drilling Contractor	Budinger	Drill Rig Type	Mobile B57
	Sampling Method(s)	SPT	Hammer Data	120 # Auto
	Level/ Date Measured	5ft	Surface Elevation	Approx 2292

Elevation (ft)	Depth (ft)	SAMPLES				Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
		Type	ID	Blows/ft	OVM (ppm)				
	0						OL	Top Soil	
							SM	Light Brown SILT with some SAND	
	1						■		
							■		
	2						SW	Light brown medium to fine grain SAND with SILT. Moist	
							■		
	3						■		
							■		
	4						■		
							■		
	5	■		4			■		Water @ 5 ft
		■		5			■		
	6	■		6			SP	Olive gray medium grain clean SAND, obtained sample	
		■		8			■		
	7						■		
							■		
	8						■		
							■		
	9						GP	Coarse GRAVEL or begin bedrock	
							■		
	10	■		50+			■	No recovery	3" sampler could
							■		not penetrate
	11						■		
							■		
	12						■		
							■		
	13						BR	Basalt rock strong, difficult drilling	
							■		
	14						■		
							■		
	15	■		50+			■	No recovery	
							■		
	16						■		
							■		
	17						■	Highly fractured weathered bedrock	
							■		
	18						■	Well screened from 5 to 20ft. Sand from 4 to 20ft. Bentonite from	
							■	3 to 4ft	End boring at 20'
	19						■		Well Installed
							■		

P:\36310018 SIA Stormwater 09\Working\Additional Well Installation\MW-5 Installation.xls(Soil Boring Log)
7/23/2009

Project: SIA Stormwater	**BORING NO. MW-6**
Project Location: North end of Runway 21	
Project Number: 36310018	Sheet 1 of 1

Location: N 47° 38' 13.8" W 117° 30' 13.5"	Date(s) Drilled	27-May-09	Logged By	J. Sugiaki
	Drill Bit Size/ Type	Air Rotary	Total Borehole Depth	20
	Drilling Contractor	Budinger	Drill Rig Type	Mobile B57
	Sampling Method(s)	SPT	Hammer Data	120 # Auto
	Level/ Date Measured	9.5 ft	Surface Elevation	Approx 2300

Elevation (ft)	Depth (ft)	SAMPLES				Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
		Type	ID	Blows/6"	OVM (ppm)				
	0						OL	Top Soil	
							SM	Brown SILT with some sand	
	1						■		
							■		
	2						■		
							■		
	3						■		
							■		
	4						■		
		■		X			SC	Light Brown clayey silty and SAND	
	5	■		X			■	Sampled from 4.5 to 6.5ft	
		■		X			■		
	6	■		X			■		
							■		
	7						SP	Olive Gray medium clean SAND	
							■		
	8						■		
							■		
	9	■		3			■	Obtained sample	
		■		4			■		Water @ 9.5 ft
	10	■		4			■		
							■		
	11						■		
							■		
	12						■		
							■		
	13						■		
							■		
	14						■		
							■		
	15						■		
		■		4			■		
	16	■		11			■	Obtained sample	
		■		14			■		
	17						GW	Medium fine SAND and GRAVEL	
							■		
	18						■		
							BR	Competent Bed Rock encountered at 18.5ft, very difficult drilling	End boring at 20'
	19						■	Well screened from 5 to 20ft. Sand from 4 to 20 ft. Bentonite from 3 to	Well Installed
							■	4ft	

URS

Y:\36310018 SIA Stormwater IS\Working\Additional Well Installation\MW-6 installation.xls(Soil Boring Log)
7/23/2009

Project: SIA Stormwater	**BORING NO. MW-7**
Project Location: North end of Runway 21	
Project Number: 36310018	Sheet 1 of 1

Location:				
N 47° 38' 7.9"	Date(s) Drilled	27-May-09	Logged By	J. Sugalski
W 117° 30' 59.7"	Drill Bit Size/ Type	Air Rotary	Total Borehole Depth	20
	Drilling Contractor	Budinger	Drill Rig Type	Mobile B57
	Sampling Method(s)	SPT	Hammer Data	120 # Auto
	Level/ Date Measured	13.5 ft	Surface Elevation	

Elevation (ft)	Depth (ft)	SAMPLES				Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
		Type	ID	Blows/ft	OVM (ppm)				
	0						SW	Light Brown SAND with trace SILT and some GRAVEL, dry	
	1								
	2								
	3								Difficult to drill
	4						BR	Gray highly fractured basalt bedrock, dry	
		■		50+					
	5								No Recovery
	6								
	7								
	8								Drilling eases
	9	■		50+					No Recovery
	10								
	11								
	12						BR	Silty Black weathered bedrock with some sand	
	13								
									Water @ 13.5 ft
	14								
	15								
		■		50+					No Recovery
	16								
	17								
	18								
									End boring at 19'
	19							Well screened from 5 to 19ft. Sand from 4 to 20 ft. Bentonite from 3 to 4ft	Well Installed

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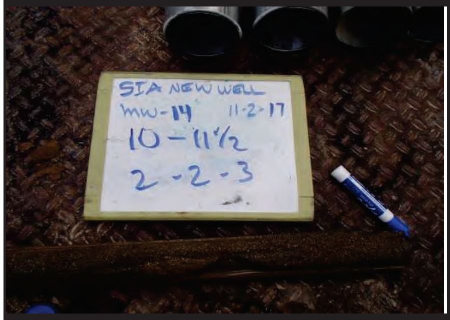
P:\36310018 SIA Stormwater\09Working\Additional Well Installation\MW-7 Installation.xls(Soil Boring Log)
7/23/2009

AECOM

AECOM Project Number: 60557313	**Spokane International Airports, New Wells PFOA-PFOS Assessment**
Boring Number: MW-13	**Well Tag: BKP-258**
Equipment Type/ model #: Mobile G-2400	**Location NAD 83** 47.6355 N, -117.4977 W
Auger type/diameter: 8-inch Hollow Stem	
Contractor: Geologic Drill, LLC	
Sampling method: 2-inch SPT	**Sheet 1 of 1**
Hammer Weight: 140 Lbs	**Above-Grade Monument**
Free Fall: 30"	
Location of Boring: Approx. 185 feet W of east property line.	**Time** 830
Surface conditions/ Topsoil Depth: Grass-covered hillside.	**Date** 11/2/17

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
2-2-6	100%	0		SM	Brown silty SAND with occasional gravel. Loose, Moist. With organics.
		1			
		2			
		3			
		4			
5-6-6	100%	5		SM	Brown silty SAND, Medium-dense, Moist.
		6		GM	Brown, silty GRAVEL with sand, Medium-dense, Wet.
		7			
		8			
		9		SP	Grey- brown SAND with trace silt, Medium-dense, Wet.
10-13-37	76%	10			
		11		RX	Basalt. Refusal at 11.5 feet bgs.
		12			
		13			Well constructed with 6-feet of 20-slot screen.
		14			
		15			
		16			
		17			
		18			
		19			
		20			
		21			Boring Completed at 11.5 feet BGS. Groundwater encountered at 6.8 feet bgs.

AECOM



AECOM Project Number: 60557313	**Spokane International Airports, New Wells PFOA-PFOS Assessment**	**Boring Number:** MW-14 Well Tag: BKP-259
Equipment Type/ model #: Mobile G-2400		**Location NAD 83** 47.6385 N, -117.4981 W
Auger type/diameter: 8-inch Hollow Stem		
Contractor: Geologic Drill, LLC		
Sampling method: 2-inch SPT		**Sheet 1 of 1**
Hammer Weight: 140 Lbs		**Above-Grade Monument**
Free Fall: 30"		
Location of Boring: Approx. 300 feet W of east property line.		**Time** 1330
Surface conditions/ Topsoil Depth: Grass-covered.		
		Date 11/2/17

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
2-2-4		0		**SM**	**Brown silty SAND with occasional gravel. Loose, Moist. With organics.**
		1			
		2			
		3			
		4			
3-4-5		5		**SP**	**Grey- brown SAND with trace silt, Loose, Moist.**
		6			
		7			
		8			
		9			
2-2-3		10		**SP**	**Grey- brown SAND, Loose, Wet.**
		11			
		12			
		13			
		14			
2-2-5		15		**SP**	**Grey- brown SAND, Loose, Wet.**
		16			**Heaving sands-lost approximately 2-feet of boring. Boring terminated, well set.**
		17			
		18			
		19			**Completed well depth is 14.5- feet bgs.**
		20			**Well constructed with 10-feet of 20-slot screen.**
		21			**Boring Completed at 16.5-feet BGS. Groundwater encountered at 7.0 feet bgs.**

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. RE 10445

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *(select one)*
☒ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Type of Well *(select one)*
☒ Resource Protection
☐ Geotech Soil Boring

Consulting Firm URS

Unique Ecology Well ID Tag No. BHW-566 MW 321

Property Owner Spokane International Airport

Site Address South Spotted Rd

City Spokane County Spokane

Location SW1/4-1/4 NE1/4 Sec 28 Twn 25N R 42 Select One ☒ EWM ☐ WWM

Lat/Long (s, t, r still REQUIRED) Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Randall E Wilder

Driller/Engineer /Trainee Signature RWE

Driller or Trainee License No. 2578

If trainee, licensed driller's Signature and License No. ______

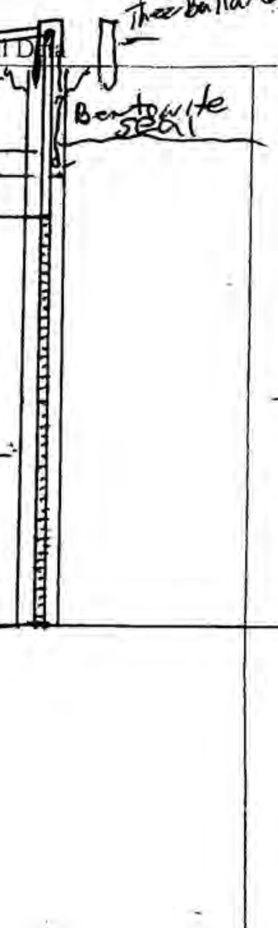
Tax Parcel No. 25285.9011

Cased or Uncased Diameter ______ Static Level 8

Work/Decommission [✓ Start Date] 9-9-14

Work/Decommission [✓ Completed Date] 9-9-14

Construction/Design | Well Data | Formation Description



6" Above Ground monument
2" locking cap
2' of concrete
5' 2" sch 40 PVC Riser
Top of sand pack
Top of 10' of 2" sch 40 PVC 010 screen
6" Borehole
2" Threaded Bottom cap

Silty Gravel

8

Basalt

15'

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OCT 10 2014
Department of Ecology
Eastern Regional Office

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ECY 050-12 (Rev. 2/03) SCALE: 1"= __ Page __ of __ Ecology is an Equal Opportunity Employer

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RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. RE 10445

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *(select one)*
☒ Construction
☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Consulting Firm URS

Unique Ecology Well ID Tag No. BHW-565 MW-A

Type of Well *(select one)*
☒ Resource Protection
☐ Geotech Soil Boring

Property Owner Spokane International Airport

Site Address South Spotted Rd

City Spokane County Spokane

Location SW1/4-1/4 NE1/4 Sec 28 Twn25NR 42 Select One ☒ EWM ☐ WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Randall E Wilder

Driller/Engineer/Trainee Signature REW

Driller or Trainee License No. 2578

If trainee, licensed driller's Signature and License No. ______

Lat/Long (s, t, r still REQUIRED) Lat Deg ______ Lat Min/Sec ______
Long Deg ______ Long Min/Sec ______

Tax Parcel No. 25285.9011

Cased or Uncased Diameter ______ Static Level 8

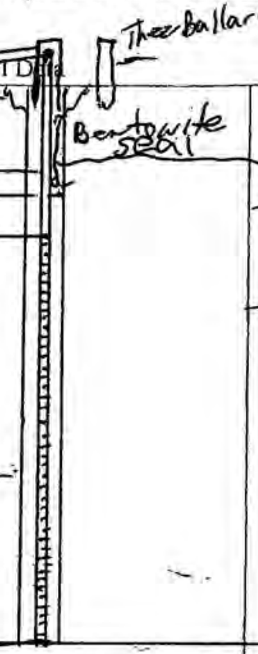
Work/Decommission Start Date 9-9-14

Work/Decommission Completed Date 9-9-14

Construction/Design

6" Above Ground monument
2" locking cap
2' of concrete
5' 2" sch 40 PVC Riser
Top of sand pack
Top of 10' of 2" sch 40 PVC 010 screen
6" Borehole
2" Threaded Bottom cap

Well Data



Formation Description

Silt
4
Silty Gravel
6
Clay
15'

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Department of Ecology
Eastern Regional Office

SES Project Number: 0270-001

Spokane International Airports, New Wells PFOA-PFOS Assessment

Boring Number: MW-15 Well Tag: BKP-260

Equipment Type/ model #: Mobile G-2400

Location NAD 83 47.622229 N, -117.552446 W

Auger type/diameter: 8-inch Hollow Stem

Contractor: Geologic Drill, LLC

Sampling method: 2-inch SPT

Sheet 1 of 1

Hammer Weight: 140 Lbs

Free Fall: 30"

Above-Grade Monument

Location of Boring: West of SE Ammo Storage Road.

Time 800

Surface conditions/ Topsoil Depth: Grass-covered.

Date 7/31/18

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
2-2-4	80%	0		GM	Brown silty GRAVEL with sand. Loose, Dry. With organics.
		1			
		2			
		3			
		4			
3-10-9	50%	5		GP	Grey- brown GRAVEL with trace silt, Loose, Moist.
		6			
		7			
		8			
		9			
6-10-9	50%	10		GP	Grey- brown GRAVEL with trace silt, Loose, Wet.
		11			
		12			
		13			
		14			
		15			
		16			
		17			
		18			
		19			Completed well depth is 12.0- feet bgs.
		20			Well constructed with 5-feet of 20-slot screen.
		21			Boring Completed at 12-feet BGS. Groundwater encountered at 10.0 feet bgs.

SES Project Number:
0270-001

Spokane International Airports, New Wells PFOA-PFOS Assessment

Boring Number:
MW-16 Well Tag: BKP-263

Equipment Type/ model #: Mobile G-2400

Location NAD 83
47.611527 N,
-117.558968 W

Auger type/diameter: 8-inch Hollow Stem

Contractor: Geologic Drill, LLC

Sampling method: 2-inch SPT

Sheet 1 of 1

Hammer Weight: 140 Lbs

Free Fall: 30"

Above-Grade Monument

Location of Boring: East of S. Center Road.

Time 700

Surface conditions/ Topsoil Depth: Grass-covered.

Date 7/30/18

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
2-3-2	8%	0	▨	SM	Brown silty SAND with occasional gravel. Loose, Moist. With organics.
		1	▨		
		2	▨		
		3	▨		
		4	▨		
6-7-7	8%	5	▨	SM	Grey- brown SAND with trace silt, Loose, Moist.
		6	▨		
		7	▨		
50/0	0%	8	▨	RX	Refusal on Basalt.
		9			
		10			
		11			
		12			
		13			
		14			
		15			
		16			
		17			
		18			
		19			Completed well depth is 8.5- feet bgs.
		20			Well constructed with 2.5-feet of 20-slot screen.
		21			Boring Completed at 8.5-feet BGS. Groundwater was not encountered.

SES Project Number: 0270-001	Spokane International Airports, New Wells PFOA-PFOS Assessment	Boring Number: MW-17 Well Tag: BKP-262
Equipment Type/ model #: Mobile G-2400		Location NAD 83 47.604917 N, -117.552602 W
Auger type/diameter: 8-inch Hollow Stem		
Contractor: Geologic Drill, LLC		
Sampling method: 2-inch SPT		Sheet 1 of 1
Hammer Weight: 140 Lbs		Above-Grade Monument
Free Fall: 30"		
Location of Boring: South of W. Electric Avenue.		Time 1000
Surface conditions/ Topsoil Depth: Grass-covered.		
		Date 7/30/18

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
		0		SM	Brown silty SAND with occasional gravel. Loose, Moist. With organics.
		1			
		2			
		3			
		4			
3-3-4	80%	5		SP	Grey- brown SAND with trace silt, Loose, Moist.
		6			
		7			
		8			
		9			
11-11-19	70%	10		SP	Grey- brown SAND with occasional gravel, Medium-dense, Moist.
		11			
		12			
		13			
		14			
15-19-26	80%	15		SP	Grey- brown SAND with occasional gravel, Medium-dense, Wet.
		16			
		17			
		18			
		19			
10-11-12	90%	20		SM	Brown silty SAND with occasional gravel. Medium-dense, Wet. Completed well depth is 25.0- feet bgs.
		21			Well constructed with 10-feet of 20-slot screen. Boring Completed at 25.0-feet BGS. Groundwater encountered at 15.5 feet bgs.

APPENDIX C

Spokane County Water Resources West Plains Hydrogeologic Database WRIA 54 Cross-Sections R-R’ through V-V’

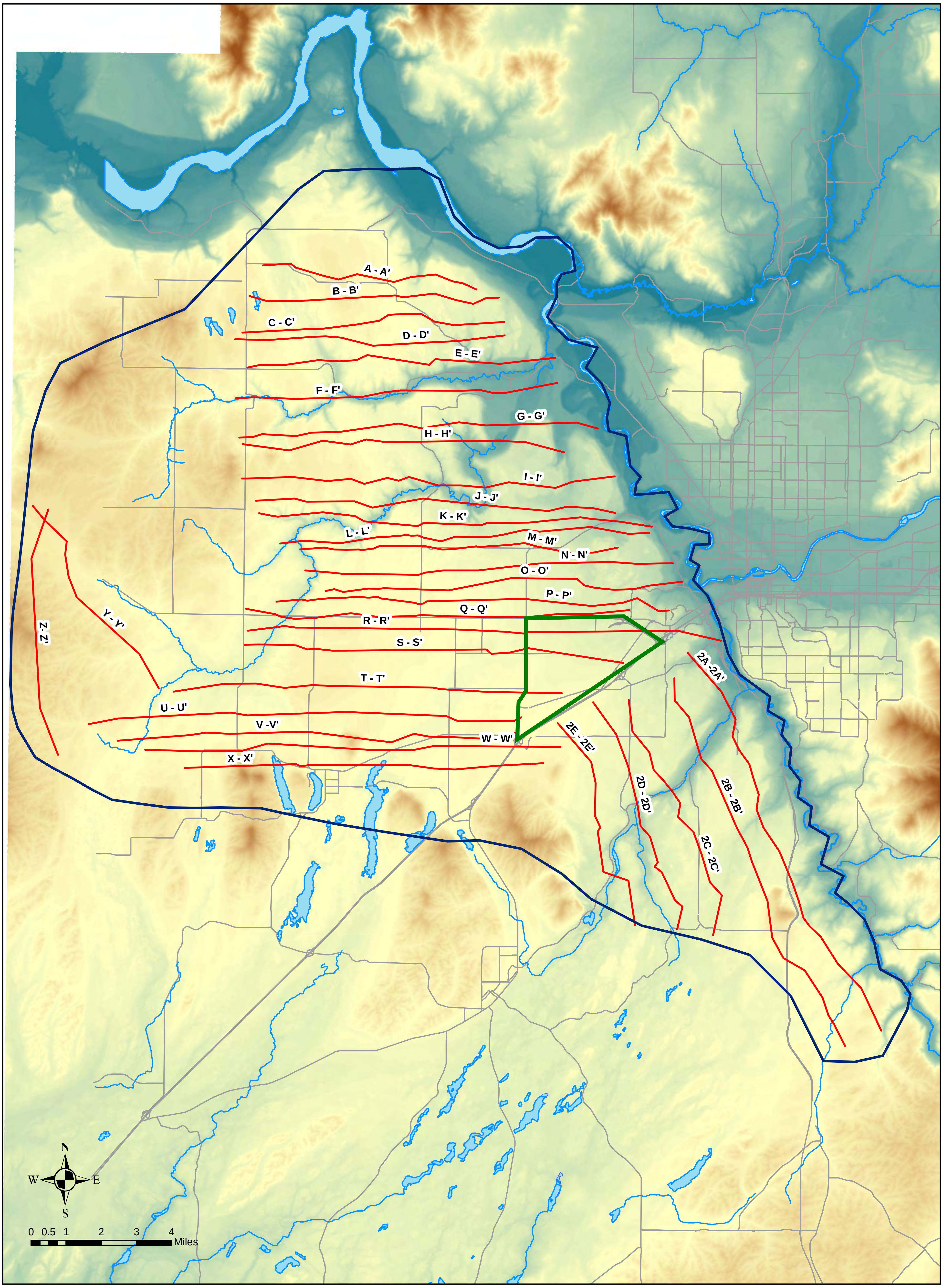


Figure 19 - Geologic Cross Section Key

Well Location with interpreted aquifer

- • basement
- • grande ronde
- ○ not identified
- ○ unconsolidated
- • wanapum

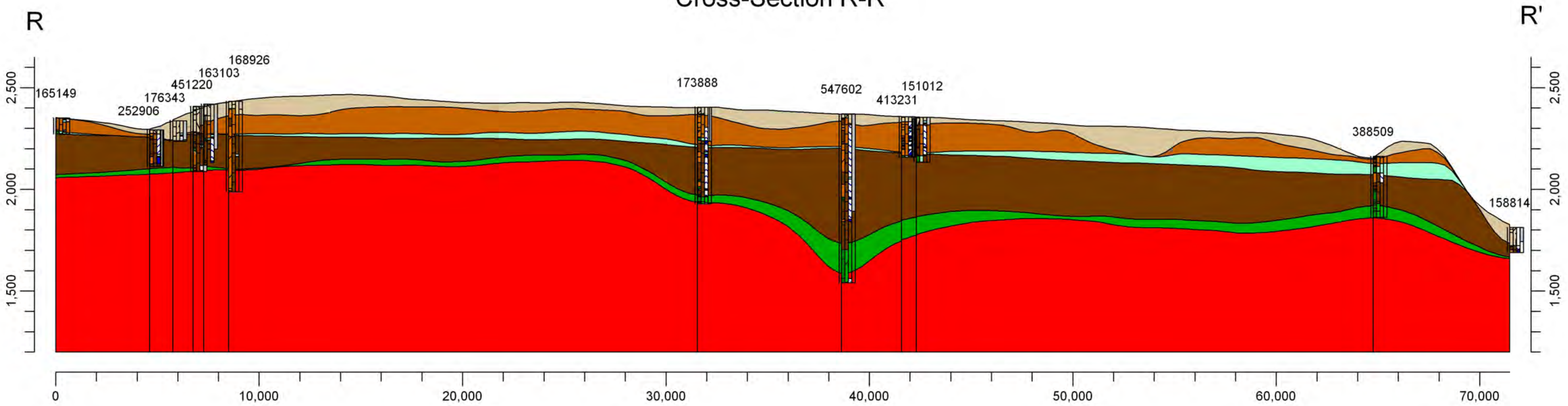
▭ Study Area

— Geologic Cross Section

SPOKANE COUNTY
WATER RESOURCES

West Plains Hydrogeologic Database
WRIA 54 Phase IV
Implementation Project

Cross-Section R-R'



Lithology Key

- ▨ 10-basalt, fractured
- ▨ 11-basalt, medium
- ▨ 12-basalt, soft or decomposed
- ▨ 13-basalt, porous or vesicular
- ▨ 14-basalt w/clay or shale
- ▨ 15-sand, interbed
- ▨ 16-clay, interbed
- ▨ 17-gravel, interbed
- ▨ 18-sand and gravel, interbed
- ▨ 19-sand, gravel, clay, interbed
- ▨ 1-soil or overburden
- ▨ 20-clay, sand, interbed
- ▨ 21-basement rock
- ▨ 2-sand, unconsolidated
- ▨ 3-gravel, unconsolidated
- ▨ 4-clay, unconsolidated
- ▨ 5-sand and gravel, unconsolidated
- ▨ 6-basalt debris, unconsolidated
- ▨ 7-sand, gravel, and clay, unconsolidated
- ▨ 8-sand and clay, unconsolidated
- ▨ 9-basalt, hard

Stratigraphy Key

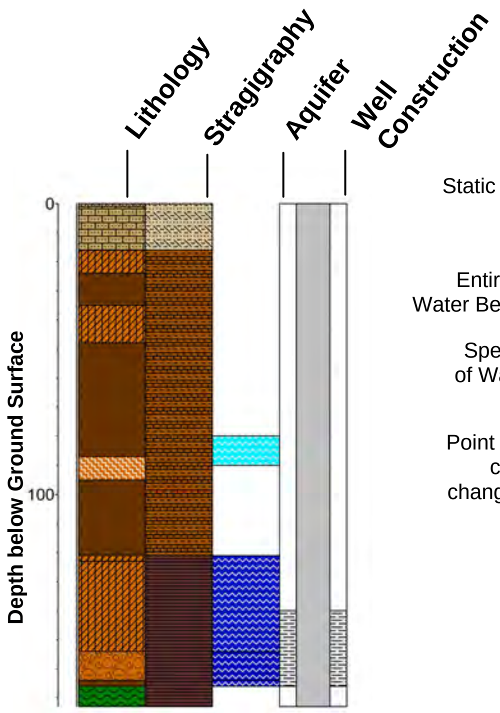
- ▨ unconsolidated
- ▨ basalt-Wanapum
- ▨ Latah I
- ▨ basalt-Grande Ronde
- ▨ Latah II
- ▨ basement

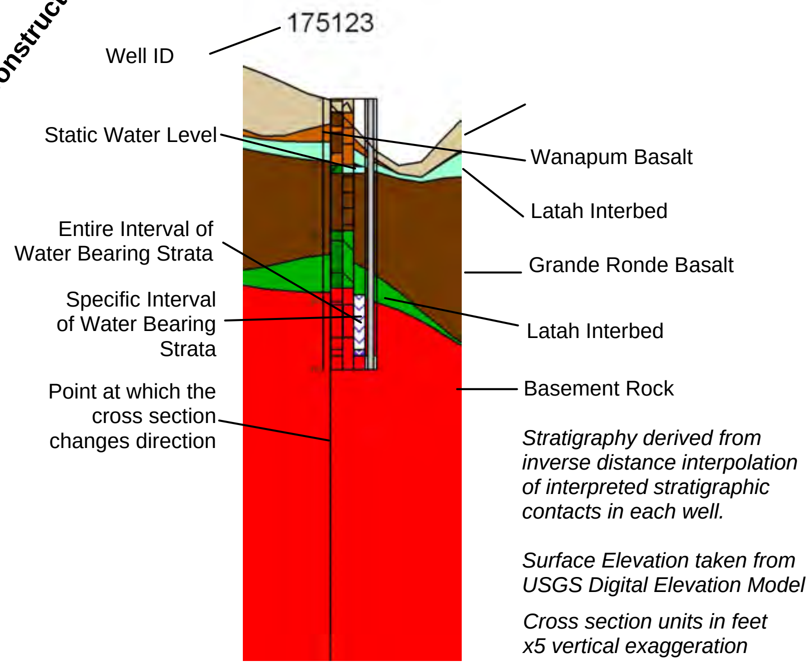
Aquifer Key

- ▨ static water level
- ▨ upper sand and gravel
- ▨ basalt
- ▨ basement

Well Construction Key

- ▨ casing
- ▨ perforations
- ▨ screen

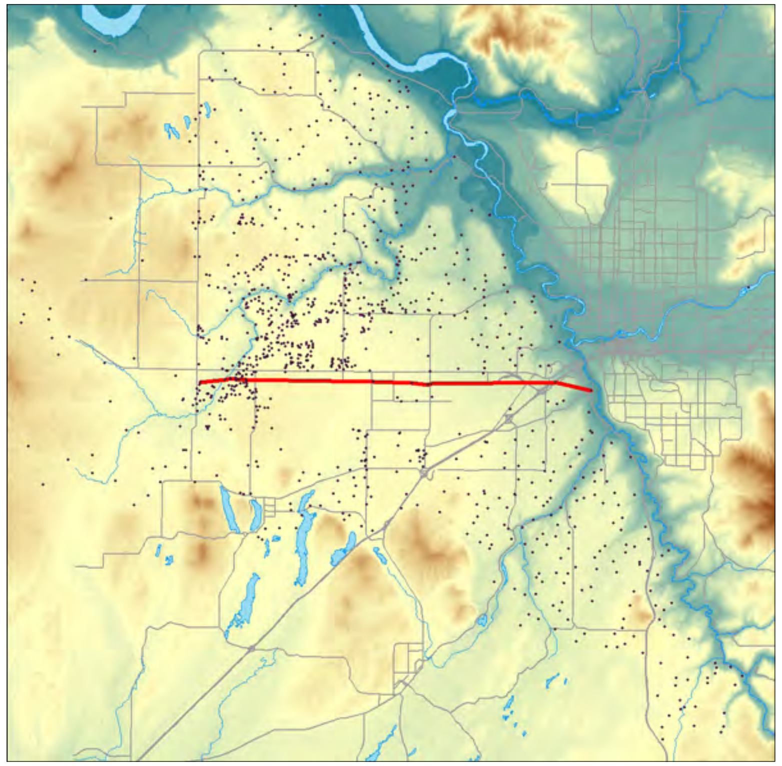




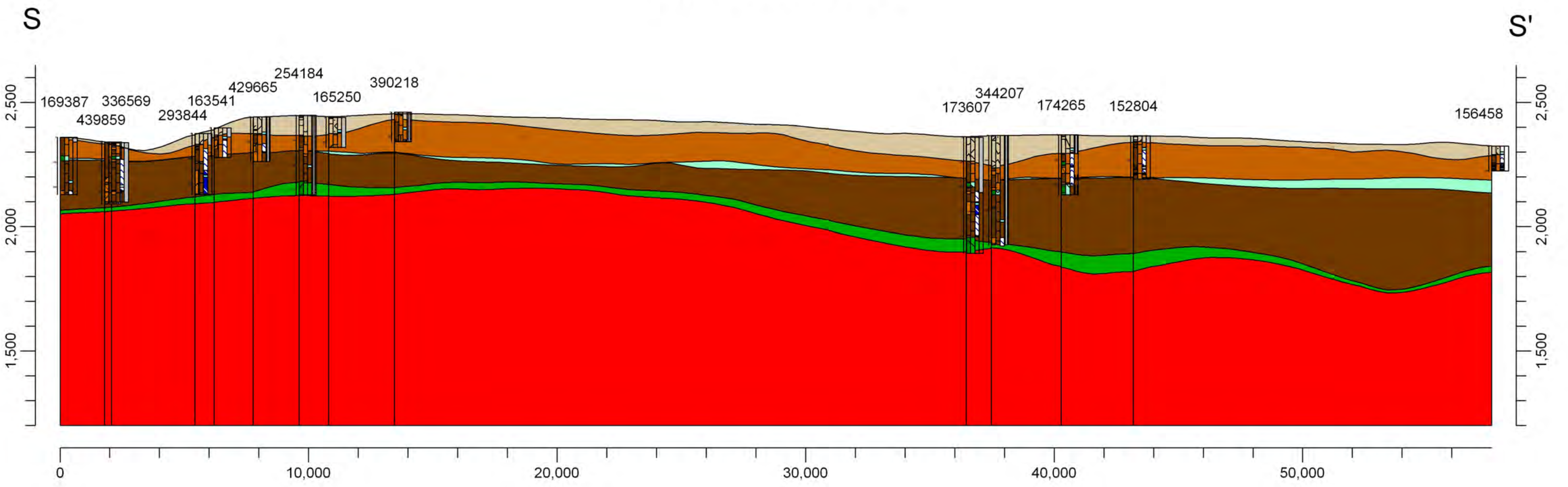
Stratigraphy derived from inverse distance interpolation of interpreted stratigraphic contacts in each well.

Surface Elevation taken from USGS Digital Elevation Model

Cross section units in feet x5 vertical exaggeration



Cross-Section S-S'



Lithology Key

- ▨ 10-basalt, fractured
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- 🟫 9-basalt, hard

Stratigraphy Key

- ⬜ unconsolidated
- 🟧 basalt-Wanapum
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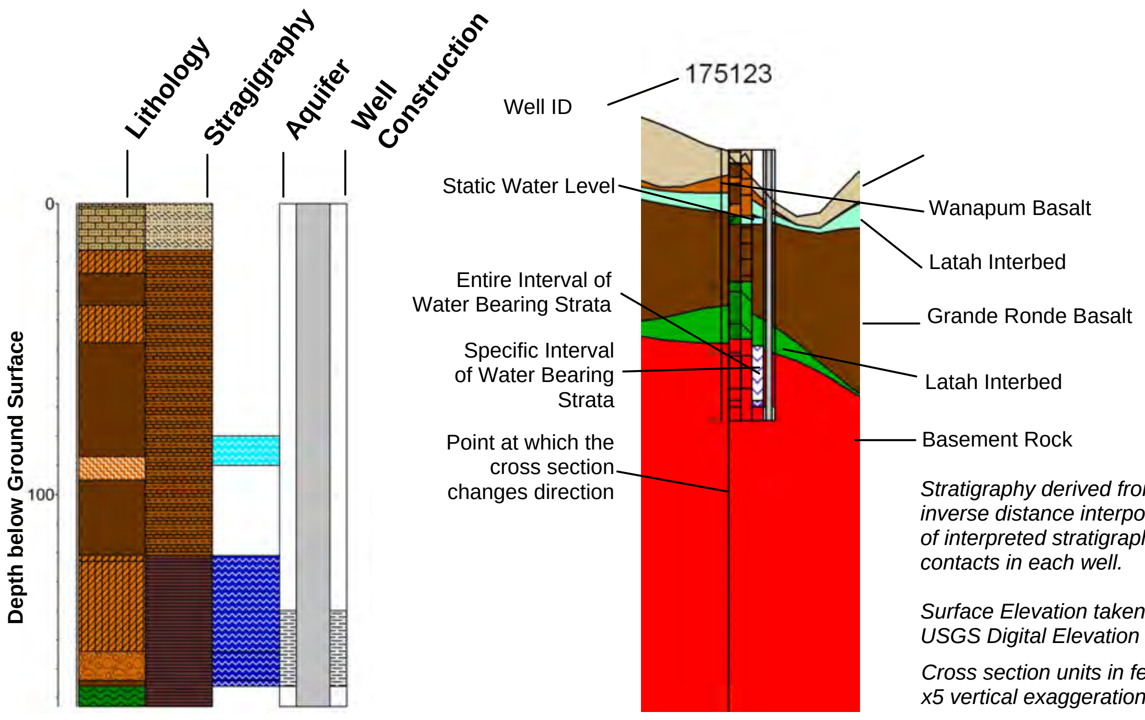
- 🟫 basalt-Grande Ronde
- 🟩 Latah II
- 🟥 basement

Aquifer Key

- 🟦 static water level
- 🟦 upper sand and gravel
- 🟦 basalt
- 🟪 basement

Well Construction Key

- ⬜ casing
- ▨ perforations
- ▨ screen



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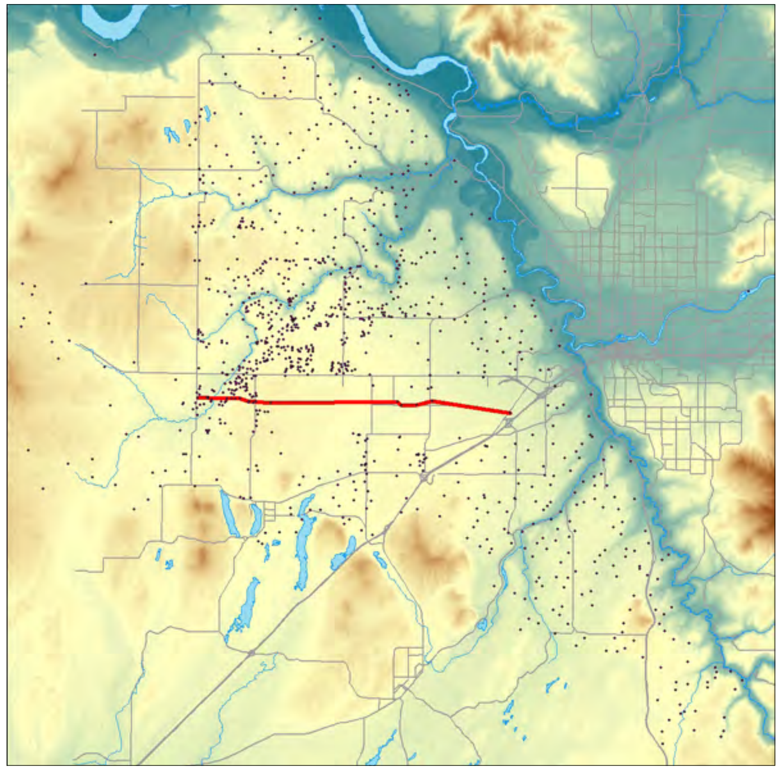
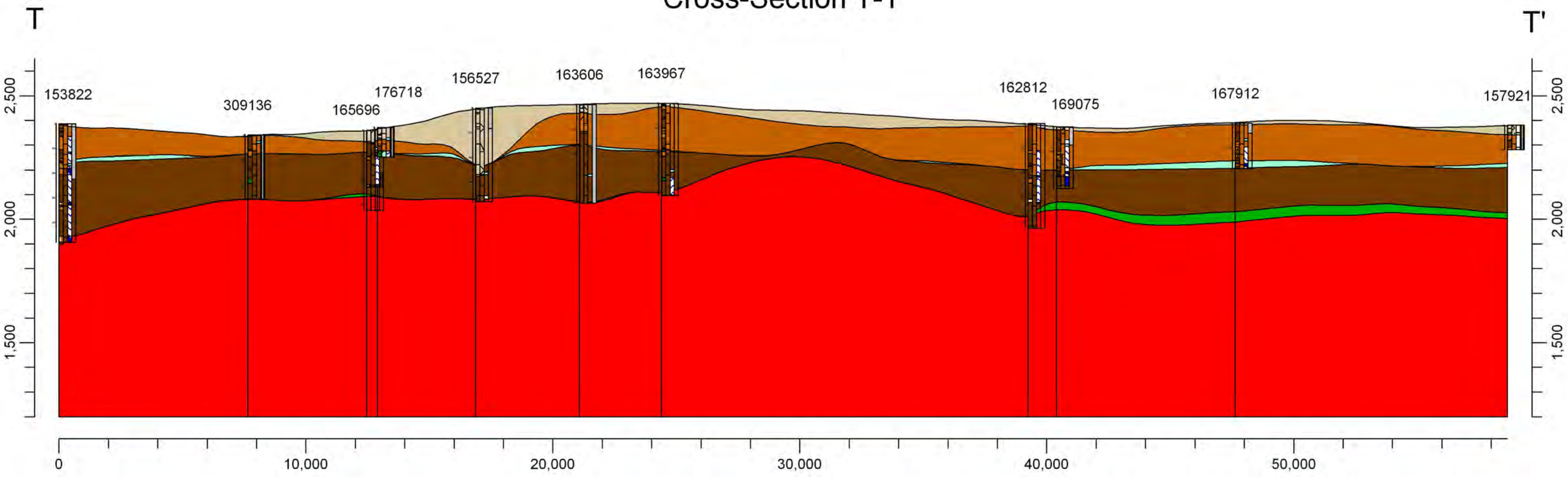


Cross-Section T-T'



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- 🟫 basalt-Grande Ronde
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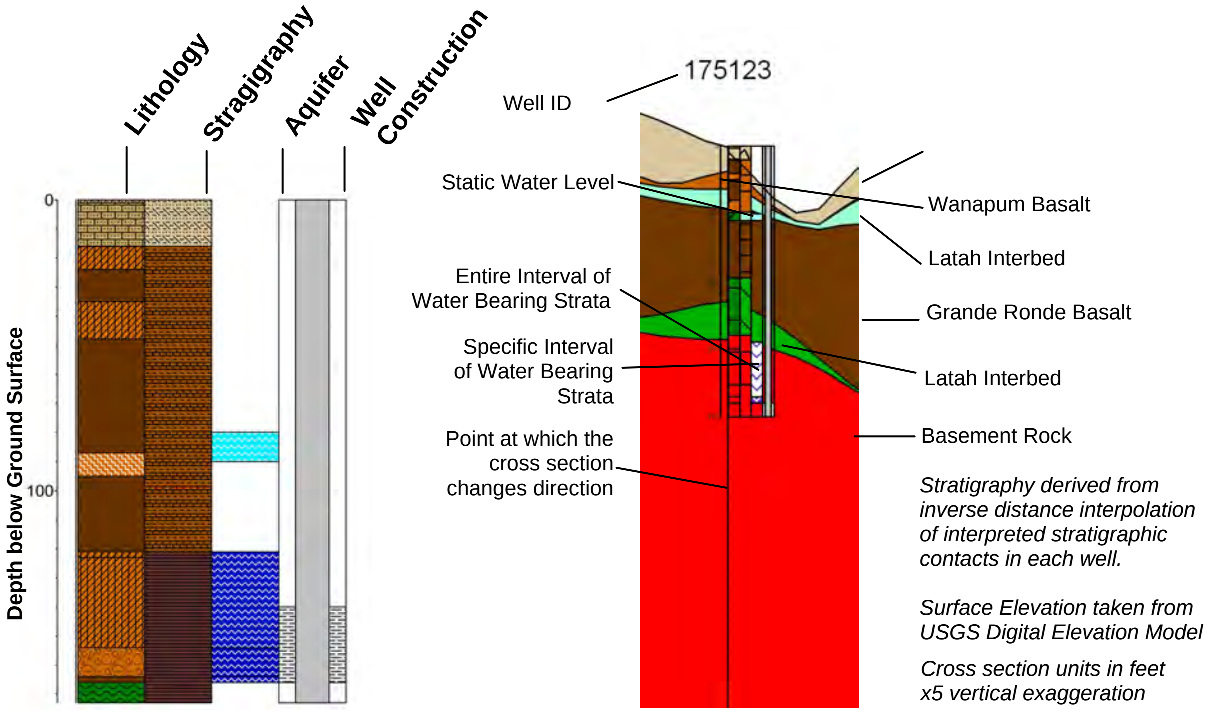
Aquifer Key

- 🟦 static water level
- 🟦 upper sand and gravel
- 🟦 basalt
- 🟪 basement

Well Construction Key

- ▨ casing
- ▨ perforations
- ▨ screen



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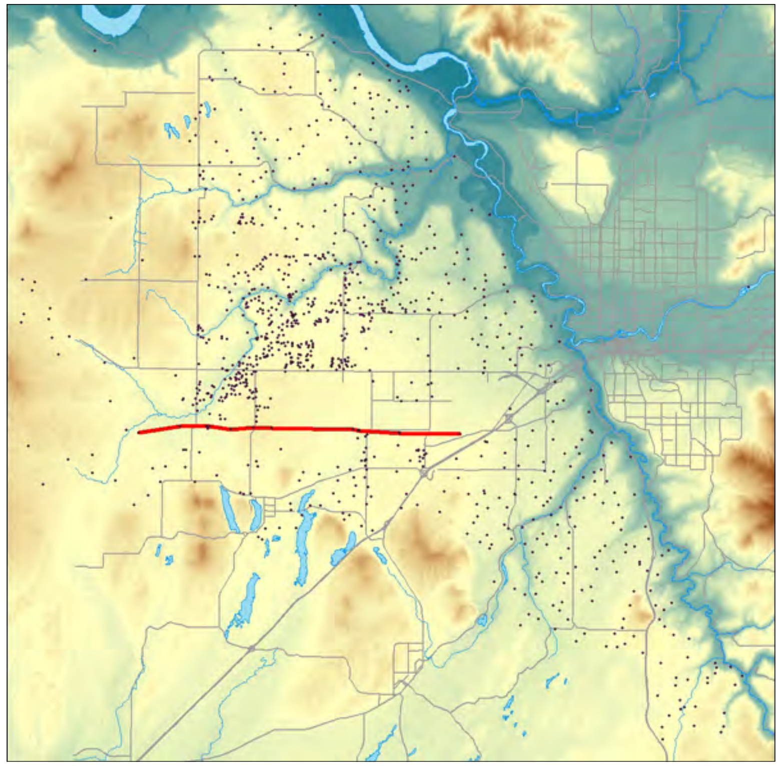
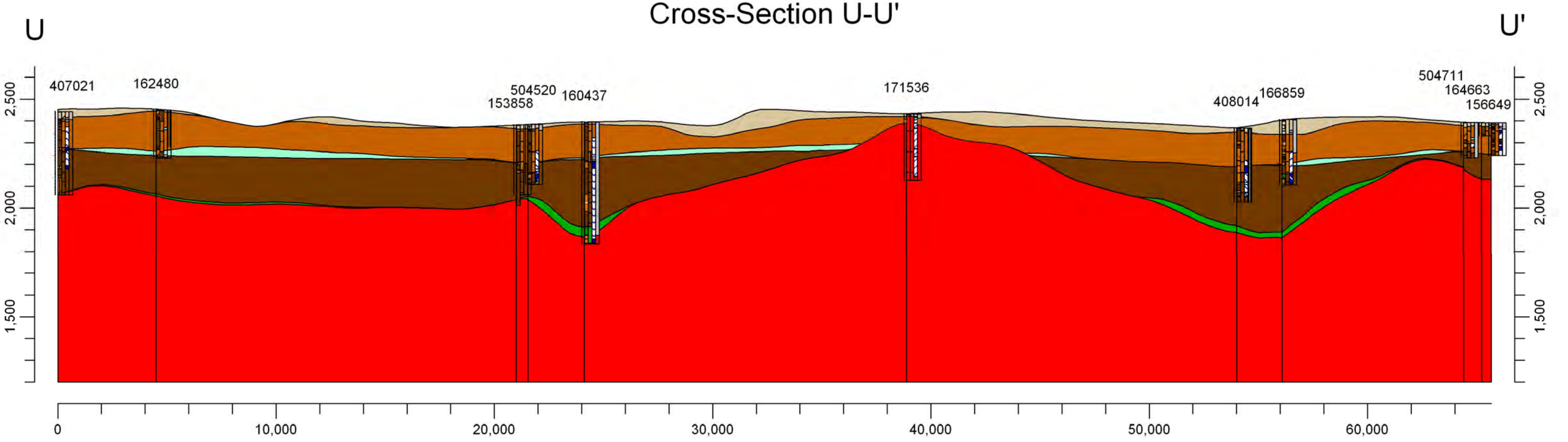
Cross section units in feet x5 vertical exaggeration



Cross-Section U-U'



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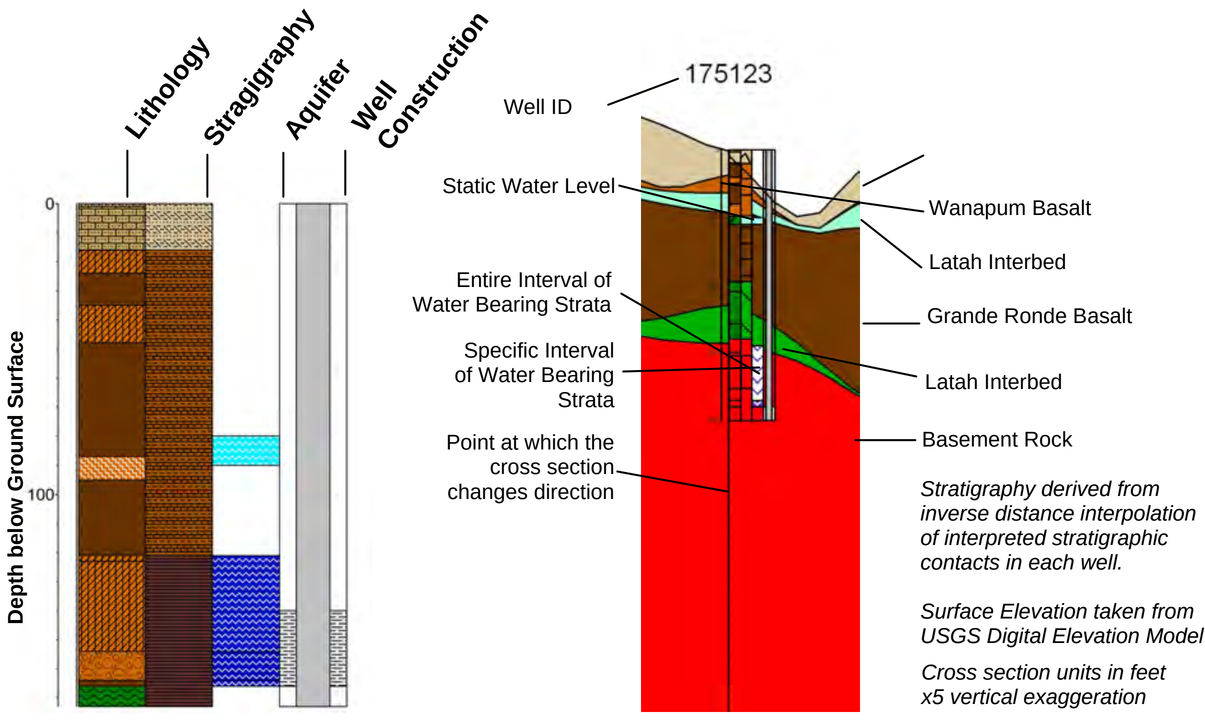
- basalt
- basement

Well Construction Key

- casing
- perforations
- screen



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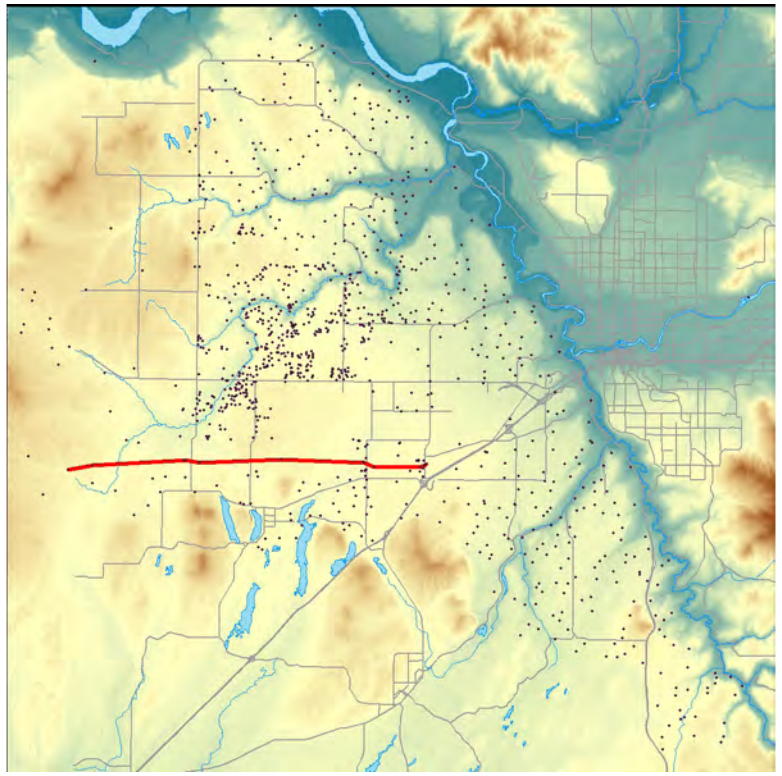
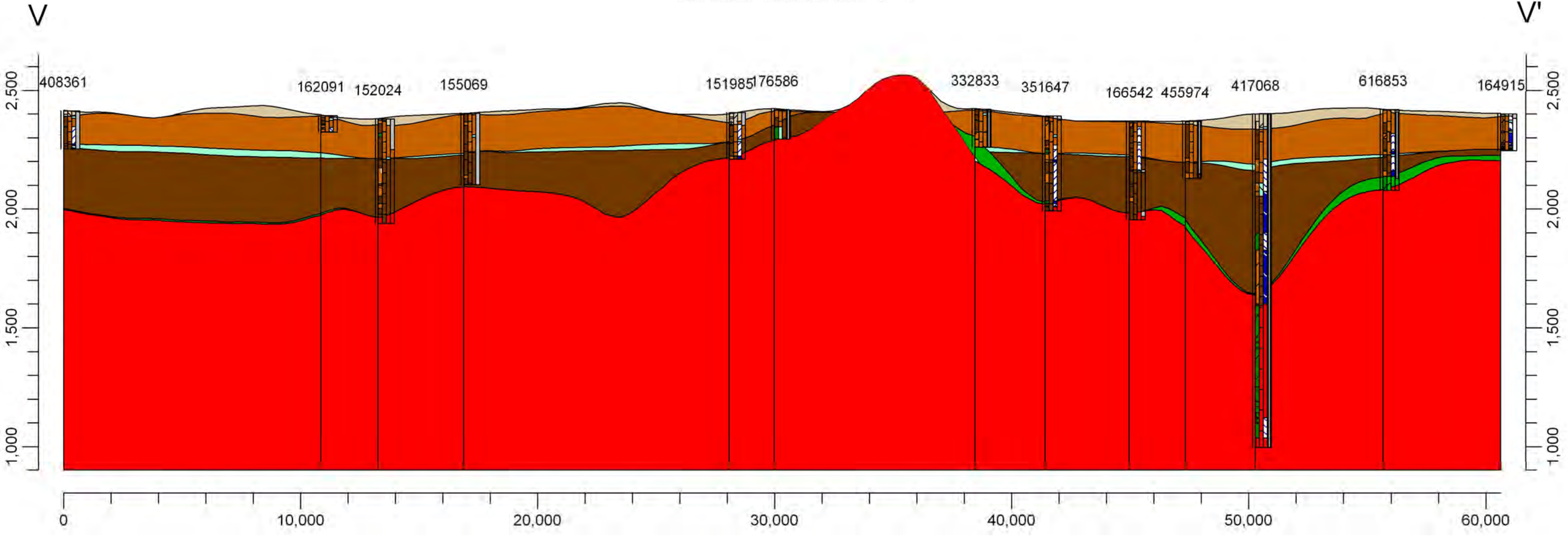


Cross-Section V-V'



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- ▨ static water level
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Well Construction Key

- ▨ casing
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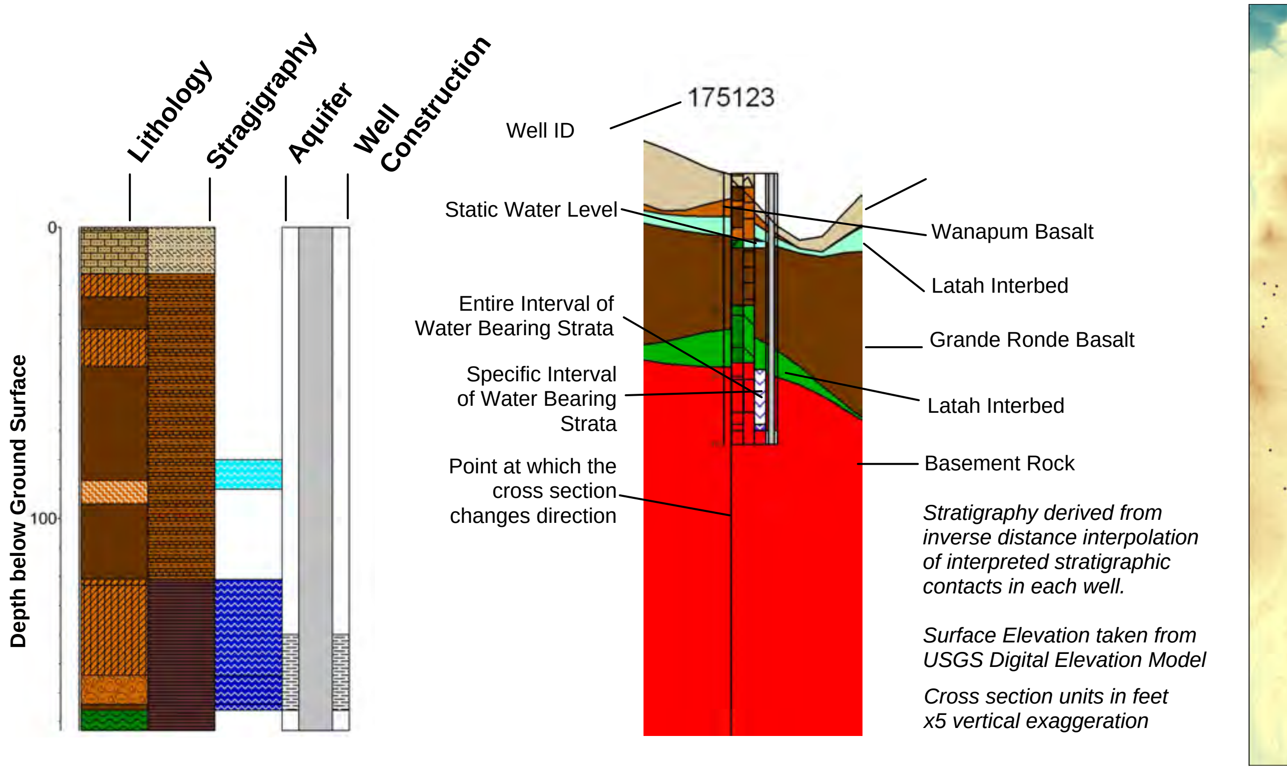
- ▨ screen



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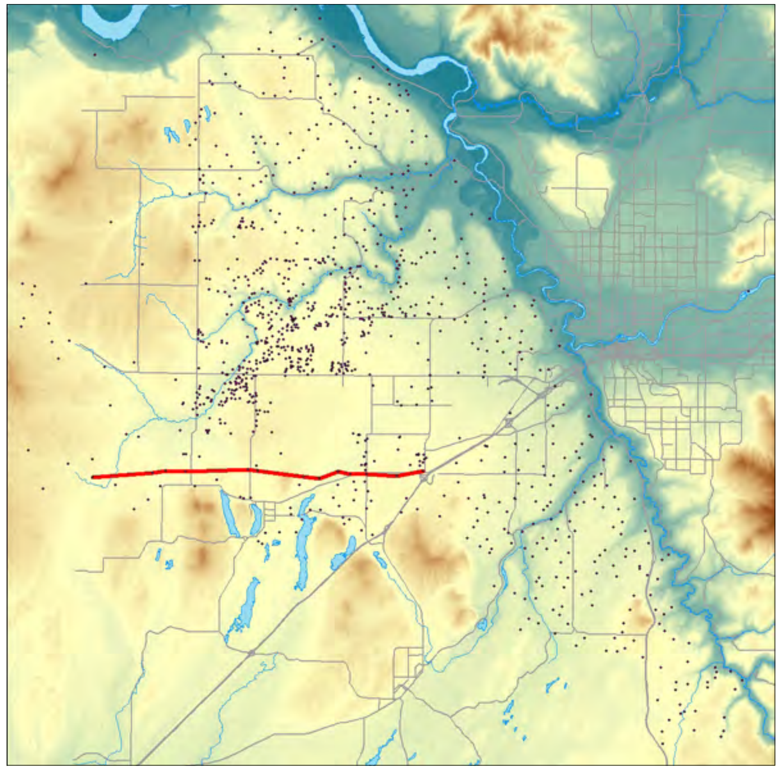
Cross section units in feet
x5 vertical exaggeration



GSI Job No.: 6892
Issued: 13 August 2024

SITE ASSESSMENT REPORT
Spokane International Airport
Spokane, WA

APPENDIX B

Historical Reports

GSI Job No.: 6892
Issued: 13 August 2024

SITE ASSESSMENT REPORT

Spokane International Airport

Spokane, WA

APPENDIX B.1

Fairchild Airforce Base, Perpetual Flowage Document (provided by Fairchild Airforce Base on 12 June 2024)

Base Tract E

FEDERAL COMMUNICATIONS COMMISSION
PERMIT TO OTHER FEDERAL GOVERNMENT DEPARTMENT OR AGENCY TO USE PROPERTY ON

A parcel of land in the west half of Government Lot 12, Section 2, Township 24 North, Range 41 East of the Willamette Meridian, Spokane County, Washington, described as beginning at a point which is 466.69 feet south and 30.00 feet east of the northwest corner of said Government Lot 12; thence east 466.69 feet; thence south 183.31 feet; thence east 164.43 feet; thence south 677.00 feet; thence west 631.12 feet; thence north in the west right-of-way line of Craig Road 860.31 feet to the point of beginning, containing 11.62 acres, more or less.

The United States Air Force is hereby granted permission to employ the described property as part of an industrial and storm drainage outfall from Fairchild Air Force Base as shown substantially in red on Exhibit "A", attached hereto and made a part hereof.

THIS PERMIT is granted subject to the following provisions and conditions:

1. That the use and occupation of the said premises shall be without cost or expense to the FCC, under the general supervision and subject to the approval of the officer having immediate jurisdiction over the premises, and subject also to such rules and regulations as he may from time to time prescribe.

2. That the permittee shall, at its own expense and without cost or expense to the FCC, maintain and keep in good repair and condition, including the control of noxious weeds, the premises herein authorized to be used insofar as it may legally do so.

3. That any interference with or damage to property under control of the FCC incident to the exercise of the privileges herein granted shall be promptly corrected by the permittee to the satisfaction of the said officer.

4. That no additions to or alterations of the premises shall be made without the prior consent of the said officer.

5. In the event flowage from the outfall, except that occuring during the spring run-off, shall approach the direction finding

equipment by a distance less than 500 feet the permittee shall take immediate steps to direct flowage to a greater distance from the Commission's equipment by constructing at the permittee's expense, dams, drainage ditches or other devices to prevent encroachment of flowage closer than 500 feet to the Commission's equipment, provided however, that no part of the construction shall be of a nature that will interfere with the Commission's monitoring or direction finding activities, and no pipes or conduits shall be installed on the property without the approval of the officer in charge of the property.

6. This agreement, with the rights and privileges herein granted, shall be subject to cancellation or termination only by mutual agreement of the parties, or in the event the terms and conditions hereof are not fulfilled, or in the event the Air Force abandons the use of the premises for the purposes herein granted. In either of the latter two events, cancellations may be effected by either party hereto upon thirty (30) days' written notice to the other; and upon the expiration of said thirty (30) days after service of such notice, this agreement and the rights and privileges hereby granted, as well as the obligations hereby imposed upon the parties, shall absolutely cease and determine. All obligations requiring expenditures of funds shall be subject to the availability of legal appropriations therefor.

ACCEPTED FOR THE UNITED STATES AIR FORCE

By: Gerald H. Rourke
Contracting Officer

U.S. Army Engineer District, Seattle
Corps of Engineers

Dated: 16 March 1959

ACCEPTED FOR THE FEDERAL COMMUNICATIONS COMMISSION

By: John C Doerfer

FEB 9 1983

George Gregory Moen, Chief
Real Estate Division
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Mr. Moen:

This letter amends our letter of December 7, 1982, concerning the value of the 39.41 acre FCC Spokane Monitoring Station, Spokane County, Washington, GSA Control Number Z-Wash-890.

Prior to reporting the property excess, the Federal Communications Commission issued a permit to the Air Force for use of 11.62 acres of the FCC Monitoring Station as a storm drain outfall and the property was reported to GSA subject to this permit. The fair market value of the flowage easement quoted in our letter of December 7, 1982, was $78,800 based on an easement over the entire tract. Inasmuch as the Permit covering the 11.62 acres existed prior to reporting the property excess, the Air Force requires a flowage easement only over the remaining 27.79 acres.

We have recently been advised that Spokane County has a requirement to make a minor realignment of Craig Road near the northwest corner of the property. This change encompasses a triangular area at the extreme northwest corner bordering the easterly right-of-way of Craig Road extending easterly from Craig Road 170 feet and southerly along the east right-of-way of Craig Road about 450 feet encompassing approximately 0.88-acre. (See attached drawing). This conveyance to the County would not be subject to the flowage easement, however, the County will be required as a condition of the conveyance to take any necessary precaution to protect the integrity of the Air Force's outfall system including rerouting of any ditch or tile network in order to provide continuity of storm water flow onto the property. With the County being required to comply with the above conditions we do not anticipate any adverse impact on the use of the remaining 38.53 acres by the Air Force.

The fair market value for a flowage easement covering 26.91 acres (38.53 acres less the 11.62 acres already under permit to the Air Force) has been determined to be $53,800. The flowage easement description will encompass the 38.53 acres.

Please submit to this office within 30 days from date of this letter, a completed GSA Form 1431 requesting transfer of the property indicating that funds are available for reimbursement. Upon receipt of the Request for Transfer, we will request that our Finance Division prepare and forward to you Standard Form 1081 in the amount of $53, 800 for your execution. Upon completion of the transfer of funds, we will prepare the easement transfer document.

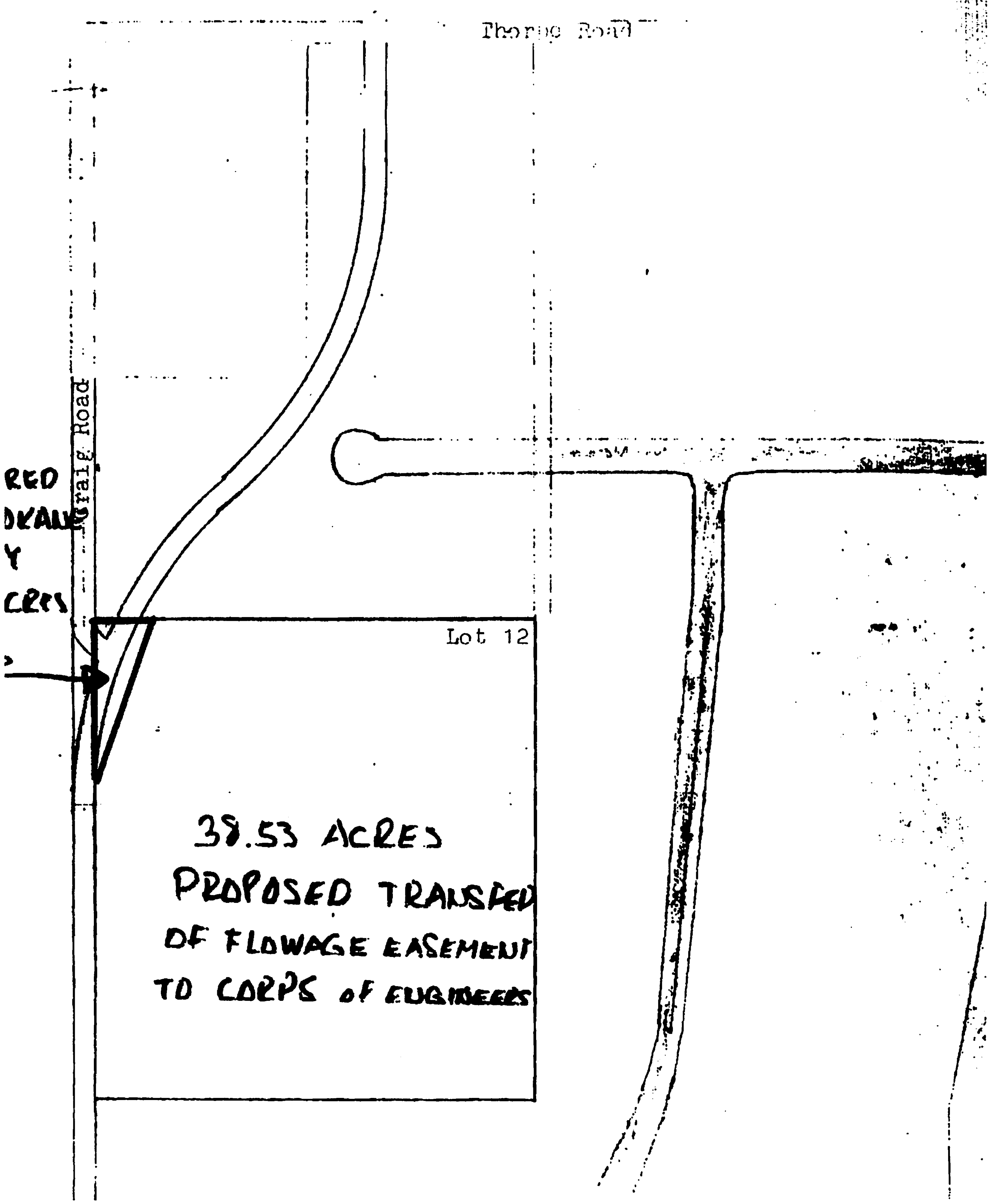
If you have any questions, please let us know.

Sincerely,

James R Clay

JAMES R. CLAY
Acting Assistant Chief
Disposal Branch
Real Estate Division

Section 2, Township 24 North, Range 41 East, W.M.



REQUEST FOR TRANSFER OF EXCESS REAL AND RELATED PERSONAL PROPERTY

1. GSA CONTROL NO.
Z-Wash-890

2. DATE OF REQUEST

PAGE 1 OF 2 PAGES

THIS BLOCK FOR USE BY AGENCY RECEIVING REQUEST
DATE REQUEST RECEIVED
HOLDING AGENCY NO. *(If any)*
ACQUISITION COST
$
APPRAISED FAIR MARKET VALUE
$
REIMBURSEMENT
$

TO *(Name, address and ZIP Code of agency being requested to transfer the property)*

General Services Administration
Region 10
Auburn, Washington 98002

4. FROM *(Name, address and ZIP Code of agency requesting transfer of the property)*

Commander
U. S. Army Corps of Engineers
Seattle District
P. O. Box C-3755
Seattle, Washington 98124

. REQUESTING AGENCY'S REPRESENTATIVE TO BE CONTACTED FOR FURTHER INFORMATION *(Name, address and ZIP Code)*

Linda B. Vert
Real Estate Division
Seattle, Dist. C. of E.
P. O. Box C-3755, Seattle, WA 9812

6. PROPERTY IDENTIFICATION AND ADDRESS *(Include ZIP Code)*

Federal Communications Commission Monitoring Stat
Craig Road
Spokane, Washington

REAL PROPERTY REQUESTED

STRUCTURES		
USE (a)	NUMBER OF BUILDINGS (b)	FLOOR AREA *(Sq. Ft.)* (c)
1) OFFICE		
2) STORAGE		
3) OTHER *(Specify)*		
4) TOTAL		

B. LAND	
GOVERNMENT'S INTEREST (a)	AREA *(Acres or Sq. Ft.)* (b)
(1) FEE	
(2) LEASED	
(3) OTHER *(Specify)* Easement	39.41
(4) TOTAL	39.41

C. UTILITIES

None

. RELATED PERSONAL PROPERTY REQUESTED

None

9. ARE FUNDS AVAILABLE FOR REIMBURSEMEN FOR THE TRANSFER OF THIS PROPERTY?

☒ YES ☐ NO

0. CERTIFICATION

Certification is hereby made that this agency has a need for the property identified above to carry on an approved program; tha he transfer thereof to this agency for the purposes indicated would be in accord with the intent of the Congress with respect to the rogram; that the requirement cannot be satisfied by better use of this agency's existing property; and that the proposed land use i consistent with FPMR 101-47.201-1 and 201-2. The statement of justification under block 11 below for the transfer of the property equested is complete and accurate.

SIGNATURE
George Gregory Moen
GEORGE GREGORY MOEN

TITLE
Chief, Real Estate Division
Seattle District, Corps of Engineers

DATE
4 NOV 1983

1. STATEMENT OF JUSTIFICATION *(This statement must include data with respect to all factors covered in FPMR 101-47.4904-1(c) Block 11, Instructions for Preparation of GSA Form 1334).*

Transfer is requested pursuant to Title 40, United States Code, Section 483. The easement is required for storm and industrial drainage overflow from Fairchild Air Force Base. The Air Force has had a permit from the Federal Communications Commissior for overflow over 11.62 acres of the requested easement since March 1959.

A copy of the acquisition authorization is attached. This acquisition is authorized under the provisions of 10 USC 2672.

There is no other available property in the area suitable for the overflow area.

An estimate of the probable value of the 39.41 acres of easement is $55,000.00.

(If required, use an additional 8x10½ shee

Continued use of the property will continue to be compatible with state, regional and local agencies program. The property is not eligible for listing on the National Register of Historic Places.

A legal description, drawing and flowage easement estate are attached for your reference.

FAIRCHILD AIR FORCE BASE, WA
Perpetual Flowage Easement

Tract M
(39.41 ac ±)

LEGAL DESCRIPTION

All of Government Lot 12, Section 2, Township 24 north, Range 41 east, Willamette Meridian, Spokane County, Washington, lying easterly of the public road right-of-way running along the west boundary of said lot.

Contains 39.41 acres, more or less.

Written by: DJD 12 Sep 83
Chkd by: EHL 12 Sep 83
Prfd by: DJD 16 Sep 83
Rev by: DJD 31 Oct 83
Prfd by: DJD 3 Nov 83
WANG: 0342P

ESTATE

The estate hereby conveyed is the perpetual right, power, privilege and easement in, upon, over and across all of Government Lot 12, Section 2, Township 24 north, Range 41 east, Willamette Meridian, Spokane County, Washington, lying easterly of the public road right-of-way running along the west boundary of said lot, for the purposes set forth below:

(a) Permanently or intermittently to overflow, flood and submerge the lands with waters and industrial waste from Fairchild Air Force Base, Spokane County, Washington, together with the permanent right, power and privilege to enter upon said lands to inspect and improve water flow conditions and to remov any natural or artificial obstructions, which in the opinion of the representative of the United States in charge may be detrimental to the operation and maintena of the project, including underbrush or debris, as may be necessary from time to time, and to clear, improve and maintain existing water courses, streams and drainage channels.

(b) The permanent right, power and privilege to enter upon said lands for the purpose of constructing, maintaining, operating and patrolling any necessa drainage structures or appurtenances.

(c) The permanent right, power and privilege to prohibit construction or maintenance of structures for human habitation on said lands.

(d) All rights and privileges which may be used or enjoyed without interfe with or abridging the rights and easements hereby acquired are specifically reserved to the Grantors, their heirs and assigns.

(NO CARBON REQUIRED)

WORK ORDER/COMPLETION REPORT

DISTRICT: SEATTLE

APPROPRIATION: 733300 377-6725 P351 MCAF(BAAN 83-6725)

PROJECT: Fairchild AFB, WA

LASS OF WORK: Military Construction, Air Force
Fairchild AFB (SAC), WA

ORIGINAL ESTIMATE
DATE: 20Mar84
AMOUNT: $55,000.00

DATE WORK IS TO START: 20 Mar 84

ESTIMATED COMPLETION DATE:

ETHOD OF WORK: XX CONTRACT ☐ HIRED LABOR

BASIS FOR ORDER: ☒ JOB ☐ FISCAL YEAR

TYPE OF ESTIMATE: ☒ ORIGINAL ☐ REVISED

FEATURE AND SUB-FEATURE NR: KA3 DND 3000 30006

ACCOUNT NUMBER	DESCRIPTION OF WORK	ESTIMATED			ACTUAL		
		TOTAL QUANTITIES	TOTAL COST	UNIT COST	TOTAL QUANTITIES	TOTAL COST	UNIT COST
	Land Acquisition		$55,000.00				
	TOTALS		$55,000.00				

TTED BY Patricia M. Dice
ATRICIA M. DICE, Ch, P&C Br, RE Div 3/30/84
(NAME) (ORGANIZATION UNIT) (DATE)

FUNDS FOR THIS WORK ARE AVAILABLE
CHARLES WILSON, Ch, F&A Br
(NAME) (OFFICE OF THE COMPTROLLER) (DATE)

WORK IS INCLUDED IN THE APPROVED PROGRAM
OHN LEONARD, Ch, Budget Br
(NAME) (BUDGET & PROGRAM BRANCH) (DATE)

APPROVED
GEORGE GREGORY MOEN, Ch, RE Div
(DISTRICT ENGINEER CORPS OF ENGINEERS (DATE)

DESCRIBED ABOVE HAS BEEN COMPLETED

ATE COMPLETED

AMOUNTS REPORTED ABOVE AS ACTUAL COSTS ARE REFLECTED IN THE COST ACCOUNTS AS OF THIS DATE

BETWEEN APPROPRIATIONS AND/OR FUNDS

SCHEDULE NO. DEC 28 1983

BILL NO.

PAID BY

tment, establishment bureau, or other billing

eneral Services Administration
nance Division-Accounts Receivable 9BCR

tment, establishment, bureau, or office billed

● U.S. ARMY CORPS OF ENGINEERS ●
Seattle District
P.O. Box C-3755
SEATTLE, WA. 98124

P084-159

NO.	DATE OF DELIVERY	ARTICLES OR SERVICES	QUANTITY	UNIT PRICE		AMOUNT
				COST	PER	DOLLARS AND CENTS
		Transfer of a permanent flowage easement over approximately 0.88 acre of the former Spokane FCC Monitoring Station. GSA Control No. Z-WASH-890				1,200.00
					TOTAL,	$1,200.00

ance in payment hereof should be sent to—

eneral Services Administration
inance Division Accounts Receivable Branch 9BCR
25 Market Street, San Francisco, Ca. 94105

ACCOUNTING CLASSIFICATION—*Billing Office*

7 0952 114.1/409.1

2 0952 303.5/114.1

CERTIFICATE OF OFFICE BILLED

I certify that the above articles were received and accepted or the services performed as stated and should be charged to the ropriation(s) and/or fund(s) as indicated below; or that the advance payment requested is approved and should be paid as licated.

March 1984
(Date)

George Gregory Moen
(Authorized administrative or certifying officer)

GEORGE GREGORY MOEN, Chief, Real Estate Division
(Title)

ACCOUNTING CLASSIFICATION—*Office Billed*

Check No.

Department, establishment, bureau, or office billing
G.S.A., Finance Div., Accts. Receivable Branch
9BCR, 525 Market Street, San Francisco, Ca. 94105

BILL NO.
1AR84110

PAID BY

Department, establishment, bureau, or office billed

U.S. ARMY CORPS OF ENGINEERS
Seatle District
P.O. Box C-3755
Seatle, Wa. 98124

PC84-108

ORDER NO.	DATE OF DELIVERY	ARTICLES OR SERVICES	QUANTITY	UNIT PRICE		AMOUNT
				COST	PER	DOLLARS AND CEN
		Payment of FMV for transfer of a permanent flowage easement over +38.53 acres of the former Spokane FCC Monitoring Station G.S.A. Control No. Z-WASH-890				$53,800.0
					TOTAL,	$53,800.0

Remittance in payment hereof should be sent to—
G.S.A., Finance Division
Accounts Receivable Branch 9BCR
525 Market Street, San Francisco, Ca. 94105

ACCOUNTING CLASSIFICATION—*Billing Office*

J7 0951 114.1/409.1.

C2 0951 303.5/114.1

CERTIFICATE OF OFFICE BILLED

I certify that the above articles were received and accepted or the services performed as stated and should be charged to t appropriation(s) and/or fund(s) as indicated below; or that the advance payment requested is approved and should be paid indicated.

22 March 1984
(Date)

(Authorized administrative or certifying officer)

GEORGE GREGORY MOHN, Chief, Real Estate Div.
(Title)

ACCOUNTING CLASSIFICATION—*Office Billed*

Paid by Check No.

ENCE OR OFFICE SYMBOL

E-AQ

SUBJECT

Request for Check - Payment of Permanent Easement over +38
and 0.88 acres - Spokane FCC Monitoring Station

RU: NPSF-Property Br
Attn: Barbara Schlosser

FROM Ch, Real Estate Div

DATE 23 March 1984
VERT/ds/3666

CMT

: ~~NPSF~~
NPPDC-F

It is requested a check for $55,000.00 be forwarded to General Services Administratio
nce Division, Accounts Receivable Branch 9BCR, 525 Market Street, San Francisco, CA 9
vouchers attached. Please advise us when check has been mailed.

The work order for this acquisition and ENG Form 4480 are also enclosed.

cl

George Gregory Moen
GEORGE GREGORY MOEN
Chief, Real Estate Division

APR 6 1984

Mailed 6 Apr 84

Pauline Morgan

PAULINE MORGAN, NPPDC-F-D
CHIEF, DISBURSING SECTION
221-6962

Z-Wash-890

MAY 11 1984

Mr. George Gregory Moen
Chief, Real Estate Division
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, WA 98124

Dear Mr. Moen:

Your letter of November 7, 1983, requested transfer of a permanent flowage easement over 39.41 acres at the former FCC Monitoring Station, Spokane County, Washington. Reimbursement in the amount of $55,000.00 has been received from your agency.

Pursuant to the authority delegated under the Federal Property and Administrativ Services Act of 1949, 63 Stat. 377, as amended, such an easement over the proper is hereby transferred to the Department of the Air Force subject to compliance with the provisions of the National Environmental Policy Act of 1969, including the preparation of an environmental impact statement, if necessary, and the Flood Disaster Protection Act of 1973. The legal description of the property rights transferred is enclosed as Exhibit A.

In order to expedite the transfer of this property, we are recommending the Federal Communications Commission take action to transfer custody and accountabi lity of the property to your agency effective 12:01 a.m., June 15, 1984. If for any reason you cannot accept custody and accountability as of that date, please advise us no later than May 30, 1984.

Mr. Charles D. Ferris, Chairman, Federal Communications Commission, Field Operati Bureau, 1919 M. Street NW, Washington, DC 20554 (telephone FTS 632-7593), will act on behalf of that agency in transferring custody and accountability of the property. A copy of our letter of this date to the FCC authorizing the transfer of custody and accountability is enclosed for your file.

Please sign and return the enclosed copy of this letter acknowledging receipt of this communication. If we may be of further assistance in accomplishing the transfer, please let me know.

Sincerely,

KENNETH E. LINDEBAK
Director
Disposal Division
Office of Public Buildings and Real Property

Enclosures

Original received and
concurred in:

George Gregory Moen
Name
GEORGE GREGORY MOEN
Chief, Real Estate Division
Title Seattle District, Corps of Engin

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT. CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE. WASHINGTON 98124

REPLY TO
ATTENTION OF

May 22, 1984

Real Estate Division
Acquisition Branch

Kenneth E. Lindebak, Director
Disposal Division
Office of Public Buildings and Real Property
General Services Administration, Region 10
GSA Center
Auburn, Washington 98002

Dear Mr. Lindebak:

Enclosed as requested is the executed copy of your letter of May 1 19 acknowledging receipt thereof. Thank you for your cooperation and assiance

Sincerely,

George Gregory Moen
Chief, Real Estate Division

Enclosure

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON

OFFICE OF
MANAGING DIRECTOR

MAY 30 1984

Mr. George Gregory Moen
Chief, Real Estate Division
Seattle District, Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124

Dear Mr. Moen:

The purpose of this letter is to transfer the custody and accountability of a permanent flowage easement over 39.41 acres of the former Federal Communications Commission Monitoring Station, Spokane County, Washington. The legal description of the property rights is enclosed. If you agree to accept the custody and accountability of this property, effective 12:01 a.m., June 15, 1984, please sign at the space indicated below and return it to me. I will use this as the document GSA requested in their letter of May 11, 1984, showing the transfer of the above property.

Sincerely,

Alan R. McKie

for Edward J. Minkel
Managing Director

Enclosure

I accept the custody and accountability of the above property effective 12:01 a.m., June 15, 1984.

George Gregory Moen

NAME GEORGE GREGORY MOEN
Chief, Real Estate Division
Seattle District, Corps of Engineers

TITLE

7 JUN 1984

DATE

JUN 14 1984

Acquisition Branch

Mr. Edward J. Minkel, Managing Director
Federal Communications Commission
Room 316, Brown Building
1200 - 19th Street Northwest
Washington, D. C. 20554

Dear Mr. Minkel:

Enclosed as requested is acceptance of custody and accountability of permanent flowage easement over 39.41 acres of the former Federal Communications Commission Monitoring Station, Spokane County, Washington.

Sincerely,

Enclosure

GEORGE GREGORY MOEN
Chief, Real Estate Division

Copy furnished:
√P&C Branch, Historical Files, w/encl
F&A Branch, Property & Accounting

QUITCLAIM DEED

8502220140

The UNITED STATES OF AMERICA, acting by and through the Administrator of General Services under and pursuant to the powers and authority contained in applicable provisions of the Federal Property and Administrative Services Act of 1949, 63 Stat. 377, as amended, and regulations and orders promulgated thereunder, (hereinafter referred to as "Grantor"), for a monetary consideration of FIFTY TWO THOUSAND DOLLARS ($52,000), and other valuable consideration, does hereby convey and quitclaim to WILLIAM J. HOUK, as his separate property, (hereinafter referred to as "Grantee"), his successors and assigns, all of Grantor's right, title and interest in and to the following described property (hereinafter referred to as "Property") situated in Spokane County, State of Washington.

Parcel B

Lot 12, Section 2, Township 24 North, Range 41 East, Willamette Meridian, Spokane County, Washington, EXCEPT a parcel of land identified as Beginning at the northwest corner of Lot 12 said Section, Township and Range thence easterly in the north line of said Lot 12 200 feet; thence southwesterly to a point on the west line of Lot 12 which point lies 550 feet south of the northwest corner of said Lot 12; thence north along the west line of Lot 12 550 feet to the point of beginning.

RESERVING TO the United States of America and its assigns the right to permanently or intermittently to overflow, flood and submerge the land herein described with waters and industrial waste from Fairchild Air Force Base, Spokane County, Washington, together with the permanent right, power and privilege to enter upon said lands to inspect and improve water flow conditions and to remove any natural or artificial obstruction, which in the opinion of the representative of the United States in charge, may be detrimental to the operation and maintenance of the project, including underbrush or debris, as may be necessary from time to time, and to clear, improve and maintain existing water courses, streams, and drainage channels. Also, the permanent right, power and privilege to enter upon said lands for the purposes of constructing, maintaining, operating and patrolling any necessary drainage structures or appurtenances, and the permanent right, power and privilege to prohibit construction or maintenance of structures for human habitation on said lands.

TOGTHER WITH

Improvements located thereon.

All rights and privileges which may be used or enjoyed without interfering with or abridging the rights described in the Reservation to the United States.

SUBJECT TO

Existing easements for public roads and highways, public utilities, railroads and pipelines and to other easements of record.

TO HAVE AND TO HOLD the Property together with all the privileges and appurtenances thereto belonging, unto Grantee, his successors and assigns, forever.

By acceptance of this deed, the Grantee herein named covenants for himself, his heirs, successors or assigns that:

Excise Tax Paid on
Sale Amt. Pd. None
D.E. "SKIP" CHILBERG
Spokane County Treas. 303485
By 2/22/85

The Government shall be held harmless from all claims for damage that may accrue to any or all of the property herein described by reason of the overflow of water and industrial waste or by the exercise of any or all of the rights, powers, privileges enumerated in the Reservation to the United States of America described above.

No structures or alterations to existing structures shall be made which would exceed fifty (50) feet in height unless a determination of no hazard to air navigation is issued by the Federal Aviation Administration in accordance with CFR Part 77 "Objects Affecting Navigable Air Space," or under the authority of the Federal Aviation Act of 1958, as amended.

The Property was both duly determined to be surplus to the needs and requirements of the United States of America and assigned to General Services Administration for disposal pursuant to authority contained in the said Federal Property and Administrative Services Act as amended, and applicable orders and regulations promulgated thereunder.

IN WITNESS WHEREOF, Grantor has caused this instrument to be effective as of April 25, 1983.

UNITED STATES OF AMERICA
Acting by and through the
Administrator of General Services

BY
Director, Disposal Division
Public Buildings and Real Property

STATE OF WASHINGTON)
)
COUNTY OF KING)

On this 24th day of May, 1983, before the undersigned, a Notary Public in and for the State of Washington, personally appeared Kenneth E Lindebak, to me known to be the Director, Disposal Division, Public Buildings and Real Property, General Services Administration, Region 10, and to me known to be the individual described in and who executed the foregoing instrument and who under oath stated that he was duly authorized, empowered, and delegated by the Administrator of General Services to execute the said instrument and acknowledged the foregoing instrument to be his free and voluntary act and deed, acting for and on behalf of the Administrator of General Services, acting for and on behalf of the United States of America, for the uses and purposes therein mentioned.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate above written.

Notary Public in and for the State of
Washington, residing in Issaquah

4.00

W 5905 Vale Lane 99208

GSI Job No.: 6892
Issued: 13 August 2024

SITE ASSESSMENT REPORT

Spokane International Airport

Spokane, WA

APPENDIX B.2

AECOM, 2017a. DRAFT- Groundwater Monitoring for Perfluorinated Chemicals.

AECOM

July 14, 2017

Mr. Matt Breen
Spokane International Airport
9000 West Airport Drive
Spokane, Washington 99219

Re: **DRAFT** -Groundwater Monitoring for Perfluorinated Chemicals
Spokane International Airport
Spokane, Washington
SIA Environmental #4304-00
AECOM Job No.:60545218

Dear Mr. Breen:

Attached are the results and supporting documentation for the recent, limited groundwater monitoring event of four select monitoring wells that were analyzed for the perfluorinated chemicals, Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS). This monitoring event was conducted per your request so that Spokane International Airport's (SIA) could ascertain if detectable levels of perfluorinated chemicals are present in shallow groundwater beneath the airport and if concentrations present a risk to human health and the environment.

Our scope of work for this project included the following tasks:

- Performed one limited groundwater monitoring and sampling event on May 23, 2017. Groundwater samples were collected from downgradient monitoring wells MW-1, MW-3 and MW-5 and from the inferred upgradient well, MW-8 (Figure 1).
- Goundwater samples were shipped to ALS Global Laboratories' (ALS) laboratory in Kelso, Washington for analysis. ALS is accredited by the Washington State Department of Ecology with the certification number C544. The samples were analyzed for PFOA and PFOS by USEPA Method 537M. Samples were submitted on a standard turnaround time of 15–business days. An AECOM project chemist reviewed all of the analytical data and no data usability issues were identified.
- Prepared this letter report presenting the results of the sampling event, compared the analytical results to national standards, and provided our conclusions and recommendations.

Groundwater Sampling

Depth to water in each well was measured to the nearest 1/100th of a foot prior to sampling. Groundwater samples were collected from each well using a peristaltic pump. The wells were purged and sampled using low-flow sampling techniques where flow rates were generally about 0.3 to 0.5 liters per minute (l/min). The purge rate was adjusted to minimize the drawdown of groundwater in the wells during purging.

AECOM
528 E. Spokane Falls Blvd.
Suite 503
Spokane, WA 99202
Tel: 509.928.4413
www.AECOM.com

Field parameters were measured with a Horiba-U52 water quality meter. Parameters include pH, conductivity, turbidity, dissolved oxygen (DO), temperature, and oxidation reduction potential (ORP). Once field parameters stabilized within 10% from reading to reading for each parameter, laboratory-prepared sample containers were filled with water from the wells, sealed and placed on ice pending next-day transport to the laboratory.

Results

Groundwater levels measured in the monitoring wells on May 23, 2017 were noted at depths ranging from 2.94 to 9.55 feet bgs. Groundwater samples were collected from monitoring wells MW-1, MW-3, MW-5 and MW-8. Monitoring well locations and analytical results are shown on **Figure 1**. MW-1 is located along the 3-21 Outfall flow path and MW-3 is located along the Alpha Outfall flow path. MW-5 is located east, and down-gradient of the main infiltration area. MW-8 is located in an inferred up-gradient direction of the Airport. Groundwater flow direction was not calculated for this event. Various studies have been conducted in support of the pending Stormwater Discharge Permit and each has concluded that the direction of flow for shallow groundwater across the site is generally northeasterly.

The downgradient monitoring wells MW-1, 3 and 5 detected concentrations of PFOA\PFOS at levels exceeding the screening level of 70 ng\L. The greatest concentrations are observed in samples collected from MW-3 and MW-1, respectively. These areas are subjected to stormwater collection and discharge from active portions of the Airport. The upgradient groundwater sample collected from MW-8 did not detect PFOA or PFOS at concentrations exceeding the screening levels. Analytical results are shown on **Table 1** and the laboratory analytical report is included in **Attachment A**.

Discussion

Perfluorinated chemicals are widespread and persistent in the environment. Potential sources of these chemicals include aviation-related products such as lubricants, hydraulic oils, detergents, firefighting agents and deicing compounds. It has been reported that the use of PROA/PFOS has been curtailed beginning in the early 2000s, however, there has been no known substitute developed for usage in aircraft hydraulic systems.

Given that the perfluorinated compounds are not easily degraded, their detection in the shallow groundwater downgradient of the airport suggests that historic releases of various aviation related fluids have occurred, and are not necessarily indicative of current practices.

Summary

The highest concentration of perfluorinated compounds was detected in the groundwater sample collected from MW-3 and this well is downgradient of the Alpha Outfall. Current and historic aviation practices within the capture zone of this outfall appear to have an impact on the outfall and shallow groundwater quality downgradient of the Airport.

The likely source for this impact is deicing fluids since deicing was and continues to be a standard practice during wintertime operations. Further assessment of current and past deicing agents is advised to evaluate if this is a primary source of PFOS/PFOA.

Limitations

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area and in general accordance with the terms and conditions set forth in our Agreement, and with the AECOM proposal dated May 17, 2017. No other warranty, express or implied, is made.

The findings presented in this report are based on conditions observed at specific site locations and sampling intervals at the time of the assessment. Because conditions between the wells and sampling intervals may vary over distance and time, the potential always remains for the presence of unknown, unidentified, unforeseen, or changed surface and subsurface contamination.

This report is for the exclusive use of Spokane International Airport and its representatives. No third party shall have the right to rely on AECOM's opinions rendered in connection with the services or in this document without our written consent and the third party's agreement to be bound to the same conditions and limitations as Spokane International Airport.

AECOM appreciates the opportunity to provide these services. Please contact the undersigned regarding any questions related to the information provided in this letter report.

Sincerely,

AECOM

Gary D. Panther, LG, LEG

Attachments:

Figure 1: Spokane International Airport PFOA\PFOS Study Area
Table 1: Summary of Groundwater Analytical Results
Attachment A: Analytical Results

Notes:
Perfluorooctanoic Acid (PFOA)
Perfluorooctane Sulfonic Acid (PFOS)
ng\L = nanograms per liter, or parts per trillion
Samples analyzed by ALS Environmental, Kelso, Washington

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
USGS Imagery, 2012.

500 0 500 1,000
SCALE IN FEET

AECOM

SPOKANE INTERNATIONAL AIRPORT PFOA/PFOS STUDY AREA

MAY 2017
60545218

SPOKANE INTERNATIONAL AIRPORT
PFOA/PFOS STUDY AREA
SPOKANE, WASHINGTON

FIGURE 1

K:\60545218_SI\MXD\Fig 1 Study Area.mxd

Table 1

Summary of Groundwater Analytical Results

Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS)

Spokane International Airport

Well ID	Sample Date	Depth to Water (feet bgs)	PFOA (ng/L)	PFOS (ng/L)
Groundwater Screening Level (ng/L) [1]			70	70
MW-1	5/23/2017	5.93	**130**	**130**
MW-3	5/23/2017	3.48	**330**	**93**
MW-5	5/23/2017	2.94	**110**	**140**
MW-8	5/23/2017	9.55	1.4 U	9.5

Notes:

[1] Groundwater screening levels were obtained from EPA's "Fact Sheet, PFOA & PFOS Drinking Water Health Advisories," dated November 2016.

Values in **bold** font indicate that the result reported meets or exceeds the groundwater screening level.

feet bgs - feet below ground surface

ng/L - nanogram per liter

PFOA - perfluorooctanoic acid

PFOS - perfluorooctane sulfonic acid

U - Compound was analyzed for but not detected above the reporting limit shown.

Samples analyzed by ALS Global Laboratories, Kelso, Washington.

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

June 26, 2017

Analytical Report for Service Request No: K1705255

Gary Panther
AECOM
528 E. Spokane Falls Boulevard,
Suite 503
Spokane, WA 99202

RE: SIA PFOA-PFOS Sampling / TBD

Dear Gary,

Enclosed are the results of the sample(s) submitted to our laboratory May 24, 2017
For your reference, these analyses have been assigned our service request number **K1705255.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Chris Leaf
Project Manager

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

Table of Contents

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory’s NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client:	AECOM	**Service Request No.:**	K1705255
Project:	SIA PFOA-PFOS Sampling/TBD	**Date Received:**	05/24/17
Sample Matrix:	Water		

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

Sample Receipt

Four water samples were received for analysis at ALS Environmental on 05/24/17. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

No anomalies associated with the analysis of these samples were observed.

Approved by____

Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Environmental

CHAIN OF CUSTODY
79857

001

SR# K1705265

COC Set____of____

COC#________

Page 1 of 1

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

Project Name: SIA PFOA-PFOS Sampling
Project Number: TBD
Project Manager: GARY PANTHER
Company: AECom
Address: 528 E. Spokane Falls BLVD, #503 Spokane, WA 99019
Phone # 509-954-5090
email: GARY.PANTHER@AECOM.com
Sampler Signature:
Sampler Printed Name: Gary D. Panther

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	14D PFC/537M / PFOA	1	2	3	4	5	Remarks
1. MW-8		5.23.17	900	W	4	X						
2. MW-3		5.23.17	1000	W	2	X						
3. MW-1		5.23.17	1100	W	2	X						
4. MW-5		5.23.17	1200	W	2	X						
5.												
6.												
7.												
8.												
9.												
10.												

Report Requirements

___ I. Routine Report: Method Blank, Surrogate, as required

X II. Report Dup., MS, MSD as required

___ III. CLP Like Summary (no raw data)

___ IV. Data Validation Report

___ V. EDD

Invoice Information

P.O.#________

Bill To: AECom

Turnaround Requirements

___ 24 hr. ___ 48 hr.

___ 5 Day

X Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments:

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other____(Circle One)

	Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature		B				
Printed Name	GARY D. PANTHER	B Rickman				
Firm	AEcom	ALS				
Date/Time	5-23-17 1400	5/24/17 1610				

PC Cl

Cooler Receipt and Preservation Form

Client Aecom Service Request K17 05255

Received: 5/24/17 Opened: 5/24/17 By: BR Unloaded: 5/24/17 By: BR

1. Samples were received via? *USPS* [✓ *Fed Ex*] *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other*______ *NA*
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where?______
   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

Raw Cooler Temp	Corrected. Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID [✓ NA]	Tracking Number NA	Filed
1.9	1.6	—	—	-0.3	380		722724309462	

4. Packing material: *Inserts* [✓ *Baggies*] *Bubble Wrap* *Gel Packs* [✓ *Wet Ice*] *Dry Ice* *Sleeves* ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA [✓ Y] N
   If applicable, tissue samples were received: ***Frozen*** ***Partially Thawed*** ***Thawed***
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions:______

7/25/16

***Page*____*of*____**

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	AECOM	**Service Request:**	K1705255
Project:	SIA PFOA-PFOS Sampling/TBD	**Date Collected:**	05/23/17 09:00
Sample Matrix:	Water	**Date Received:**	05/24/17 10:10
Sample Name:	MW-8	**Units:**	ng/L
Lab Code:	K1705255-001	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluorooctanoic acid (PFOA)	ND U	1.4	1	06/09/17 22:47	6/5/17	
Perfluorooctane sulfonic acid (PFOS)	**9.5**	3.6	1	06/09/17 22:47	6/5/17	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	93	13 - 142	06/09/17 22:47	
13C4-PFOS	79	11 - 131	06/09/17 22:47	

Client:	AECOM	**Service Request:**	K1705255
Project:	SIA PFOA-PFOS Sampling/TBD	**Date Collected:**	05/23/17 10:00
Sample Matrix:	Water	**Date Received:**	05/24/17 10:10
Sample Name:	MW-3	**Units:**	ng/L
Lab Code:	K1705255-002	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluorooctanoic acid (PFOA)	**330**	1.4	1	06/09/17 23:18	6/5/17	
Perfluorooctane sulfonic acid (PFOS)	**93**	3.6	1	06/09/17 23:18	6/5/17	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	84	13 - 142	06/09/17 23:18	
13C4-PFOS	74	11 - 131	06/09/17 23:18	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	AECOM	**Service Request:**	K1705255
Project:	SIA PFOA-PFOS Sampling/TBD	**Date Collected:**	05/23/17 11:00
Sample Matrix:	Water	**Date Received:**	05/24/17 10:10
Sample Name:	MW-1	**Units:**	ng/L
Lab Code:	K1705255-003	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluorooctanoic acid (PFOA)	**130**	1.4	1	06/09/17 23:29	6/5/17	
Perfluorooctane sulfonic acid (PFOS)	**130**	3.6	1	06/09/17 23:29	6/5/17	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	85	13 - 142	06/09/17 23:29	
13C4-PFOS	70	11 - 131	06/09/17 23:29	

Analytical Report

Client:	AECOM	**Service Request:**	K1705255
Project:	SIA PFOA-PFOS Sampling/TBD	**Date Collected:**	05/23/17 12:00
Sample Matrix:	Water	**Date Received:**	05/24/17 10:10
Sample Name:	MW-5	**Units:**	ng/L
Lab Code:	K1705255-004	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluorooctanoic acid (PFOA)	**110**	1.4	1	06/09/17 23:39	6/5/17	
Perfluorooctane sulfonic acid (PFOS)	**140**	3.6	1	06/09/17 23:39	6/5/17	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	101	13 - 142	06/09/17 23:39	
13C4-PFOS	77	11 - 131	06/09/17 23:39	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	AECOM	**Service Request:**	K1705255
Project:	SIA PFOA-PFOS Sampling/TBD	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KQ1707145-04	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result		MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluorooctanoic acid (PFOA)	ND	U	2.0	1	06/09/17 22:05	6/5/17	
Perfluorooctane sulfonic acid (PFOS)	ND	U	5.0	1	06/09/17 22:05	6/5/17	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	99	13 - 142	06/09/17 22:05	
13C4-PFOS	85	11 - 131	06/09/17 22:05	

Client: AECOM **Service Request:** K1705255
Project: SIA PFOA-PFOS Sampling/TBD
Sample Matrix: Water

SURROGATE RECOVERY SUMMARY

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Extraction Method: EPA 3535A

Sample Name	Lab Code	13C4-PFOA 13 - 142	13C4-PFOS 11 - 131
MW-8	K1705255-001	93	79
MW-3	K1705255-002	84	74
MW-1	K1705255-003	85	70
MW-5	K1705255-004	101	77
MW-8	KQ1707145-01	89	71
MW-8	KQ1707145-02	94	76
Lab Control Sample	KQ1707145-03	87	80
Method Blank	KQ1707145-04	99	85

Client:	AECOM	**Service Request:**	K1705255
Project:	SIA PFOA-PFOS Sampling/TBD	**Date Collected:**	05/23/17
Sample Matrix:	Water	**Date Received:**	05/24/17
		Date Analyzed:	06/9/17
		Date Extracted:	06/5/17

Duplicate Matrix Spike Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Sample Name:	MW-8	**Units:**	ng/L
Lab Code:	K1705255-001	**Basis:**	NA
Analysis Method:	PFC/537M		
Prep Method:	EPA 3535A		

		Matrix Spike KQ1707145-01			**Duplicate Matrix Spike** KQ1707145-02					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Perfluorooctanoic acid (PFOA)	ND U	133	143	93	113	143	79	72-130	16	30
Perfluorooctane sulfonic acid (PFOS)	9.5	130	133	91	139	133	98	74-135	7	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	AECOM	**Service Request:**	K1705255
Project:	SIA PFOA-PFOS Sampling/TBD	**Date Analyzed:**	06/09/17
Sample Matrix:	Water	**Date Extracted:**	06/05/17

Lab Control Sample Summary

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method:	PFC/537M	**Units:**	ng/L
Prep Method:	EPA 3535A	**Basis:**	NA
		Analysis Lot:	549217

Lab Control Sample
KQ1707145-03

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Perfluorooctane sulfonic acid (PFOS)	172	186	93	74-135
Perfluorooctanoic acid (PFOA)	174	200	87	72-130

QUALITY ASSURANCE REVIEW (FORM 3)

Revision:	**1**	**Date:11/18/04**	
Approval:			

Project Number: TBD

Document Author: Jennifer B. Garner

Document Title: Table
Summary of Groundwater Analytical Results
Perfluorooctanoic acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS)
Spokane International Airport

Revision : 1

Document Date: 6/27/2017

					Project Manager Check the appropriate Boxes below		**Reviewer document exceptions resolved by Project Manager By initialing the appropriate boxes below**	
Data Validation Review by:	Lucy Panteleeff	LAP	**Date:**	6/27/2017	**All Comments addressed:**	N/A	**Exceptions resolved:**	
Table Preparation by:	Jennifer B. Garner		**Date:**	6/27/2017	**All Comments addressed:**	NA	**Exceptions resolved:**	
Data Table Review by:	Lucy Panteleeff		**Date:**	6/27/2017	**All Comments addressed:**		**Exceptions resolved:**	
Screening Levels added by:	Jennifer B. Garner		**Date:**	NA	**All Comments addressed:**	NA	**Exceptions resolved:**	
Screening Levels reviewed by:	Lucy Panteleeff	LAP	**Date:**	9/7/2016	**All Comments addressed:**	NA	**Exceptions resolved:**	
Calculations Review by:	NA		**Date:**	NA	**All Comments addressed:**	NA	**Exceptions resolved:**	
EDD Flags Review by:	NA		**Date:**	NA	**All Comments addressed:**	NA	**Exceptions resolved:**	
Senior/Reasonableness Review by:			**Date:**		**All Comments addressed:**		**Exceptions resolved:**	
Final Report Date	27-Jun-17							
Project Status Sheet Updated by:	NA		**Date:**	NA				
Project Manager Signature:			**Date:**					
Quality Assurance Coordinator:			**Date:**					
Database Entry by:	NA		**Date:**	NA	**All Comments addressed:**		**Exceptions resolved:**	
Database Check by:	NA		**Date:**	NA	**All Comments addressed:**		**Exceptions resolved:**	

Original to: Project File (1 hard copy, 1 pdf)
Copies: to Project Manager and Group QA Manager

Notes:
ALS Lab Group: K1705255

GSI Job No.: 6892
Issued: 13 August 2024

SITE ASSESSMENT REPORT

Spokane International Airport

Spokane, WA

APPENDIX B.2

AECOM, 2017b. Monitoring Well Installation and Groundwater Monitoring for Perfluorinated Chemicals.

December 12, 2017

Mr. Matt Breen
Spokane International Airport
9000 West Airport Drive
Spokane, Washington 99219

Re: Monitoring Well Installation and Groundwater Monitoring for Perfluorinated Chemicals
Spokane International Airport
Spokane, Washington
SIA Contract #17-43-9999-020-001-00
AECOM Job No.:60557313

Dear Mr. Breen:

Attached are the results and supporting documentation for the recent, limited groundwater monitoring event for the perfluorinated chemicals, Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS). This monitoring event was conducted per your request so that Spokane International Airport's (SIA) could ascertain if detectable levels of perfluorinated chemicals are present in shallow groundwater beneath the airport. Samples were collected from newly installed monitoring wells MW-13 and MW-14, and from existing well MW-5. MW-5 was added to the sampling program so as to provide a reference point when discussing analytical results.

Our scope of work for this project included the following tasks:

- Contracted and provided oversight for the installation of two additional monitoring wells with locations near the east property line of the Airport. Boring locations were screened for utilities by both public and private utility locate contractors. Monitoring wells were installed on November 2, 2017 by Geologic Drill, LLC, a Washington-licensed driller in accordance with applicable state regulations.
- Performed one limited groundwater monitoring and sampling event on November 8, 2017. Groundwater samples were collected from the two new downgradient monitoring wells MW-13 and MW-14 and from MW-5 (Figure 1).
- Groundwater samples were shipped to ALS Global Laboratories' (ALS) laboratory in Kelso, Washington for analysis. ALS is accredited by the Washington State Department of Ecology with the certification number C544. The samples were analyzed for PFOA and PFOS by USEPA Method 537M. Samples were submitted on a standard turnaround time of 15–business days. An AECOM project chemist reviewed the analytical data and no data usability issues were identified.
- Prepared this letter report presenting the results of the sampling event, compared the analytical results to national standards, and provided our conclusions and recommendations.

Monitoring Well Installation

Two groundwater monitoring wells were installed on November 2, 2017. The locations of the wells were approved prior to installation by SIA personnel. Utility clearance was conducted through the public One Call system, with specific boring locations cleared by Advance Underground Utility Locating (AUUL) prior to bringing the driller on site. Monitoring wells were installed using 2-inch diameter poly-vinyl chloride screen and casing and were finished with aboveground steel monuments and protective bollards. Monitoring well locations are shown on **Figure 1**. Boring logs and construction information are included in **Attachment A - Boring Logs**.

Groundwater Sampling

Depth to water in each well was measured to the nearest 1/100th of a foot prior to sampling. Groundwater samples were collected from each well using a peristaltic pump. The new wells were purged for approximately one hour prior to measuring field parameters. Purging and sampling using low-flow sampling techniques where flow rates were generally about 0.3 to 0.5 liters per minute (l/min). The purge rate was adjusted to minimize the drawdown of groundwater in the wells during purging.

Field parameters were measured with a Horiba-U52 water quality meter. Parameters include pH, conductivity, turbidity, dissolved oxygen (DO), temperature, and oxidation reduction potential (ORP). Once field parameters stabilized within 10% from reading to reading for each parameter, laboratory-prepared sample containers were filled with water from the wells, sealed and placed on ice pending next-day transport to the laboratory.

Results

Groundwater levels measured in the monitoring wells on November 8, 2017 were noted at depths ranging from 6.90 to 10.00 feet bgs. Groundwater samples were collected from monitoring wells MW-5, MW-13 and MW-14. Monitoring well locations, depth to water and analytical results are shown on **Figure 1**.

MW-5 is an existing well and is located east, and down-gradient of the main infiltration area. MW-13 is located in an inferred down-gradient direction of MW-5. MW-13 is located in an area where drainages from 3-21 and Alpha Outfall's merge with a drainage located south of 3-21. This drainage captures flow from the southern-portion of the Airport which is serviced by Taxiway G and the associated Outfall.

MW-14 is located in what is inferred to be a system which is predominantly fed by flow from the Alpha Outfall. However, the hydrology is not well understood at this location and it is possible that some mixing with subsurface flow from 3-12 Outfall could be occurring.

Groundwater flow direction was not calculated for this event. Various studies have been conducted in support of the pending Stormwater Discharge Permit and each has concluded that the direction of flow for shallow groundwater across the site is generally northeasterly.

Each sample collected from the three monitoring wells had detections of PFOA\PFOS at levels exceeding the screening level of 70 ng\L. The greatest concentrations are observed in samples collected from MW-14. The concentration of PFOA\PFOS observed in the sample collected from MW-13 was observed to be lower that the concentration observed in the sample collected from MW-5. This suggests that some mixing and/or dilution could be occurring as a result of inflow from the Taxiway G Outfall.

Each of these sample locations are subjected to stormwater collection and discharge from active portions of the Airport. As a result each sample contained concentrations of PFOA\PFOS at concentrations exceeding regulatory guidelines. Analytical results are shown on **Table 1** and the laboratory analytical report is included in **Attachment B – Analytical Results**.

Summary

The highest concentration of perfluorinated compounds was detected in the groundwater sample collected from MW-14. This well is predominantly downgradient of the 3-21 Outfall. Current and historic aviation practices within the capture zone of this outfall appear to have an impact on shallow groundwater quality downgradient of the Airport.

Limitations

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area and in general accordance with the terms and conditions set forth in our Agreement, and with the AECOM proposal dated October 6, 2017. No other warranty, express or implied, is made.

The findings presented in this report are based on conditions observed at specific site locations and sampling intervals at the time of the assessment. Because conditions between the wells and sampling intervals may vary over distance and time, the potential always remains for the presence of unknown, unidentified, unforeseen, or changed surface and subsurface contamination.

This report is for the exclusive use of Spokane International Airport and its representatives. No third party shall have the right to rely on AECOM's opinions rendered in connection with the services or in this document without our written consent and the third party's agreement to be bound to the same conditions and limitations as Spokane International Airport.

AECOM appreciates the opportunity to provide these services. Please contact the undersigned regarding any questions related to the information provided in this letter report.

Sincerely,

AECOM

Gary D. Panther, LG, LEG

Attachments:

Figure 1: Spokane International Airport PFOA\PFOS Study Area
Table 1: Summary of Groundwater Analytical Results
Attachment A: Boring Logs
Attachment B: Analytical Results

Figure 1: **Spokane International Airport PFOA\PFOS Study Area**

J:\DCS\Resources\GRFX\Projects\60557313 GRFX Spokane Intl Airport\60557313_01.ai

Legend

Monitoring Well

Inferred Groundwater Direction of Flow

Notes

Perfluorooctanoic Acid (PFOA)

Perfluorooctane Sulfonic Acid (PFOS)

ng\L = nanograms per liter, or parts per trillion

Samples analyzed by ALS Environmental, Kelso, Washington

MW-14	*Nov. 2017*
PFOA	350 ng/L
PFOS	50 ng/L

MW-3	*May 2017*
PFOA	330 ng/L
PFOS	93 ng/L

MW-13	*Nov. 2017*
PFOA	85 ng/L
PFOS	72 ng/L

MW-1	*May 2017*
PFOA	130 ng/L
PFOS	130 ng/L

MW-5	*May 2017*	*Nov. 2017*
PFOA	110 ng/L	66 ng/L
PFOS	140 ng/L	120 ng/L

MW-8	*May 2017*
PFOA	<1.4 ng/L
PFOS	9.5 ng/L

Source: Google Earth Pro, imagery dated 6/20/17

N

0 1,000 2,000

Scale in Feet

Job No. 60557313

Figure 1

Spokane International Airport
PFOA/PFOS Study Area

AECOM

Spokane International Airport
PFOA/PFOS Study Area
Spokane, Washington

Table 1: Summary of Groundwater Analytical Results

Table 1
Summary of Groundwater Analytical Results
Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS)
Spokane International Airport

Well ID	Sample Date	Depth to Water	PFOA (ng/L)	PFOS (ng/L)
	Groundwater Screening Level (ng/L) [1]		70	70
MW-5	11/8/2017	6.90	66	**120**
MW-13	11/8/2017	9.90	**85**	**72**
MW-14	11/8/2017	10.00	**350**	50

Notes:

[1] Groundwater screening levels were obtained from EPA's "Fact Sheet, PFOA & PFOS Drinking Water Health Advisories," dated November 2016.

Values in **bold** font indicate that the result reported meets or exceeds the groundwater screening level.

Depth to water measured from top of casing.

ng/L - nanogram per liter

PFOA - perfluorooctanoic acid

PFOS - perfluorooctane sulfonic acid

Samples analyzed by ALS Global Laboratories, Kelso, Washington.

Attachment A: Boring Logs

AECOM

AECOM Project Number: **60557313**	**Spokane International Airports, New Wells PFOA-PFOS Assessment**	**Boring Number: MW-13 Well Tag: BKP-258**
Equipment Type/ model #: Mobile G-2400		**Location NAD 83 47.6355 N, -117.4977 W**
Auger type/diameter: 8-inch Hollow Stem		
Contractor: Geologic Drill, LLC		**Sheet 1 of 1**
Sampling method: 2-inch SPT		
Hammer Weight: 140 Lbs		**Above-Grade Monument**
Free Fall: 30"		
Location of Boring: Approx. 185 feet W of east property line.		**Time 830**
Surface conditions/ Topsoil Depth: Grass-covered hillside.		**Date 11/2/17**

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
2-2-6	**100%**	0		**SM**	**Brown silty SAND with occasional gravel. Loose, Moist. With organics.**
		1			
		2			
		3			
		4			
5-6-6	**100%**	5		**SM**	**Brown silty SAND, Medium-dense, Moist.**
		6		**GM**	**Brown, silty GRAVEL with sand, Medium-dense, Wet.**
		7			
		8			
		9		**SP**	**Grey- brown SAND with trace silt, Medium-dense, Wet.**
10-13-37	**76%**	10			
		11		**RX**	**Basalt. Refusal at 11.5 feet bgs.**
		12			
		13			**Well constructed with 6-feet of 20-slot screen.**
		14			
		15			
		16			
		17			
		18			
		19			
		20			
		21			**Boring Completed at 11.5 feet BGS. Groundwater encountered at 6.8 feet bgs.**

AECOM Project Number: 60557313

Spokane International Airports, New Wells PFOA-PFOS Assessment

Boring Number: MW-14 Well Tag: BKP-259

Equipment Type/ model #: Mobile G-2400

Location NAD 83 47.6385 N, -117.4981 W

Auger type/diameter: 8-inch Hollow Stem

Contractor: Geologic Drill, LLC

Sampling method: 2-inch SPT

Sheet 1 of 1

Hammer Weight: 140 Lbs

Free Fall: 30"

Above-Grade Monument

Location of Boring: Approx. 300 feet W of east property line.

Time 1330

Surface conditions/ Topsoil Depth: Grass-covered.

Date 11/2/17

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
2-2-4		0		**SM**	**Brown silty SAND with occasional gravel. Loose, Moist. With organics.**
		1			
		2			
		3			
		4			
3-4-5		5		**SP**	**Grey- brown SAND with trace silt, Loose, Moist.**
		6			
		7			
		8			
		9			
2-2-3		10		**SP**	**Grey- brown SAND, Loose, Wet.**
		11			
		12			
		13			
		14			
2-2-5		15		**SP**	**Grey- brown SAND, Loose, Wet.**
		16			**Heaving sands-lost approximately 2-feet of boring. Boring terminated, well set.**
		17			
		18			
		19			**Completed well depth is 14.5- feet bgs.**
		20			**Well constructed with 10-feet of 20-slot screen.**
		21			**Boring Completed at 16.5-feet BGS. Groundwater encountered at 7.0 feet bgs.**

Attachment B: **Analytical Results**

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

November 30, 2017

Analytical Report for Service Request No: K1712199

Gary Panther
AECOM
528 E. Spokane Falls Boulevard,
Suite 503
Spokane, WA 99202

RE: SIA New Wells / 60557313

Dear Gary,

Enclosed are the results of the sample(s) submitted to our laboratory November 09, 2017
For your reference, these analyses have been assigned our service request number **K1712199.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Chris Leaf
Project Manager

Table of Contents

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory’s NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Environmental

CHAIN OF CUSTODY

81661

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

001

SR# K1712199

COC Set_____of_____

COC#____________

Page 1 of 1

Project Name SIA NEW WELLS
Project Number: 60557313
Project Manager GARY PANTHER
Company AECOM
Address C/o 101 S. GreenRidge DR. Liberty Lake, WA
Phone # 509-954-5090
email GARY.PANTHER@AECOM.COM
Sampler Signature
Sampler Printed Name GARY D. PANTHER

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	14D PFC/537M / PFOA	1	2	3	4	5	Remarks
1. MW-5		11-8-17	1300	W	4	X						
2. MW-13		11-8-17	1200	W	2	X						
3. MW-14		11-8-17	1100	W	2	X						
4.												
5.												
6.												
7.												
8.												
9.												
10.												

Report Requirements

☒ I. Routine Report: Method Blank, Surrogate, as required
☐ II. Report Dup., MS, MSD as required
☐ III. CLP Like Summary (no raw data)
☐ IV. Data Validation Report
☐ V. EDD

Invoice Information

P.O.# NON PO
Bill To: GARY PANTHER
AECOM

Turnaround Requirements

☐ 24 hr. ☐ 48 hr.
☐ 5 Day
☒ Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments:

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other_____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature CODY GRAVES	Signature	Signature	Signature	Signature
Printed Name GARY D. PANTHER	Printed Name ALS	Printed Name	Printed Name	Printed Name	Printed Name
Firm AECOM	Firm 11/9/17 0930	Firm	Firm	Firm	Firm
Date/Time 11-8-17 1500	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

ALS

PC CC

Cooler Receipt and Preservation Form

Client Aecom Service Request K17 12199

Received: 11/9/17 Opened: 11/9/17 By: CG Unloaded: 11/9/17 By: CG

1. Samples were received via? USPS [✓ Fed Ex] UPS DHL PDX Courier Hand Delivered
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other ______ NA
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? 2 Front

   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

Raw Cooler Temp	Corrected. Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.3	-0.3	4.9	4.9	0.0	391	81661	788385070332	

4. Packing material: Inserts [✓ Baggies] [✓ Bubble Wrap] [✓ Gel Packs] Wet Ice Dry Ice Sleeves ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA [✓ Y] N

   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y [✓ N]
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Identified by:
MW-11	MW-14	Elimination

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: ______

7/25/16

Page ____ ***of*** ____

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

Client:	AECOM	**Service Request:**	K1712199
Project:	SIA New Wells/60557313	**Date Collected:**	11/08/17 13:00
Sample Matrix:	Water	**Date Received:**	11/09/17 09:30
Sample Name:	MW-5	**Units:**	ng/L
Lab Code:	K1712199-001	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluorooctanoic acid (PFOA)	**66**	1.8	1	11/22/17 22:27	11/15/17	
Perfluorooctane sulfonic acid (PFOS)	**120**	4.6	1	11/22/17 22:27	11/15/17	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	77	31 - 142	11/22/17 22:27	
13C4-PFOS	72	27 - 142	11/22/17 22:27	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	AECOM	**Service Request:**	K1712199
Project:	SIA New Wells/60557313	**Date Collected:**	11/08/17 12:00
Sample Matrix:	Water	**Date Received:**	11/09/17 09:30
Sample Name:	MW-13	**Units:**	ng/L
Lab Code:	K1712199-002	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluorooctanoic acid (PFOA)	**85**	1.8	1	11/22/17 22:37	11/15/17	
Perfluorooctane sulfonic acid (PFOS)	**72**	4.6	1	11/22/17 22:37	11/15/17	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	70	31 - 142	11/22/17 22:37	
13C4-PFOS	70	27 - 142	11/22/17 22:37	

Analytical Report

Client:	AECOM	**Service Request:**	K1712199
Project:	SIA New Wells/60557313	**Date Collected:**	11/08/17 11:00
Sample Matrix:	Water	**Date Received:**	11/09/17 09:30
Sample Name:	MW-14	**Units:**	ng/L
Lab Code:	K1712199-003	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluorooctanoic acid (PFOA)	**350**	1.8	1	11/22/17 22:48	11/15/17	
Perfluorooctane sulfonic acid (PFOS)	**50**	4.5	1	11/22/17 22:48	11/15/17	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	65	31 - 142	11/22/17 22:48	
13C4-PFOS	71	27 - 142	11/22/17 22:48	

Client:	AECOM	**Service Request:**	K1712199
Project:	SIA New Wells/60557313	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KQ1717064-03	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result		MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluorooctanoic acid (PFOA)	ND	U	2.0	1	11/22/17 21:03	11/15/17	
Perfluorooctane sulfonic acid (PFOS)	ND	U	5.0	1	11/22/17 21:03	11/15/17	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	73	31 - 142	11/22/17 21:03	
13C4-PFOS	67	27 - 142	11/22/17 21:03	

Client: AECOM **Service Request:** K1712199
Project: SIA New Wells/60557313
Sample Matrix: Water

SURROGATE RECOVERY SUMMARY
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Extraction Method: EPA 3535A

		13C4-PFOA	13C4-PFOS
Sample Name	**Lab Code**	31 - 142	27 - 142
MW-5	K1712199-001	77	72
MW-13	K1712199-002	70	70
MW-14	K1712199-003	65	71
Lab Control Sample	KQ1717064-01	72	69
Duplicate Lab Control Sample	KQ1717064-02	69	65
Method Blank	KQ1717064-03	73	67

Client:	AECOM	**Service Request:**	K1712199
Project:	SIA New Wells/60557313	**Date Analyzed:**	11/22/17
Sample Matrix:	Water	**Date Extracted:**	11/15/17

Duplicate Lab Control Sample Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method:	PFC/537M	**Units:**	ng/L
Prep Method:	EPA 3535A	**Basis:**	NA
		Analysis Lot:	571129

	Lab Control Sample KQ1717064-01			**Duplicate Lab Control Sample KQ1717064-02**					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Perfluorooctane sulfonic acid (PFOS)	138	155	89	145	155	94	29-162	5	30
Perfluorooctanoic acid (PFOA)	164	167	98	170	167	102	52-147	4	30

GSI Job No.: 6892
Issued: 13 August 2024

SITE ASSESSMENT REPORT

Spokane International Airport

Spokane, WA

APPENDIX B.2

SES, 2018. 2018 Monitoring Well Installation and Groundwater Monitoring for Perfluorinated Chemicals.

3810 East Boone Avenue, Suite 101
Spokane, Washington 99202
509.688.5376

September 10, 2018

Mr. Matt Breen
Spokane International Airport
9000 West Airport Drive
Spokane, Washington 99219

RE: Monitoring Well Installation and Groundwater Monitoring for Perfluorinated Chemicals
Spokane International Airport
Spokane, Washington
SIA Contract #18-43-9999-028-001-00
SES Project No.:0270-001

Dear Mr. Breen:

Attached are the results and supporting documentation for the recent, limited groundwater monitoring event for the perfluorinated chemicals, Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS). This monitoring event was conducted per your request so that Spokane International Airport's (SIA) could ascertain if detectable levels of perfluorinated chemicals are present in shallow groundwater beneath the airport. Samples were collected from newly installed monitoring wells MW-15, MW-17 and MW-18. Monitoring well MW-16 was observed to be dry and was not sampled.

Our scope of work for this project included the following tasks:

- Contracted and provided oversight for the installation of additional monitoring wells with locations near the east property line of the Airport. Boring locations were screened for utilities by both public and private utility locate contractors. Monitoring wells were installed on July 30 and 31, 2018 by Geologic Drill, LLC, a Washington-licensed driller in accordance with applicable state regulations.
- Performed one limited groundwater monitoring and sampling event on August 6, 2018. Groundwater samples were collected from the three of the four new monitoring wells MW-15, MW-17 and MW-18. The locations of the wells are shown on Figure 1.
- Groundwater samples were shipped to ALS Global Laboratories' (ALS) laboratory in Kelso, Washington for analysis. ALS is accredited by the Washington State Department of Ecology with the certification number C544. The samples were analyzed for PFOA and PFOS by USEPA Method 537M. Samples were submitted on a standard turnaround time of 15–business days. SES reviewed the analytical data and no data usability issues were identified.
- Prepared this letter report presenting the results of the sampling event, compared the analytical results to national standards, and provided our conclusions and recommendations.

Monitoring Well Installation

Three groundwater monitoring wells (MW-16, MW-17 and MW-18) were installed on July 30 with MW-15 being installed on July 31, 2018. The locations of the wells were approved prior to installation by SIA personnel. Utility clearance was conducted through the public One Call system, with specific boring locations cleared by Advance Underground Utility Locating (AUUL) prior to bringing the driller on site. Monitoring wells were installed using 2-inch diameter poly-vinyl chloride screen and casing and were finished with aboveground steel monuments and protective bollards.

MW-15 is located in an undeveloped area west of the former USAF Ammo Storage area. The well is located in an inferred cross-gradient location to the Airport.

MW-16 is located in an undeveloped area west of runway 3/21. The well is located in an inferred up-gradient location to the Airport.

MW-17 is located in an undeveloped area south of runway 3/21. The well is located in an inferred up-gradient location to the Airport.

MW-18 is located in an area which was part of the former Geiger Field. The well is located in an inferred up-gradient location to the Airport.

Groundwater flow direction was not calculated for this event. Various studies have been conducted in support of the pending Stormwater Discharge Permit and each has concluded that the direction of flow for shallow groundwater across the site is generally northeasterly.

Monitoring well locations are shown on **Figure 1**. Boring logs and well construction information are included in **Attachment A - Boring Logs**.

Groundwater Sampling

Depth to water in each well was measured to the nearest 1/100th of a foot prior to sampling. Groundwater samples were collected from each well using a peristaltic pump. The new wells were purged for approximately one hour prior to measuring field parameters. Purging and sampling using low-flow sampling techniques where flow rates were generally about 0.3 to 0.5 liters per minute (l/min). The purge rate was adjusted to minimize the drawdown of groundwater in the wells during purging.

Field parameters were measured with a Horiba-U52 water quality meter. Parameters include pH, conductivity, turbidity, dissolved oxygen (DO), temperature, and oxidation reduction potential (ORP). Once field parameters stabilized within 10% from reading to reading for each parameter, laboratory-prepared sample containers were filled with water from the wells, sealed and placed on ice. Samples were shipped next-day delivery to the laboratory the same day as collected.

Results

Groundwater levels were measured in the monitoring wells on August 6, 2018. Depth to water ranged from 10.32 to 15.52 feet bgs. Groundwater samples were collected from monitoring wells MW-15, MW-17 and MW-18. Monitoring well MW-16 was observed to be dry.

PFOA was not detected at a concentration exceeding the Method Reporting Limit in the sample collected from monitoring well MW-15. Only one sample (MW-18) collected from the three monitoring wells had detection of PFOS at a level exceeding the screening level of 70 ng\L.

Concentrations of PFOA/PFOS in the remaining samples did not exceed the 70 ng/L screening level.

Analytical results are shown on **Table 1** and the laboratory analytical report is included in **Attachment B – Analytical Results**.

Summary

The highest concentration of perfluorinated compounds was detected in the groundwater sample collected from MW-18. This well is located within the former Geiger Field area. Current and historic aviation practices appear to have impacted shallow groundwater quality in this portion of the Airport.

Limitations

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area and in general accordance with the terms and conditions set forth in our Agreement, and with the SES proposal dated July 2, 2018. No other warranty, express or implied, is made.

The findings presented in this report are based on conditions observed at specific site locations and sampling intervals at the time of the assessment. Because conditions between the wells and sampling intervals may vary over distance and time, the potential always remains for the presence of unknown, unidentified, unforeseen, or changed surface and subsurface contamination.

This report is for the exclusive use of Spokane International Airport and its representatives. No third party shall have the right to rely on SES's opinions rendered in connection with the services or in this document without our written consent and the third party's agreement to be bound to the same conditions and limitations as Spokane International Airport.

SES appreciates the opportunity to provide these services. Please contact the undersigned regarding any questions related to the information provided in this letter report.

Sincerely,

Spokane Environmental Solutions, LLC.

Gary D. Panther, LG, LEG

Attachments:

Figure 1: Spokane International Airport Additional Site Monitoring Wells
Table 1: Summary of Groundwater Analytical Results
Attachment A: Boring Logs
Attachment B: Analytical Results

Figures

MW-14	*Nov 2017*
PFOA	350 ng/L
PFOS	50 ng/L

MW-13	*Nov 2017*
PFOA	85 ng/L
PFOS	72 ng/L

MW-15	*Aug 2018*
PFOA	<3.8 ng/L
PFOS	1.6 ng/L

MW-18	*Aug 2018*
PFOA	72 ng/L
PFOS	22 ng/L

MW-16	*Aug 2018*
PFOA	DRY
PFOS	DRY

MW-17	*Aug 2018*
PFOA	6.2 ng/L
PFOS	3.9 ng/L

Source: Google Earth Pro

SITE MAP

SPOKANE INTERNATIONAL AIRPORT
ADDITIONAL SITE MONITORING WELLS
SPOKANE, WASHINGTON

SES
SPOKANE ENVIRONMENTAL SOLUTIONS

FIGURE 1

Tables

Table 1
Summary of Groundwater Analytical Results
Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS)
Spokane International Airport

Well ID	Sample Date	Depth to Water	PFOA (ng/L)	PFOS (ng/L)
Groundwater Screening Level (ng/L)[1]			70	70
MW-15	8/6/2018	10.32	<3.8	1.6
MW-16	8/6/2018	Dry	--	--
MW-17	8/6/2018	15.52	6.2	3.9
MW-18	8/6/2018	10.56	**72**	22

Notes:

[1] Groundwater screening levels were obtained from EPA's "Fact Sheet, PFOA & PFOS Drinking Water Health Advisories," dated November 2016.

Values in **bold** font indicate that the result reported meets or exceeds the groundwater screening level.

Depth to water measured from top of casing.

ng/L - nanogram per liter

PFOA - perfluorooctanoic acid

PFOS - perfluorooctane sulfonic acid

Samples analyzed by ALS Global Laboratories, Kelso, Washington.

Attachment – A

Boring Logs

SES Project Number: 0270-001	**Spokane International Airports, New Wells PFOA-PFOS Assessment**	**Boring Number:** MW-15 Well Tag: BKP-260
Equipment Type/ model #: Mobile G-2400		**Location NAD 83** 47.622229 N, -117.552446 W
Auger type/diameter: 8-inch Hollow Stem		
Contractor: Geologic Drill, LLC		
Sampling method: 2-inch SPT		Sheet 1 of 1
Hammer Weight: 140 Lbs		Above-Grade Monument
Free Fall: 30"		
Location of Boring: West of SE Ammo Storage Road.		Time 800
Surface conditions/ Topsoil Depth: Grass-covered.		
		Date 7/31/18

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
2-2-4	80%	0		GM	Brown silty GRAVEL with sand. Loose, Dry. With organics.
		1			
		2			
		3			
		4			
3-10-9	50%	5		GP	Grey- brown GRAVEL with trace silt, Loose, Moist.
		6			
		7			
		8			
		9			
6-10-9	50%	10		GP	Grey- brown GRAVEL with trace silt, Loose, Wet.
		11			
		12			
		13			
		14			
		15			
		16			
		17			
		18			
		19			Completed well depth is 12.0- feet bgs.
		20			Well constructed with 5-feet of 20-slot screen.
		21			Boring Completed at 12-feet BGS. Groundwater encountered at 10.0 feet bgs.

SES Project Number: 0270-001

Spokane International Airports, New Wells PFOA-PFOS Assessment

Boring Number: MW-16 Well Tag: BKP-263

Equipment Type/ model #: Mobile G-2400

Location NAD 83 47.611527 N, -117.558968 W

Auger type/diameter: 8-inch Hollow Stem

Contractor: Geologic Drill, LLC

Sampling method: 2-inch SPT

Sheet 1 of 1

Hammer Weight: 140 Lbs

Free Fall: 30"

Above-Grade Monument

Location of Boring: East of S. Center Road.

Surface conditions/ Topsoil Depth: Grass-covered.

Time 700

Date 7/30/18

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
2-3-2	8%	0	░	SM	Brown silty SAND with occasional gravel. Loose, Moist. With organics.
		1	░		
		2	░		
		3	░		
		4	░		
6-7-7	8%	5	░	SM	Grey- brown SAND with trace silt, Loose, Moist.
		6	░		
		7	░		
50/0	0%	8	▒	RX	Refusal on Basalt.
		9			
		10			
		11			
		12			
		13			
		14			
		15			
		16			
		17			
		18			
		19			Completed well depth is 8.5- feet bgs.
		20			Well constructed with 2.5-feet of 20-slot screen.
		21			Boring Completed at 8.5-feet BGS. Groundwater was not encountered.

SES Project Number: 0270-001	Spokane International Airports, New Wells PFOA-PFOS Assessment	Boring Number: MW-17 Well Tag: BKP-262
Equipment Type/ model #: Mobile G-2400		Location NAD 83 47.604917 N, -117.552602 W
Auger type/diameter: 8-inch Hollow Stem		
Contractor: Geologic Drill, LLC		
Sampling method: 2-inch SPT		Sheet 1 of 1
Hammer Weight: 140 Lbs		Above-Grade Monument
Free Fall: 30"		
Location of Boring: South of W. Electric Avenue.		Time 1000
Surface conditions/ Topsoil Depth: Grass-covered.		
		Date 7/30/18

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
		0		SM	Brown silty SAND with occasional gravel. Loose, Moist. With organics.
		1			
		2			
		3			
		4			
3-3-4	80%	5		SP	Grey- brown SAND with trace silt, Loose, Moist.
		6			
		7			
		8			
		9			
11-11-19	70%	10		SP	Grey- brown SAND with occasional gravel, Medium-dense, Moist.
		11			
		12			
		13			
		14			
15-19-26	80%	15		SP	Grey- brown SAND with occasional gravel, Medium-dense, Wet.
		16			
		17			
		18			
		19			
10-11-12	90%	20		SM	Brown silty SAND with occasional gravel. Medium-dense, Wet. Completed well depth is 25.0- feet bgs.
		21			Well constructed with 10-feet of 20-slot screen. Boring Completed at 25.0-feet BGS. Groundwater encountered at 15.5 feet bgs.

SES Project Number: 0270-001	Spokane International Airports, New Wells PFOA-PFOS Assessment	Boring Number: MW-18 Well Tag: BKP-261
Equipment Type/ model #: Mobile G-2400		Location NAD 83 47.619878 N, -117.517124 W
Auger type/diameter: 8-inch Hollow Stem		
Contractor: Geologic Drill, LLC		
Sampling method: 2-inch SPT		Sheet 1 of 1
Hammer Weight: 140 Lbs		Above-Grade Monument
Free Fall: 30"		
Location of Boring: South of W. Electric Avenue.		Time 1300
Surface conditions/ Topsoil Depth: Grass-covered.		
		Date 7/30/18

Blow Counts	Recovery %	Depth in Feet	Graphic Log	Soil Graph/ USCS	Material Description
		0		GM	Brown silty Gravel with sand. Loose, Dry. With organics.
		1			
		2			
		3			
		4			
3-7-9	60%	5		GM	Grey- brown silty GRAVEL with sand, Loose, Dry.
		6			
		7			
		8			
		9			
10-12-15	70%	10		SP	Grey- brown SAND, Loose, Wet. Becomes weathered Basalt
		11		Rx	Weathered Basalt. Refusal at 13.0 feet bgs.
		12			
		13			
		14			
		15			
		16			
		17			
		18			
		19			Completed well depth is 12.0- feet bgs.
		20			Well constructed with 5-feet of 20-slot screen.
		21			Boring Completed at 13.0-feet BGS. Groundwater encountered at 10.0 feet bgs.

Attachment – B

Analytical Results

August 31, 2018 Service Request No:K1807404

Gary Panther
Spokane Environmental Solutions, LLC
3810 E. Boone Avenue, Ste 101
Spokane, WA 99202

Laboratory Results or: SIA

Dear Gary,

Enclosed are the results of the sample(s) submitted to our laboratory August 08, 2018
For your reference, these analyses have been assigned our service request number **K1** **.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf ALSGlobal.com.

Respectfully submitted,

ALS Group SA, Corp. dba ALS Environmental

for Chris Leaf
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHO E 1 360 577 7222 FA 1 360 636 1068
ALS Group SA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Spokane Environmental Solutions, LLC
Service Request: K1807404
Project: SIA
Date Received: 08/08/2018
Sample Matrix: Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

Sample Receipt:

Three water samples were received for analysis at ALS Environmental on 08/08/2018. The samples were received in good condition and consistent with the accompanying chain of custody form except as noted on the cooler receipt and preservation form included in this report. Please note that these samples were received above the recommended cooler temperature of six degrees C. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

Organic LC:

No significant anomalies were noted with this analysis.

Approved by ______________________

Date 08/31/2018

SAMPLE DETECTION SUMMARY

CLIENT ID: MW-1 **Lab ID: K1 - 1**

Analyte	Results	Flag	MDL	MRL	Units	Method
Perfluorooctanoic acid (PFOA)	1.6			1.5	ng/L	PFC/537M

CLIENT ID: MW-1 **Lab ID: K1 -**

Analyte	Results	Flag	MDL	MRL	Units	Method
Perfluorooctanoic acid (PFOA)	3.9			1.5	ng/L	PFC/537M
Perfluorooctane sulfonic acid (PFOS)	6.2			3.8	ng/L	PFC/537M

CLIENT ID: MW-1 **Lab ID: K1 -**

Analyte	Results	Flag	MDL	MRL	Units	Method
Perfluorooctanoic acid (PFOA)	22			1.5	ng/L	PFC/537M
Perfluorooctane sulfonic acid (PFOS)	72			3.8	ng/L	PFC/537M

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Spokane Environmental Solutions, LLC **Service Request:** K1807404

Project: SIA/270-001

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K1807404-001	MW-15	8/6/2018	1500
K1807404-002	MW-17	8/6/2018	1230
K1807404-003	MW-18	8/6/2018	1100

ALS Environmental

CHAIN OF CUSTODY
91636

1317 South 13th Ave. Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

001

SR# K1807404
COC Set____of____
COC#__________

Page 1 of 1

Project Name: SIA
Project Number: 270-001
Project Manager: GARY PANTHER
Company: SES
Address: 3808 E. Boone, Spokane, WA 99202
Phone #: 509-954-5090
email: GARY@SPOKANEENVIRONMENTAL.COM
Sampler Signature:
Sampler Printed Name: GARY D. PANTHER

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	14D PFC/537M / PFOA	1	2	3	4	5	Remarks
1. MW-15		8-6-18	1500	W	2	X						
2. MW-17		8-6-18	1230	W	2	X						
3. MW-18		8-6-18	1100	W	2	X						
4.												
5.												
6.												
7.												
8.												
9.												
10.												

Report Requirements

X I. Routine Report: Method Blank, Surrogate, as required
__ II. Report Dup., MS, MSD as required
__ III. CLP Like Summary (no raw data)
__ IV. Data Validation Report
__ V. EDD

Invoice Information

P.O.# 270-001
Bill To: SES

Turnaround Requirements

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments:

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other_____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name Gary D. Panther	Printed Name ALS	Printed Name	Printed Name	Printed Name	Printed Name
Firm SES	Firm 8/8/18 1010	Firm	Firm	Firm	Firm
Date/Time 8-6-18 1600	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

PC CL

Cooler Receipt and Preservation Form

Client SES

Service Request K18 C7404

Received: 8/8/18 Opened: 8/8/18 By: Unloaded: 8/8/18 By:

1. Samples were received via? USPS [✓ Fed Ex] UPS DHL PDX Courier Hand Delivered
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other NA
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? One, front

   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

Raw Cooler Temp	Corrected. Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
13.4	13.5	13.2	13.3	+0.1	384		7227 2443 3404	

4. Packing material: Inserts [✓ Baggies] [✓ Bubble Wrap] [✓ Gel Packs] Thawed Wet Ice Dry Ice Sleeves
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA [✓ Y] N

   If applicable, tissue samples were received: Frozen Partially Thawed Thawed
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
All		X								

Notes, Discrepancies, & Resolutions:

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client: Spokane Environmental Solutions, LLC
Service Request: K1807404
Project: SIA/270-001

Sample Name: MW-15
Date Collected: 08/6/18
Lab Code: K1807404-001
Date Received: 08/8/18
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
PFC/537M	NHILLIKER	CMULLER

Sample Name: MW-17
Date Collected: 08/6/18
Lab Code: K1807404-002
Date Received: 08/8/18
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
PFC/537M	NHILLIKER	CMULLER

Sample Name: MW-18
Date Collected: 08/6/18
Lab Code: K1807404-003
Date Received: 08/8/18
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
PFC/537M	NHILLIKER	CMULLER

Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

ALS Environmental

High Performance Liquid Chromatography

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1807404
Project:	SIA/270-001	**Date Collected:**	08/06/18 15:00
Sample Matrix:	Water	**Date Received:**	08/08/18 10:10
Sample Name:	MW-15	**Units:**	ng/L
Lab Code:	K1807404-001	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	ND U	3.8	1	08/22/18 13:08	8/10/18	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	**1.6**	1.5	1	08/22/18 13:08	8/10/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	67	31 - 142	08/22/18 13:08	
13C4-PFOS	62	27 - 142	08/22/18 13:08	

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1807404
Project:	SIA/270-001	**Date Collected:**	08/06/18 12:30
Sample Matrix:	Water	**Date Received:**	08/08/18 10:10
Sample Name:	MW-17	**Units:**	ng/L
Lab Code:	K1807404-002	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	**6.2**	3.8	1	08/22/18 13:18	8/10/18	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	**3.9**	1.5	1	08/22/18 13:18	8/10/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	67	31 - 142	08/22/18 13:18	
13C4-PFOS	65	27 - 142	08/22/18 13:18	

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1807404
Project:	SIA/270-001	**Date Collected:**	08/06/18 11:00
Sample Matrix:	Water	**Date Received:**	08/08/18 10:10
Sample Name:	MW-18	**Units:**	ng/L
Lab Code:	K1807404-003	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	**72**	3.8	1	08/22/18 13:29	8/10/18	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	**22**	1.5	1	08/22/18 13:29	8/10/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	64	31 - 142	08/22/18 13:29	
13C4-PFOS	60	27 - 142	08/22/18 13:29	

QC Summary Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

High Performance Liquid Chromatography

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

Client: Spokane Environmental Solutions, LLC **Service Request:** K1807404
Project: SIA/270-001
Sample Matrix: Water

SURROGATE RECOVERY SUMMARY

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Extraction Method: EPA 3535A

Sample Name	Lab Code	13C4-PFOA 31-142	13C4-PFOS 27-142
MW-15	K1807404-001	67	62
MW-17	K1807404-002	67	65
MW-18	K1807404-003	64	60
Method Blank	KQ1810863-03	85	75
Lab Control Sample	KQ1810863-01	79	72
Duplicate Lab Control Sample	KQ1810863-02	68	65

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1807404
Project:	SIA/270-001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KQ1810863-03	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	ND U	5.0	1	08/22/18 10:52	8/10/18	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	ND U	2.0	1	08/22/18 10:52	8/10/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOA	85	31 - 142	08/22/18 10:52	
13C4-PFOS	75	27 - 142	08/22/18 10:52	

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1807404
Project:	SIA/270-001	**Date Analyzed:**	08/22/18
Sample Matrix:	Water	**Date Extracted:**	08/10/18

Duplicate Lab Control Sample Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method:	PFC/537M	**Units:**	ng/L
Prep Method:	EPA 3535A	**Basis:**	NA
		Analysis Lot:	603453

	Lab Control Sample KQ1810863-01			Duplicate Lab Control Sample KQ1810863-02					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Perfluorooctane sulfonic acid (PFOS)	161	149	108	170	149	114	29-162	5	30
Perfluorooctanoic acid (PFOA)	134	160	84	174	160	109	52-147	26	30

SITE ASSESSMENT REPORT

Spokane International Airport

Spokane, WA

APPENDIX B

SES, 2019a. Limited Groundwater Assessment Park Drive Disposal Area.

SPOKANE ENVIRONMENTAL SOLUTIONS
3810 East Boone Avenue, Suite 101
Spokane, Washington 99202
509.688.5376

April 2, 2019

Mr. Matt Breen
Spokane International Airport
9000 West Airport Drive
Spokane, Washington 99219

RE: Limited Groundwater Assessment Park Drive Disposal Area
Spokane International Airport
Spokane, Washington
SIA Contract #19-43-9999-006-001-00
<u>SES Project No.:0270-002</u>

Dear Mr. Breen:

Attached are the results and supporting documentation for the recent, limited groundwater monitoring event for perfluorinated chemicals and conventional chemistry contaminants of concern historically associated with this site. This monitoring event was conducted per your request to provide a snap shot of current shallow groundwater conditions beneath the Site. Samples were collected from historic groundwater monitoring wells installed in the 1990s on behalf of the Army Corps of Engineers.

SES understands that the site was formerly used as a borrow source, with an associated asphalt batch plant being located to the north. Later, portions of the site were used as a construction waste disposal site. The Site location is shown on **Figure 1**.

The latest Site Closure Summary was conducted by Herrera and Associates in 2003 which reported that the only contaminates of concern (COCs) exceeding the Model Toxics Control Act (MTCA) Method A cleanup criteria for unrestricted use in shallow groundwater were oil-range petroleum hydrocarbons and arsenic. Detections of TCE were also observed in samples collected from site wells but these detections were reported as ‘minor and infrequent’. The last reported sampling of these wells was in 1999.

Our scope of work for this project included the following tasks:

- SES developed a Work Plan which dictated site sampling protocol. The Work plan included a sampling and analysis plan and a site-specific health and safety plan.
- Conducted one (1) groundwater sampling event on February 28, 2019. Groundwater samples were collected from the well pair from MW1-A and MW1-B.
- Groundwater samples were delivered to TestAmerica in Spokane, Washington for analysis of: diesel-range petroleum hydrocarbons by Northwest Method NWTPH-Dx, volatile organic compounds (VOCs) by EPA Method 8260, and total arsenic by EPA Methods 6000/7000. Sample containers collected for perfluorinated compounds were sent to ALS Global laboratory for analysis by EPA Method 537M. ALS is accredited by the Washington State Department of Ecology with the certification number C544. The samples were analyzed for PFOA and PFOS by USEPA Method 537M.

Samples were submitted on a standard turnaround time of 15–business days. SES reviewed the analytical data and no data usability issues were identified.

- Prepared this letter report presenting the results of the sampling event, compared the analytical results to national standards, and provided our conclusions and recommendations.

Groundwater Sampling

Depth to water in each well was measured to the nearest 1/100th of a foot prior to sampling.

Depth to water was measured at 14.35 feet below top of casing in MW-1A and 13.23 feet below top of casing in MW-1B.

Groundwater samples were collected from each well using a peristaltic pump. Purging and sampling using low-flow sampling techniques where flow rates were generally about 0.2 to 0.3 liters per minute (l/min). The purge rate was adjusted to minimize the drawdown of groundwater in the wells during purging.

Groundwater levels were measured in the monitoring wells on February 28, 2019. Depth to water ranged from 13.23 to 14.35 feet below top of casing in monitoring wells MW-1B and MW-1A, respectively.

The well pair are located on the south side of the Site, north of the current pond. MW-1A is the deepest of the wells and has an installed depth of 83 feet. The well is screened from 65 - 75 feet. SES was not able to advance the sample tubing to the screened interval due to an obstruction in the well casing at about 50 feet below top of casing. This obstruction is likely a joint in the casing that has loosened over time and creates a ridge which does not allow the tubing to pass as it hangs on the sidewall. The well is screened into a deeper, semi-confined water-bearing unit. The connection, if any with the water-bearing unit sampled from MW-1B is not fully understood.

Monitoring well MW-1B has an installed depth of 65.5 feet and has screened intervals between 2.5 - 32.5 feet and from 35 – 45 feet. SES placed the sample tubing intake at approximately 20 feet for this sample.

Field parameters were measured with a Horiba-U52 water quality meter. Parameters include pH, conductivity, turbidity, dissolved oxygen (DO), temperature, and oxidation reduction potential (ORP). Once field parameters stabilized within 10% from reading to reading for each parameter, laboratory-prepared sample containers were filled with water from the wells, sealed, and placed on ice. Samples were shipped next-day delivery to the laboratory the same day as collected.

Monitoring well locations are shown on **Figure 2**. Boring logs and well construction information is included in **Attachment A - Boring Logs.**

Analytical Results

PFOA and PFOS were not detected at a concentration exceeding the screening level of 70 ng\L in either sample.

Concentrations of BTEX, TCE and Dx did not exceed Method Reporting Limits (MRL) and/or MTCA Method A cleanup criteria in either sample.

Concentrations of total arsenic in groundwater samples did not exceed the MRL and/or MTCA Method A cleanup criteria in either sample.

Analytical results are shown on **Table 1 and Table 2.** Laboratory analytical reports are included in **Attachment B – Analytical Results**.

Summary

The highest concentration of perfluorinated compounds was detected in the groundwater sample collected from MW-1B. This well is screened near-surface and groundwater is likely interconnected to surface water in the adjacent pond. In general, contaminants of concern in both wells do not exceed applicable cleanup criteria.

Limitations

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area and in general accordance with the terms and conditions set forth in our Agreement, and with the revised SES proposal dated February 9, 2019. No other warranty, express or implied, is made.

The findings presented in this report are based on conditions observed at specific site locations and sampling intervals at the time of the assessment. Because conditions between the wells and sampling intervals may vary over distance and time, the potential always remains for the presence of unknown, unidentified, unforeseen, or changed surface and subsurface contamination.

This report is for the exclusive use of Spokane International Airport and its representatives. No third party shall have the right to rely on SES's opinions rendered in connection with the services or in this document without our written consent and the third party's agreement to be bound to the same conditions and limitations as Spokane International Airport.

SES appreciates the opportunity to provide these services. Please contact the undersigned regarding any questions related to the information provided in this letter report.

Sincerely,

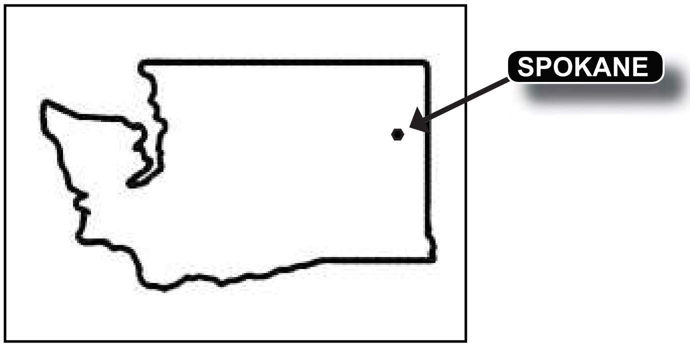
Spokane Environmental Solutions, LLC.

Gary D. Panther, LG, LEG

Attachments:

Figure 1: Location Map
Table 1: Summary of Groundwater Analytical Results - PFOA-PFOS
Table 2: Summary of Groundwater Analytical Results - Conventional Chemistry
Attachment A: Boring Logs
Attachment B: Analytical Results

Figures



N

Notes:

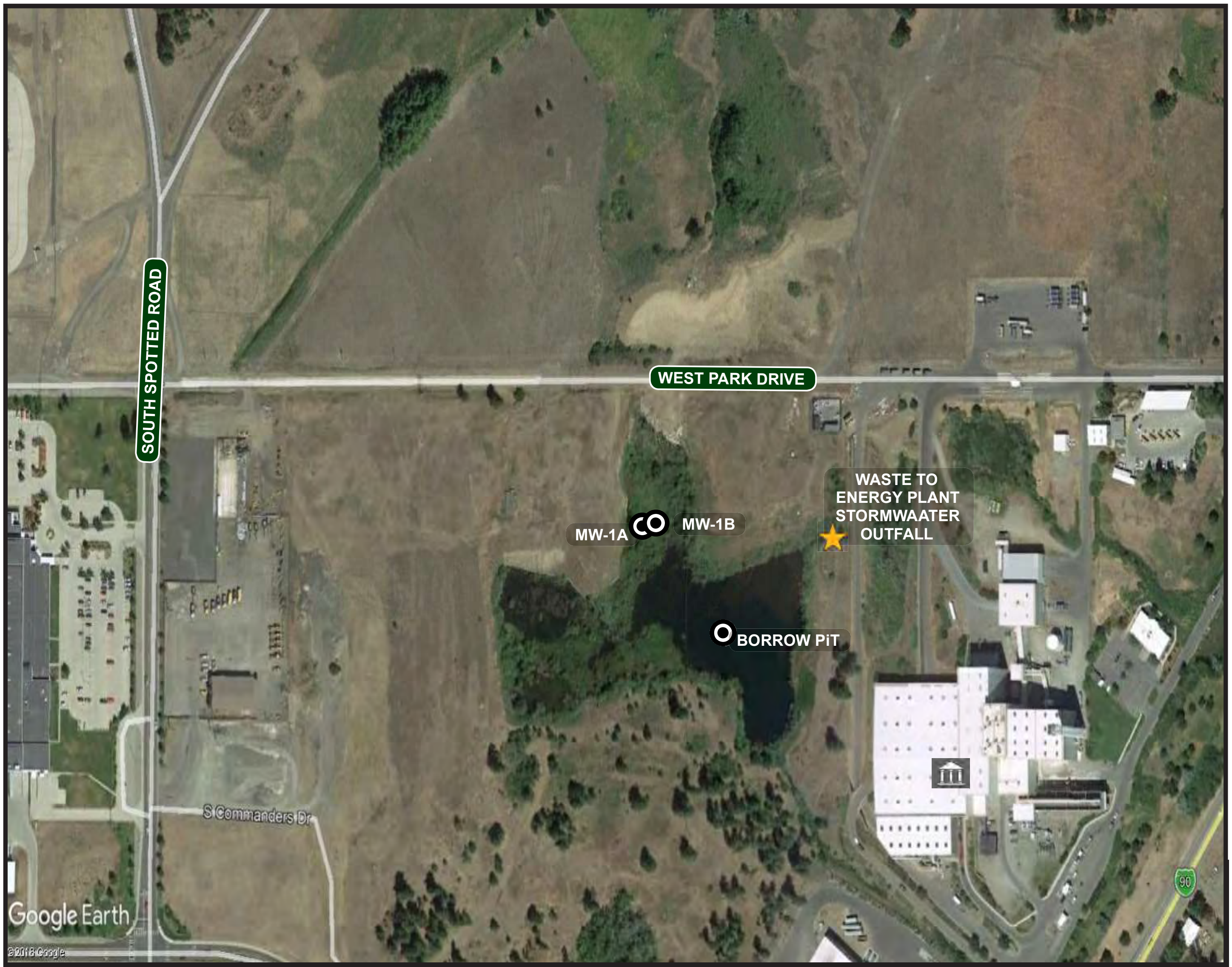
1. *The locations of all features shown are approximate.*
2. *This drawing is for information purposes. it is intended to assist in showing features discussed in an attached document.*

LOCATION MAP

SIA PARK DRIVE BORROW PIT
LIMITED GROUNDWATER ASSESSMENT
SPOKANE, WASHINGTON

SES
SPOKANE ENVIRONMENTAL SOLUTIONS

FIGURE 1



LEGEND:

◉	Monitoring Wells Sampled February 2019
🏛	Spokane Waste to Energy Plant
★	Waste to Energy Plant Stormwater Outfall

N

Notes:

1. *The locations of all features shown are approximate.*
2. *This drawing is for information purposes. it is intended to assist in showing features discussed in an attached document.*

Source: Google Maps

SAMPLE LOCATION MAP

SIA PARK DRIVE BORROW PIT
LIMITED GROUNDWATER ASSESSMENT
SPOKANE, WASHINGTON

SES
SPOKANE ENVIRONMENTAL SOLUTIONS

FIGURE 2

Tables

Table 1

Summary of Groundwater Analytical Results - Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS)

Limited Groundwater Assessment Park Drive Disposal Area

Spokane International Airport

			EPA-PFC/537M	
Well ID	**Sample Date**	**Depth to Water**	**PFOA (ng/L)**	**PFOS (ng/L)**
MW-1A	2/28/2019	14.35	10	5.9
MW-1B	2/28/2019	13.23	27	12
Groundwater Screening Level (ng/L) [1]			70	70

Notes:

[1] Groundwater screening levels were obtained from EPA's "Fact Sheet, PFOA & PFOS Drinking Water Health Advisories," dated November 2016.

Values in **bold** font indicate that the result reported meets or exceeds the groundwater screening level.

Depth to water measured from top of casing.

ng/L - nanogram per liter

PFOA - perfluorooctanoic acid

PFOS - perfluorooctane sulfonic acid

Samples analyzed by ALS Global Laboratories, Kelso, Washington.

Table 2
Summary of Groundwater Analytical Results - Conventional Chemistry
Limited Groundwater Assessment Park Drive Disposal Area
Spokane International Airport

			EPA-8260C					**NWTPH-Dx**		**EPA-6020B**
Sample ID	**Date Sampled**	**Depth to Water**	**Benzene ug/L**	**Toluene ug/L**	**Ethylbenzene ug/L**	**Total Xylenes ug/L**	**TCE ug/L**	**DRO mg/L**	**RRO mg/L**	**Arsenic mg/L**
MW-1A	2/28/2019	14.35	<0.40	<1.0	<1.0	<3.0	<1.0	<0.23	<0.39	<0.0050
MW-1B	2/28/2019	13.23	<0.4	<1.0	<1.0	<3.0	<1.0	<0.23	<0.38	<0.0050
MTCA Method A Cleanup Level [a]			5	1000	700	1000	5	0.5	0.5	0.005

Notes:

a: MTCA = Model Toxics Control Act Method A cleanup level for unrestricted use. Method B value used where Method A value not established.

DRO = Diesel-Range Organics.
RRO = Residual-Range Organics.
BTEX = benzene, toluene, ethylbenzene, (total) xylenes.
TCE = Trichloroethylene
ND = Analyte not detected at a concentration exceeding Method Reporting Limit (MRL). MRL is less than MTCA Method A Cleanup Criteria.
BOLD = Exceedance of cleanup level.

Samples Analyzed by TestAmerica, Spokane, WA

Attachment – A

Boring Logs

ECOVA Corporation
Well Installation Log

Well Number MW-1A
Date Drilled 5-10-90
Client · Army Corps of Engineers
Site SP Site (Task 6)
Job Number 801126
Field Geologist R.M. Weber
Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 83 Feet
Water Depth 13 Feet
Coordinates 246670.5625N
2460128.4101E
Casing Elevation 2319.00'
Sheet 1 of 2

General: 50 feet 6" steel casing, pressure grout.

Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	* LEL	% O$_2$	Sample Description
							SILTY SAND (SM) – Fine- to coarse-grained sand, brown, with black basalt cuttings, damp.
5							BASALT – Fresh, light gray, dry.
10							Basalt – Fresh, dark gray, dry. Hard drilling.
							∇ Static water level at 13 Feet.
15							BASALT – Alternating light and dark gray, dry.
20							
25							Dry, hard drilling.
30							BASALT – Gray, with white and orange fragments, easier drilling, damp.
35							WEATHERED BASALT – Same as above with minor clay, sand, and gravel.
40							Water yielding zone at 40 feet.
							BASALT – Fractured, weathered, orange and white fragments, some clays, sand and gravel.
45							BASALT – Dark gray.
50				3			

Graphic Log

801126-A-MW1A

* Background = 0 ppm

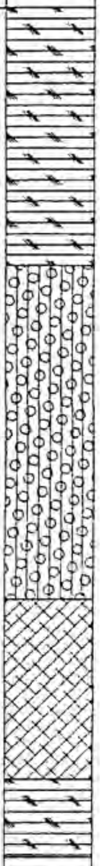
ECOVA Corporation

Well Installation Log

Client	Army Corps of Engineers	Drilling Company	Fogle Pump & Supply	Well Number	MW-1A
Site	SP Site (Task 6)	Boring Method	Air Rotary	Date Drilled	5-10-90
Job Number	801126	Borehole Depth	83 Feet	Coordinates	246670.5625N 2460128.4101E
Field Geologist	R.M. Weber	Water Depth	13 Feet	Casing Elevation	2319.00
				Sheet	2 of 2

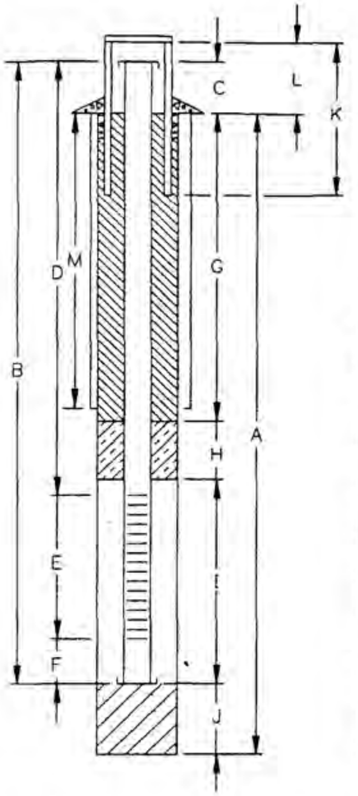
General: 50 feet 6" steel casing, pressure grout.

Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	% LEL	% O2	Sample Description	Graphic Log
							BASALT – Black, no water, good seal on conductor casing.	
55								
							BASALT – Black, with dark gray clay, damp.	
60								
							SILT AND CLAY WITH GRAVEL (GM/GC) – Black, damp.	
							Color change to dark brown.	
65								
							Color change to brown with increase in white and orange fragments, predominatly clay.	
70								
							WEATHERED BASALT – Black-gray, with orange and white clasts, soft drilling, damp. Water yielding zone at 75 feet.	
75								
							WEATHERED BASALT – Black-gray, with abundant orange and white fragments, soft drilling.	
80							BASALT – Dark gray, hard.	
							Bottom of Hole – 83 Feet	
85								
90								
95								
100								



* Background = ____ppm

WELL COMPLETION MW-1A



TOP OF CASING ELEVATION 2319.00'

A BORING DEPTH 83 FT.
BORING DIAMETER 6 IN.
B WELL DEPTH 79.3 FT.
C WELL STICKUP 1 FT.
D BLANK INTERVAL 66 FT.
BLANK DIAMETER 2 IN.
E SCREEN INTERVAL 65-75' FT.
SCREEN DIAMETER 2 IN.
TYPE/SLOT SIZE 0.01
F SEDIMENT TRAP 5 FT.
G ANNULAR SEAL 54 FT.
MATERIAL. GROUT
H. BENTONITE SEAL 6 FT.
I SANDPACK 18 FT.
TYPE/SIZE: 20/40
J BOTOM SEAL/PACK 2 FT.
MATERIAL: SAND
K WELL COVER ________ FT.
L STICKUP ________ FT.
M CONDUCTOR CASING 50 FT.

NOT TO SCALE

DRILLING TIMES:
START 0800 - 5/10/90 FINISH 1100 - 5/11/90
STANDBY or DOWN TIME:

METHOD OF DECON. PRIOR TO DRILLING:

DEVELOPMENT

METHOD OF DEVELOPMENT: DISPLACEMENT PUMPING @ 70 CYCLES/SEC

PUMP TIME 0305 TO 0500 DATE 5/17/90

TURBIDITY AFTER DEVELOPMENT: X CLEAR ____ MOD. TURBID ____ SL. TURBID ____ TURBID

ODOR IN WATER ?

WATER DISCHARGED TO: ____ GROUND SURFACE ____ STORAGE TANK ____ STORM SEWERS ____ TANK TRUCK 3 DRUMS

DEPTH OF WATER AFTER DEVELOPMENT: 6'

MATERIALS USED

4 1/2 SACKS of 20/40 SAND
7 SACKS of PORTLAND CEMENT
____ SACKS of PREMIX CONCRETE
____ GALLONS of GROUT USED
____ GROUT COMPOSITION #6 BENTONITE
1 SACKS of BENTONITE PELLETS
____ BUCKETS of BENTONITE PELLETS
____ YARDS CEMENT - SAND USED
3 CENTRALIZERS at 31, 59, AND 78.5' BGS

WELL COVER USED:
X Above Grade
____ At Grade
____ Other
X Lockable

FEB 6 1991

© 1990 ECOVA Corporation

801126-A-MW1AW

ECOVA Corporation

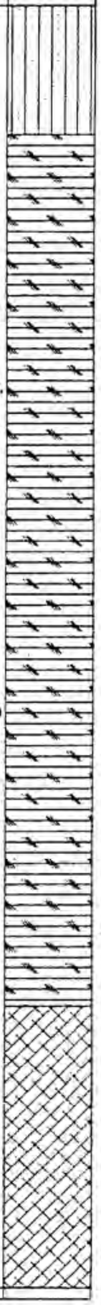
Well Installation Log

Well Number MW-1B
Date Drilled 5-8-90
Client. Army Corps of Engineers
Drilling Company Fogle Pump & Supply
Coordinates 246670.3593N
2460138.2368E
Site SP Site (Task 6)
Boring Method Air Rotary
Job Number 801126
Borehole Depth 65.5 Feet
Casing Elevation 2318.63
Field Geologist R.M. Weber
Water Depth 5 Feet
Sheet 1 of 2

General: 6" steel casing to 5 feet.

Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	% LEL	% O_2	Sample Description
							SILTY SAND (SM) – Fine- to coarse-grained sand, brown, black basalt gravel.
5							∇ Static water level at 5 feet.
							BASALT – Fresh, gray, dry.
10							BASALT – Fresh, dark gray – water at 12 feet.
							Water yielding zone at 12 feet.
15							BASALT – Light gray, cuttings are fine and powdery, very hard, dry.
20							
25							
30							BASALT – Dark gray, softer drilling, damp.
35							
							Water yielding zone at 30 feet.
40							WEATHERED BASALT – Dark gray, orange, and white fragments, minor clay and sand, soft.
45							
50							

Graphic Log



1990 ECOVA Corporation

* Background = 0 ppm

ECOVA Corporation

Well Installation Log

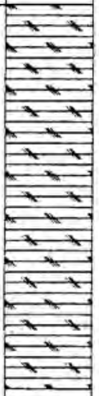
Client Army Corps of Engineers
Site SP Site (Task 6)
Job Number 801126
Field Geologist R.M. Weber

Drilling Company Fogle Pump & Supply
Boring Method Air Rotary
Borehole Depth 65.5 Feet
Water Depth 12/39 Feet

Well Number MW-1B
Date Drilled 5-8-90
Coordinates 246670.3593N
2460138.2368E
Casing Elevation 2318.63
Sheet 2 of 2

General:

Depth (Feet)	Blow Counts	Sample No.	Recover	Organic* Vapor (ppm)	% LEL	% O2	Sample Description	Graphic Log
							BASALT - Dark gray, hard.	
55								
60								
65							Bottom of Hole - 65.5 Feet	
70								
75								
80								
85								
90								
95								
100								

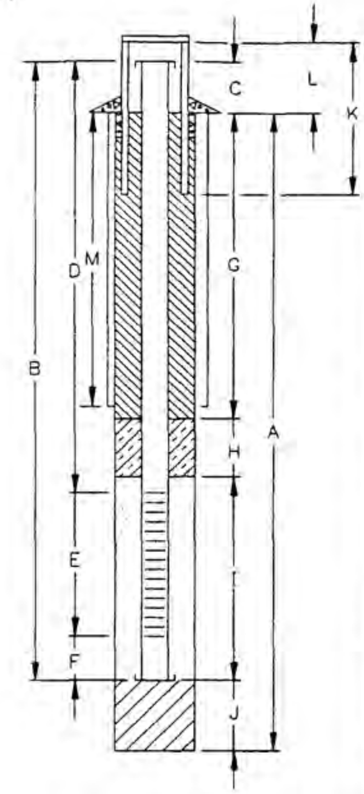


1990 ECOVA Corporation

801126-A-MW1B

* Background = 0 ppm

WELL COMPLETION MW-1B



TOP OF CASING ELEVATION 2318.63 FT.

A BORING DEPTH 65.5 FT.
BORING DIAMETER 6 IN.
B WELL DEPTH 50.0 FT.
C WELL STICKUP 0.5' FT.
D BLANK INTERVAL 66 FT.
BLANK DIAMETER 2 IN.
E SCREEN INTERVAL 2.5-32.5' 35-45' FT.
SCREEN DIAMETER 2 IN.
TYPE/SLOT SIZE 0.01
F SEDIMENT TRAP 5 FT.
G ANNULAR SEAL ______ FT.
MATERIAL: GROUT
H. BENTONITE SEAL ______ FT.
I SANDPACK ______ FT.
TYPE/SIZE: 20/40
J BOTOM SEAL/PACK 2 FT.
MATERIAL: SAND
K WELL COVER ______ FT.
L STICKUP ______ FT.
M CONDUCTOR CASING ______ FT.

NOT TO SCALE

DRILLING TIMES:
START 1245 5/8/90 FINISH 1504 5/8/90
STANDBY or DOWN TIME:

METHOD OF DECON. PRIOR TO DRILLING:

DEVELOPMENT

METHOD OF DEVELOPMENT: DISPLACEMENT PUMPING 60 CYCLES/SEC

START TIME 0820 TO 0120 DATE 5/17/90

TURBIDITY AFTER DEVELOPMENT: ______ CLEAR ______ MOD. TURBID
X SL. TURBID ______ TURBID

ODOR IN WATER ? NONE

WATER DISCHARGED TO: ______ GROUND SURFACE ______ STORAGE TANK
______ STORM SEWERS ______ TANK TRUCK
X DRUMS

DEPTH OF WATER AFTER DEVELOPMENT: 6 FEET

MATERIALS USED

9.5 SACKS of 20/40 SAND
4.5 SACKS of PORTLAND CEMENT
______ SACKS of PREMIX CONCRETE
______ GALLONS of GROUT USED
______ GROUT COMPOSITION #6 BENTONITE
______ SACKS of BENTONITE PELLETS
______ BUCKETS of BENTONITE PELLETS
______ YARDS CEMENT - SAND USED
2 CENTRALIZERS at 15' AND 36' BGS

WELL COVER USED: x Above Grade
______ At Grade
______ Other
x Lockable

FEB 6 1991

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801126-A-MW1BW

Attachment – B

Analytical Results

March 20, 2019 Service Request No:K1901784

Gary Panther
Spokane Environmental Solutions, LLC
3810 E. Boone Avenue, Ste 101
Spokane, WA 99202

Laboratory Results for: Borrow Pit

Dear Gary,

Enclosed are the results of the sample(s) submitted to our laboratory March 01, 2019
For your reference, these analyses have been assigned our service request number **K1901784.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

C Leaf

Chris Leaf
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Spokane Environmental Solutions, LLC
Project: Borrow Pit
Sample Matrix: Water

Service Request: K1901784
Date Received: 03/01/2019

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), Laboratory Control Sample (LCS), and Laboratory/Duplicate Laboratory Control Sample (LCS/DLCS).

Sample Receipt:

Two water samples were received for analysis at ALS Environmental on 03/01/2019. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

Organic LC:

Method PFC/537M, 03/08/2019: Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Approved by ______________________ Date 03/20/2019

SAMPLE DETECTION SUMMARY

CLIENT ID: MW-1A	**Lab ID: K1901784-001**					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Perfluorooctane sulfonic acid (PFOS)	10			4.2	ng/L	PFC/537M
Perfluorooctanoic acid (PFOA)	5.9			1.7	ng/L	PFC/537M

CLIENT ID: MW-1B	**Lab ID: K1901784-002**					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Perfluorooctane sulfonic acid (PFOS)	27			4.2	ng/L	PFC/537M
Perfluorooctanoic acid (PFOA)	12			1.7	ng/L	PFC/537M

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Spokane Environmental Solutions, LLC **Service Request:**K1901784

Project: Borrow Pit/0270-003

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K1901784-001	MW-1A	2/28/2019	1300
K1901784-002	MW-1B	2/28/2019	1400

ALS Environmental

CHAIN OF CUSTODY
97379

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800 695-7222 / FAX (360) 636-1068
www.alsglobal.com

001

SR# K1901784
COC Set____of____
COC#____________
Page 1 of 1

Project Name Borrow Pit
Project Number 0270-003
Project Manager GARY D. PANTHER
Company Spokane Environmental Solutions, LLC
Address 3810 E. Boone Ave, STE 101, Spokane, WA 99202
Phone # 509-954-5090
email garyp@SpokaneEnvironmental.com
Sampler Signature
Sampler Printed Name Gary D. Panther

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	14D PFC/537M / PFOA	1	2	3	4	5	Remarks
1. MW-1 A		2-28-19	1300	W	2	X						
2. MW-1 b		2-28-19	1400	W	2	X						
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												

Report Requirements

- ☒ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☐ IV. Data Validation Report
- ☒ V. EDD

Invoice Information

P.O.# 0270-003
Bill To: Spokane Environmental Solutions.
ATTN: Gary Panther

Turnaround Requirements

- ☐ 24 hr.
- ☐ 48 hr.
- ☐ 5 Day
- ☒ Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other____(Circle One)

Special Instructions/Comments:

	Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature						
Printed Name	Gary D. Panther	ALS-K				
Firm	SES LLC	3-1-19 1000				
Date/Time	2-28-19 1600					

ALS

PC CL

Cooler Receipt and Preservation Form

Client SPOKANE ENVIRONMENTAL SOLUTIONS Service Request *K19* 01784
Received: 3-1-19 Opened: 3-1-19 By: DSP Unloaded: 3-1-19 By: DSP

1. Samples were received via? *USPS* [✓ *Fed Ex*] *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other*______ *NA*
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? 1 TOP FRONT

   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

Raw Cooler Temp	Corrected. Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
0.0	-0.1	5.8	5.7	-0.1	371	97379	4808 3227 9050	

4. Packing material: *Inserts* [✓ *Baggies*] [✓ *Bubble Wrap*] *Gel Packs* [✓ *Wet Ice*] *Dry Ice* *Sleeves* ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA [✓ Y] N

   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions:______

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory’s NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1901784
Project:	Borrow Pit/0270-003		

Sample Name:	MW-1A	**Date Collected:**	02/28/19
Lab Code:	K1901784-001	**Date Received:**	03/1/19
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
PFC/537M	NHILLIKER	LDOMREIS

Sample Name:	MW-1B	**Date Collected:**	02/28/19
Lab Code:	K1901784-002	**Date Received:**	03/1/19
Sample Matrix:	Water		

Analysis Method	**Extracted/Digested By**	**Analyzed By**
PFC/537M	NHILLIKER	LDOMREIS

Sample Results

ALS Environmental—Kelso Laboratory
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High Performance Liquid Chromatography

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1901784
Project:	Borrow Pit/0270-003	**Date Collected:**	02/28/19 13:00
Sample Matrix:	Water	**Date Received:**	03/01/19 10:00
Sample Name:	MW-1A	**Units:**	ng/L
Lab Code:	K1901784-001	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	**10**	4.2	1	03/08/19 00:26	3/5/19	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	**5.9**	1.7	1	03/08/19 00:26	3/5/19	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOS	117	25 - 121	03/08/19 00:26	
13C4-PFOA	97	22 - 130	03/08/19 00:26	

Analytical Report

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1901784
Project:	Borrow Pit/0270-003	**Date Collected:**	02/28/19 14:00
Sample Matrix:	Water	**Date Received:**	03/01/19 10:00
Sample Name:	MW-1B	**Units:**	ng/L
Lab Code:	K1901784-002	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	**27**	4.2	1	03/08/19 00:37	3/5/19	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	**12**	1.7	1	03/08/19 00:37	3/5/19	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOS	103	25 - 121	03/08/19 00:37	
13C4-PFOA	92	22 - 130	03/08/19 00:37	

QC Summary Forms

ALS Environmental—Kelso Laboratory
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www.alsglobal.com

High Performance Liquid Chromatography

ALS Environmental—Kelso Laboratory
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Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Spokane Environmental Solutions, LLC **Service Request:** K1901784
Project: Borrow Pit/0270-003
Sample Matrix: Water

SURROGATE RECOVERY SUMMARY

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Extraction Method: EPA 3535A

		13C4-PFOS	**13C4-PFOA**
Sample Name	**Lab Code**	**25-121**	**22-130**
MW-1A	K1901784-001	117	97
MW-1B	K1901784-002	103	92
Method Blank	KQ1902759-03	101	90
Lab Control Sample	KQ1902759-01	107	82
Duplicate Lab Control Sample	KQ1902759-02	105	87

Analytical Report

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1901784
Project:	Borrow Pit/0270-003	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KQ1902759-03	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	ND U	5.0	1	03/07/19 21:07	3/5/19	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	ND U	2.0	1	03/07/19 21:07	3/5/19	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOS	101	25 - 121	03/07/19 21:07	
13C4-PFOA	90	22 - 130	03/07/19 21:07	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1901784
Project:	Borrow Pit/0270-003	**Date Analyzed:**	03/07/19
Sample Matrix:	Water	**Date Extracted:**	03/05/19

Duplicate Lab Control Sample Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method:	PFC/537M	**Units:**	ng/L
Prep Method:	EPA 3535A	**Basis:**	NA
		Analysis Lot:	627545

	Lab Control Sample KQ1902759-01			Duplicate Lab Control Sample KQ1902759-02					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Perfluorooctane sulfonic acid (PFOS)	28.2	29.7	95	24.7	29.7	83	71-139	13	30
Perfluorooctanoic acid (PFOA)	31.9	32.0	100	29.2	32.0	91	74-146	9	30

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Spokane
11922 East 1st Ave
Spokane, WA 99206
Tel: (509)924-9200

TestAmerica Job ID: 590-10497-1
Client Project/Site: Borrow Pit/0207-003
Revision: 1

For:
Spokane Environmental Solutions LLC
3810 E. Boone Avenue
Suite #101
Spokane, Washington 99202

Attn: Gary Panther

Randee Arrington

Authorized for release by:
4/2/2019 1:39:29 PM

Randee Arrington, Project Manager II
(509)924-9200
randee.arrington@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Case Narrative

Job ID: 590-10497-1

Laboratory: TestAmerica Spokane

Narrative

Report Revision 04/01/2019
Per the client's request Trichloroethene data was added to the final report.

Receipt
The samples were received on 2/28/2019 4:40 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 6.0º C.

Receipt Exceptions
A trip blank was submitted for analysis with these samples; however, it was not listed on the Chain of Custody (COC). The trip blank has been placed on hold.

One of two voa vial containers for the following sample was received broken or leaking: Trip Blank (590-10497-3). Sufficient volume was received to continue with analysis.

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

VOA Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
590-10497-1	MW-1A	Water	02/28/19 13:00	02/28/19 16:45
590-10497-2	MW-1B	Water	02/28/19 14:00	02/28/19 16:45

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: Spokane Environmental Solutions LLC
Project/Site: Borrow Pit/0207-003

TestAmerica Job ID: 590-10497-1

Client Sample ID: MW-1A

Date Collected: 02/28/19 13:00
Date Received: 02/28/19 16:45

Lab Sample ID: 590-10497-1
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40		ug/L			03/05/19 21:35	1
Ethylbenzene	ND		1.0		ug/L			03/05/19 21:35	1
m,p-Xylene	ND		2.0		ug/L			03/05/19 21:35	1
o-Xylene	ND		1.0		ug/L			03/05/19 21:35	1
Toluene	ND		1.0		ug/L			03/05/19 21:35	1
Xylenes, Total	ND		3.0		ug/L			03/05/19 21:35	1
Trichloroethene	ND		1.0		ug/L			03/05/19 21:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*70 - 125*		*03/05/19 21:35*	*1*
4-Bromofluorobenzene (Surr)	*98*		*69 - 120*		*03/05/19 21:35*	*1*
Dibromofluoromethane (Surr)	*103*		*80 - 120*		*03/05/19 21:35*	*1*
Toluene-d8 (Surr)	*103*		*80 - 120*		*03/05/19 21:35*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		0.23		mg/L		03/01/19 11:41	03/04/19 17:07	1
Residual Range Organics (RRO) (C25-C36)	ND		0.39		mg/L		03/01/19 11:41	03/04/19 17:07	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*89*		*50 - 150*	*03/01/19 11:41*	*03/04/19 17:07*	*1*
n-Triacontane-d62	*80*		*50 - 150*	*03/01/19 11:41*	*03/04/19 17:07*	*1*

Method: 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0050		mg/L		03/07/19 11:11	03/08/19 13:55	5

Client Sample ID: MW-1B

Date Collected: 02/28/19 14:00
Date Received: 02/28/19 16:45

Lab Sample ID: 590-10497-2
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40		ug/L			03/05/19 21:56	1
Ethylbenzene	ND		1.0		ug/L			03/05/19 21:56	1
m,p-Xylene	ND		2.0		ug/L			03/05/19 21:56	1
o-Xylene	ND		1.0		ug/L			03/05/19 21:56	1
Toluene	ND		1.0		ug/L			03/05/19 21:56	1
Xylenes, Total	ND		3.0		ug/L			03/05/19 21:56	1
Trichloroethene	ND		1.0		ug/L			03/05/19 21:56	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*70 - 125*		*03/05/19 21:56*	*1*
4-Bromofluorobenzene (Surr)	*104*		*69 - 120*		*03/05/19 21:56*	*1*
Dibromofluoromethane (Surr)	*103*		*80 - 120*		*03/05/19 21:56*	*1*
Toluene-d8 (Surr)	*104*		*80 - 120*		*03/05/19 21:56*	*1*

Client Sample Results

Client Sample ID: MW-1B

Lab Sample ID: 590-10497-2

Date Collected: 02/28/19 14:00

Matrix: Water

Date Received: 02/28/19 16:45

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		0.23		mg/L		03/01/19 11:41	03/04/19 17:27	1
Residual Range Organics (RRO) (C25-C36)	ND		0.38		mg/L		03/01/19 11:41	03/04/19 17:27	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*87*		*50 - 150*	*03/01/19 11:41*	*03/04/19 17:27*	*1*
n-Triacontane-d62	*77*		*50 - 150*	*03/01/19 11:41*	*03/04/19 17:27*	*1*

Method: 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0050		mg/L		03/07/19 11:11	03/08/19 13:59	5

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 590-21195/5
Matrix: Water
Analysis Batch: 21195

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40		ug/L			03/05/19 19:30	1
Ethylbenzene	ND		1.0		ug/L			03/05/19 19:30	1
m,p-Xylene	ND		2.0		ug/L			03/05/19 19:30	1
o-Xylene	ND		1.0		ug/L			03/05/19 19:30	1
Toluene	ND		1.0		ug/L			03/05/19 19:30	1
Xylenes, Total	ND		3.0		ug/L			03/05/19 19:30	1
Trichloroethene	ND		1.0		ug/L			03/05/19 19:30	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*101*		*70 - 125*		*03/05/19 19:30*	*1*
4-Bromofluorobenzene (Surr)	*103*		*69 - 120*		*03/05/19 19:30*	*1*
Dibromofluoromethane (Surr)	*99*		*80 - 120*		*03/05/19 19:30*	*1*
Toluene-d8 (Surr)	*103*		*80 - 120*		*03/05/19 19:30*	*1*

Lab Sample ID: LCS 590-21195/1003
Matrix: Water
Analysis Batch: 21195

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Benzene			10.0	10.6		ug/L		106	80 - 120		
Ethylbenzene			10.0	10.4		ug/L		104	80 - 120		
m,p-Xylene			10.0	10.7		ug/L		107	80 - 120		
o-Xylene			10.0	10.6		ug/L		106	80 - 120		
Toluene			10.0	10.4		ug/L		104	80 - 123		
Trichloroethene			10.0	10.7		ug/L		107	75 - 129		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*105*		*70 - 125*
4-Bromofluorobenzene (Surr)	*98*		*69 - 120*
Dibromofluoromethane (Surr)	*101*		*80 - 120*
Toluene-d8 (Surr)	*97*		*80 - 120*

Lab Sample ID: LCSD 590-21195/6
Matrix: Water
Analysis Batch: 21195

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene			10.0	11.1		ug/L		111	80 - 120	4	25
Ethylbenzene			10.0	10.7		ug/L		107	80 - 120	3	25
m,p-Xylene			10.0	10.9		ug/L		109	80 - 120	2	25
o-Xylene			10.0	10.8		ug/L		108	80 - 120	1	25
Toluene			10.0	10.8		ug/L		108	80 - 123	4	25
Trichloroethene			10.0	10.8		ug/L		108	75 - 129	1	25

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*103*		*70 - 125*
4-Bromofluorobenzene (Surr)	*99*		*69 - 120*

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 590-21195/6
Matrix: Water
Analysis Batch: 21195

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Dibromofluoromethane (Surr)	*102*		*80 - 120*
Toluene-d8 (Surr)	*97*		*80 - 120*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 590-21144/1-A
Matrix: Water
Analysis Batch: 21158

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 21144

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		0.24		mg/L		03/01/19 11:41	03/04/19 10:52	1
Residual Range Organics (RRO) (C25-C36)	ND		0.40		mg/L		03/01/19 11:41	03/04/19 10:52	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*81*		*50 - 150*	*03/01/19 11:41*	*03/04/19 10:52*	*1*
n-Triacontane-d62	*82*		*50 - 150*	*03/01/19 11:41*	*03/04/19 10:52*	*1*

Lab Sample ID: LCS 590-21144/2-A
Matrix: Water
Analysis Batch: 21158

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 21144

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Diesel Range Organics (DRO) (C10-C25)	1.60	1.21		mg/L		76	50 - 150
Residual Range Organics (RRO) (C25-C36)	1.60	1.58		mg/L		99	50 - 150

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*86*		*50 - 150*
n-Triacontane-d62	*93*		*50 - 150*

Lab Sample ID: LCSD 590-21144/3-A
Matrix: Water
Analysis Batch: 21158

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 21144

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Diesel Range Organics (DRO) (C10-C25)	1.60	1.19		mg/L		74	50 - 150	2	25
Residual Range Organics (RRO) (C25-C36)	1.60	1.54		mg/L		96	50 - 150	3	25

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*85*		*50 - 150*
n-Triacontane-d62	*89*		*50 - 150*

QC Sample Results

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 580-295753/22-A
Matrix: Water
Analysis Batch: 295933

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 295753

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010		mg/L		03/07/19 11:11	03/08/19 12:16	1

Lab Sample ID: LCS 580-295753/23-A
Matrix: Water
Analysis Batch: 295933

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 295753

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Arsenic			1.00	0.946		mg/L		95	80 - 120		

Lab Sample ID: LCSD 580-295753/24-A
Matrix: Water
Analysis Batch: 295933

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 295753

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			1.00	0.959		mg/L		96	80 - 120	1	20

Client Sample ID: MW-1A

Lab Sample ID: 590-10497-1

Date Collected: 02/28/19 13:00

Matrix: Water

Date Received: 02/28/19 16:45

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	43 mL	43 mL	21195	03/05/19 21:35	MRS	TAL SPK
Total/NA	Prep	3510C			259.2 mL	2 mL	21144	03/01/19 11:41	NMI	TAL SPK
Total/NA	Analysis	NWTPH-Dx		1			21158	03/04/19 17:07	NMI	TAL SPK
Total Recoverable	Prep	3005A			50 mL	50 mL	295753	03/07/19 11:11	JKM	TAL SEA
Total Recoverable	Analysis	6020B		5	50 mL	50 mL	295933	03/08/19 13:55	FCW	TAL SEA

Client Sample ID: MW-1B

Lab Sample ID: 590-10497-2

Date Collected: 02/28/19 14:00

Matrix: Water

Date Received: 02/28/19 16:45

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	43 mL	43 mL	21195	03/05/19 21:56	MRS	TAL SPK
Total/NA	Prep	3510C			260 mL	2 mL	21144	03/01/19 11:41	NMI	TAL SPK
Total/NA	Analysis	NWTPH-Dx		1			21158	03/04/19 17:27	NMI	TAL SPK
Total Recoverable	Prep	3005A			50 mL	50 mL	295753	03/07/19 11:11	JKM	TAL SEA
Total Recoverable	Analysis	6020B		5	50 mL	50 mL	295933	03/08/19 13:59	FCW	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

TAL SPK = TestAmerica Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

Accreditation/Certification Summary

Laboratory: TestAmerica Spokane

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Washington	State Program	10	C569	01-06-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-20
ANAB	DoD / DOE		L2236	01-19-22
ANAB	ISO/IEC 17025		L2236	01-19-22
California	State Program	9	2901	11-05-19
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-20

Method Summary

Client: Spokane Environmental Solutions LLC
Project/Site: Borrow Pit/0207-003

TestAmerica Job ID: 590-10497-1

Method	Method Description	Protocol	Laboratory
8260C	Volatile Organic Compounds by GC/MS	SW846	TAL SPK
NWTPH-Dx	Northwest - Semi-Volatile Petroleum Products (GC)	NWTPH	TAL SPK
6020B	Metals (ICP/MS)	SW846	TAL SEA
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL SEA
3510C	Liquid-Liquid Extraction (Separatory Funnel)	SW846	TAL SPK
5030C	Purge and Trap	SW846	TAL SPK

Protocol References:

NWTPH = Northwest Total Petroleum Hydrocarbon

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

TAL SPK = TestAmerica Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

TestAmerica Spokane
11922 East 1st Ave
Spokane, WA 99206
Phone (509) 924-9200 Fax (509) 924-9290

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: GP	Lab PM: Arrington, Randee E	Carrier Tracking No(s):	COC No: 590-4398-1420.1
Client Contact: Gary Panther	Phone: 509-954-5090	E-Mail: randee.arrington@testamericainc.com		Page: Page 1 of 1
Company: Spokane Environmental Solutions LLC				Job #:
Address: 3810 E. Boone Avenue Suite #101	Due Date Requested: STD TAT			
City: Spokane	TAT Requested (days):			
State, Zip: WA, 99202				
Phone: 509-954-5090(Tel)	PO #: Advance Payment Required			
Email: gary@spokaneenvironmental.com	WO #:			
Project Name: Borrow Pit	Project #: 59001518			
Site: 0270-003	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6020B - Arsenic	NWTPH_Dx - DRO and RRO	8260C - BTEX											Total Number of containers	Special Instructions/Note:
				Preservation Code:			D	A	A												
MW-1A	2-28-19	1300	G	Water			X	X	X												
MW-1b	2-28-19	1400	G	Water			X	X	X												
				Water																	

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

590-10497 Chain of Custody

Possible Hazard Identification
☒ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by: Gary Panther	Date/Time: 2-28-19 1640	Company: SES	Received by: Randee Arrington	Date/Time: 2/28/19 1640	Company: TASPO
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: △ Yes △ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 6.0°C IR002

Ver: 01/16/2019

TestAmerica Spokane
11922 East 1st Ave
Spokane, WA 99206
Phone (509) 924-9200 Fax (509) 924-9290

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)

Client Contact: Shipping/Receiving
Company: TestAmerica Laboratories, Inc.
Address: 5755 8th Street East,
City: Tacoma
State, Zip: WA, 98424
Phone: 253-922-2310(Tel) 253-922-5047(Fax)
Email:
Project Name: Borrow Pit/0207-003
Site:

Sampler:
Phone:
Due Date Requested: 3/12/2019
TAT Requested (days):
PO #:
WO #:
Project #: 59001518
SSOW#:

Lab PM: Arrington, Randee E
E-Mail: randee.arrington@testamericainc.com
Accreditations Required (See note): State Program - Washington
Carrier Tracking No(s):
State of Origin: Washington
COC No: 590-4156.1
Page: Page 1 of 1
Job #: 590-10497-1

Analysis Requested

Preservation Codes:

A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6020B/3005A (MOD) Arsenic	Total Number of containers	Special Instructions/Note:
			Preservation Code:		☒	☒		☒	
MW-1A (590-10497-1)	2/28/19	13:00 Pacific		Water			X	1	
MW-1B (590-10497-2)	2/28/19	14:00 Pacific		Water			X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For ________ Months*

Deliverable Requested: I, II, III, IV, Other (specify)
Primary Deliverable Rank: 2
Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by: Malia O'Toole	Date/Time: 3/1/19 15:48	Company	Received by:	Date/Time: 3-2-19 1030	Company TASea
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ∆ Yes ∆ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks: 5=1.3

Ver: 01/16/2019

1 2 3 4 5 6 7 8 9 10 11 12

Login Sample Receipt Checklist

Client: Spokane Environmental Solutions LLC

Job Number: 590-10497-1

Login Number: 10497
List Number: 1
Creator: O'Toole, Maria C

List Source: TestAmerica Spokane

Question	**Answer**	**Comment**
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Received Trip Blank(s) not listed on COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	False	One of the two trip blanks was broken
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	No analysis requiring residual chlorine check assigned.

Login Sample Receipt Checklist

Client: Spokane Environmental Solutions LLC

Job Number: 590-10497-1

Login Number: 10497
List Number: 2
Creator: Hobbs, Kenneth F

List Source: TestAmerica Seattle
List Creation: 03/02/19 12:49 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

GSI Job No.: 6892
Issued: 13 August 2024

SITE ASSESSMENT REPORT

Spokane International Airport

Spokane, WA

APPENDIX B.2

SES, 2019b. Limited Assessment of Electric Avenue Waste Disposal/Fire Pit Training Area.

SES
SPOKANE ENVIRONMENTAL SOLUTIONS
3810 East Boone Avenue, Suite 101
Spokane, Washington 99202
509.688.5376

April 23, 2019

Mr. Matt Breen
Spokane International Airport
9000 West Airport Drive
Spokane, Washington 99219

RE: Limited Assessment of Electric Avenue Waste Disposal/Fire Pit Training Area
Spokane International Airport
Spokane, Washington
SIA Contract #19-43-9999-006
SES Project No.: 0270-003

Dear Mr. Breen:

Attached are the results and supporting documentation for the recent, limited groundwater monitoring event for the perfluorinated chemicals and conventional chemistry contaminants of concern. This monitoring event was conducted per your request to provide a snapshot of current shallow groundwater conditions beneath the Site. Samples were collected from groundwater monitoring wells installed in the 1990s on behalf of the Army Corps of Engineers and/or Spokane International Airports (SIA). The Site location is shown on **Figure 1**.

We understand that the site was formerly used for live fire training exercises where fires were intentionally set for training firefighting skills and techniques. We further understand that the site has an extensive history of assessment dating back to 1984. The latest Site Closure Summary was conducted by Herrera and Associates in 2003 which reported that the only contaminates of concern (COCs) exceeding the Model Toxics Control Act (MTCA) Method A cleanup criteria for unrestricted use in shallow groundwater were diesel-range petroleum hydrocarbons. These exceedances were reported as ‘minor and infrequent’. The last reported sampling of these wells was in August 1999. Arsenic was sporadically detected in groundwater samples with exceedances of cleanup criteria observed in samples collected from both upgradient and down gradient wells.

BTEXN compounds were detected in soil samples collected from the boring (Sample FP001) where concentrations exceeding MTCA Method A cleanup criteria were observed. Concentrations of contaminants were observed to decrease with depth with minor exceedances of cleanup criteria noted in the sample collected at a depth of 10 feet bgs. SVOCs and furans/dioxins were also sampled, but none of these compounds exceeded cleanup criteria. SES did not collect soil samples during this limited assessment.

Because this area was used for active fire training exercises, sampling for PFOA/PFOS compounds and for polycyclic aromatic hydrocarbons (PAHs) was conducted to determine if these compounds are present at concentrations exceeding cleanup criteria. PAHs are often formed as a byproduct of incomplete combustion and this was one process formerly present at the site.

Site Monitoring Wells

There are four pairs of monitoring wells located on site. Each pair consists of a shallow- and a deep-screened well. Monitoring well pairs MW-7 and MW-8 were installed by the Army Corps of Engineers in 1990. Monitoring well pairs MW-13 and MW-14 were installed by SIA in 1992. In each of the well pairs, the well designated by an A suffix is the deeper of the pair and is generally screened across the contact between sequenced flood sediments and the underlying basalt. Specific construction details of those wells sampled during this event are further discussed below. Monitoring well locations are shown on **Figure 2.** Monitoring Well Logs are shown in **Attachment A.**

SES found integrity issues with many of the wells. Well monuments and caps were found to be distressed and in need of repair or replacement in order to maintain the structural integrity of the well and to protect groundwater. SES can provide an estimate for the repair of these monuments upon request. Details are provided in the Photographic Log included as **Attachment B**.

Groundwater Sampling

Groundwater samples were collected for PFOA/PFOS analysis from site monitoring wells MW-7, MW-8B, MW-13A, MW-13B, and MW-14B. Samples from MW-13A, MW-13B, and MW-14B were analyzed with the remaining samples placed on Hold.

Groundwater samples were collected for conventional chemistry and for PAHs from MW-7, MW-8B, MW-13B, and MW-14B. Samples from MW-13B and MW-14B were analyzed with the remaining samples placed on Hold.

While there are two wells associated with the MW-7 well pair, the wells were not labeled in the field and only one was readily accessible. The sample was named MW-7 in the field and it was determined later that this was monitoring well MW-7B.

Depth to water in each accessible well was measured to the nearest 1/100th of a foot prior to sampling. Groundwater flow was not calculated during this event as top of casing elevations were not readily available. However, regional groundwater flow is generally to the northeast, based on our review of previous reports.

Groundwater samples were collected from each well using a peristaltic pump with dedicated tubing for each well sampled. SES has vetted the sampling materials and has found them to be free of perfluorinated compounds. Purging and sampling using low-flow sampling techniques where flow rates were generally about 0.2 to 0.3 liters per minute (l/min) minimize drawdown and mixing of water within the well during purging and sampling.

Field parameters were measured with a Horiba-U52 water quality meter. Parameters include pH, conductivity, turbidity, dissolved oxygen (DO), temperature, and oxidation reduction potential (ORP). Once field parameters stabilized within 10% from reading to reading for each parameter, laboratory-prepared sample containers were filled with water from the wells, sealed, and placed on ice. In general, the field parameters indicated that groundwater was not adversely impaired by petroleum hydrocarbons or metals as dissolved oxygen was present and ORP readings were positive.

Monitoring Wells Sampled

Monitoring well MW-13A is the deepest of this well pair. The well has a total depth of 42 feet and is screened across the contact of sediment and basalt from 32-42 feet. Groundwater sampled is presumed to flow primarily atop this contact. SES placed the intake at approximately 38 feet in this well.

Monitoring well MW-13B is 20 feet in depth and is screened from 10-20 feet. SES placed the intake at approximately 16 feet in this well.

Monitoring well MW-14B is 20.5 feet in depth and is screened from 9-19 feet. SES placed the intake at approximately 18 feet in this well.

Analytical Results

PFOA and PFOS were detected in each of the samples collected. As concentrations of PFOA/PFOS are to be summed for compliance, each sample collected exhibited concentrations exceeding the screening level of 70 ng\L. Analytical results are shown in **Table 1**.

Concentrations of BTEX, Dx compounds and total arsenic did not exceed Method Reporting Limits (MRL) and/or MTCA Method A cleanup criteria in the samples collected. Analytical results are shown in **Table 2.**

cPAHs were not detected in samples at concentrations exceeding MRL. As Ecology uses a formula to determine compliance with cleanup criteria, the analytical values were calculated and determined to be less than the cleanup level for each of the samples submitted. Analytical results and method calculations are shown in **Table 3.** Laboratory analytical reports are included in **Attachment C Analytical Results**.

Summary

The highest concentration of perfluorinated compounds was detected in the groundwater sample collected from monitoring well MW-13B. This well is screened near-surface. In the deeper companion well MW-13A, concentrations are much lower. This well pair is in an inferred downgradient position for the former training area. The Analytical results suggest that perfluorinated compounds are either bound to soil within the capillary fringe of the vadose zone (smear zone) or are being diluted by a higher flow regimen in the lower portion of the perched aquifer. There is not enough sampling data either temporally or spatially to make a conclusive determination.

Concentrations of BTEX, Dx compounds and cPAHs were not detected at concentrations of regulatory significance during this sampling event. This could be the result of seasonal variability in flow with spring melt fostering dilution; a sampling event scheduled for late summer could verify this hypothesis.

Limitations

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area and in general accordance with the terms and conditions set forth in our Agreement, and with the revised SES proposal dated January 31, 2019. No other warranty, express or implied, is made.

The findings presented in this report are based on conditions observed at specific site locations and sampling intervals at the time of the assessment. Because conditions between the wells and sampling intervals may vary over distance and time, the potential always remains for the presence of unknown, unidentified, unforeseen, or changed surface and subsurface contamination.

This report is for the exclusive use of Spokane International Airports and its representatives. No third party shall have the right to rely on SES's opinions rendered in connection with the services or in this document without our written consent and the third party's agreement to be bound to the same conditions and limitations as Spokane International Airports.

SES appreciates the opportunity to provide these services. Please contact the undersigned regarding any questions related to the information provided in this letter report.

Sincerely,

Spokane Environmental Solutions, LLC.

Gary D. Panther, LG, LEG

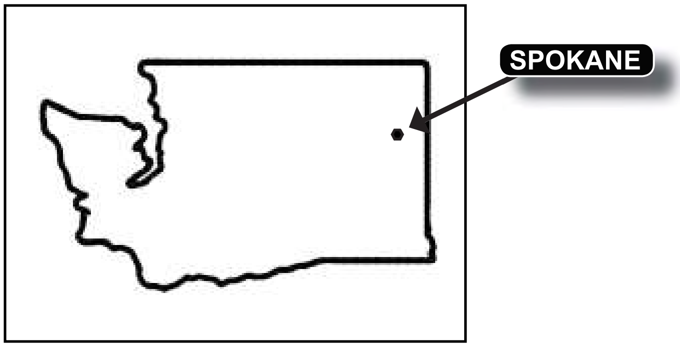
Attachments:

Figure 1: Location Map
Figure 2: Site Map

Table 1: Summary of Groundwater Analytical Results - PFOA-PFOS
Table 2: Summary of Groundwater Analytical Results - Conventional Chemistry
Table 3: Summary of Groundwater Analytical Results - PAHs

Attachment A: Boring Logs
Attachment B: Photographs
Attachment C: Analytical Results

Figures



Notes:

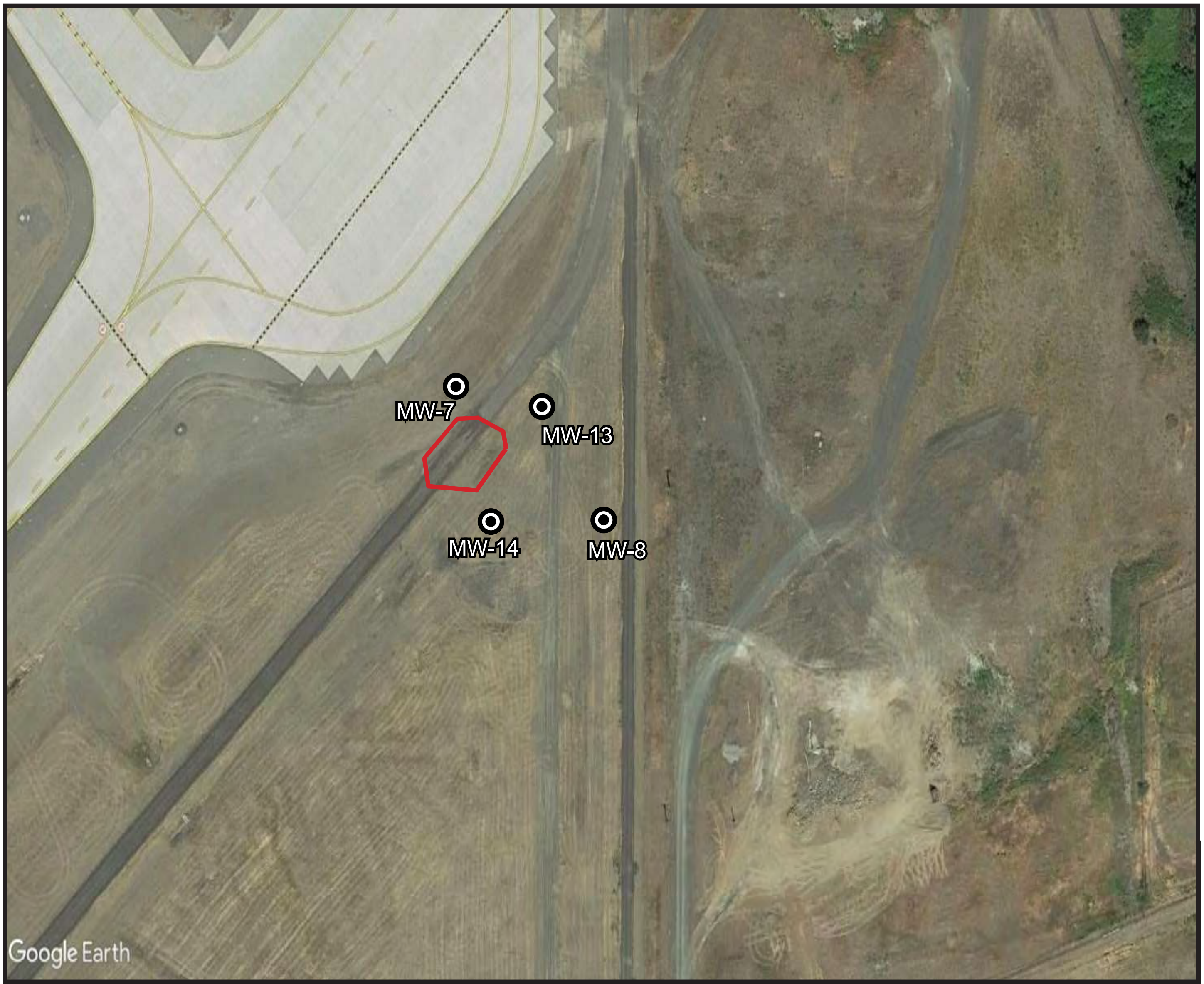
1. *The locations of all features shown are approximate.*
2. *This drawing is for information purposes. it is intended to assist in showing features discussed in an attached document.*

LOCATION MAP

SIA ELECTRIC AVENUE BURN PIT
LIMITED SITE ASSESSMENT
SPOKANE, WASHINGTON

SES
SPOKANE ENVIRONMENTAL SOLUTIONS

FIGURE 1



LEGEND:

● Site Monitoring Wells Pairs

🟥 Burn Pit - location based on observation from historic aerial photographs.

Notes:

1. *The locations of all features shown are approximate.*
2. *This drawing is for information purposes. it is intended to assist in showing features discussed in an attached document.*

Source: Google Maps

SITE MAP

SIA ELECTRIC AVENUE BURN PIT
LIMITED SITE ASSESSMENT
SPOKANE, WASHINGTON

SES
SPOKANE ENVIRONMENTAL SOLUTIONS

FIGURE 2

Tables

Table 1

Summary of Groundwater Analytical Results - Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS)
Limited Groundwater Assessment Electric Avenue Waste Disposal/Fire Training Area
Spokane International Airport

			EPA-PFC/537M	
Well ID	**Sample Date**	**Depth to Water**	**PFOA (ng/L)**	**PFOS (ng/L)**
MW-13A	3/27/2019	17.00	60	**480**
MW-13B	3/27/2019	13.90	**5200**	**1100**
MW-14B	3/27/2019	16.25	**860**	**230**
Groundwater Screening Level (ng/L) [1]			70	70

Notes:

[1] Groundwater screening levels were obtained from EPA's "Fact Sheet, PFOA & PFOS Drinking Water Health Advisories," dated November 2016.

Values in **bold** font indicate that the result reported meets or exceeds the groundwater screening level.

Depth to water measured from top of casing.

ng/L - nanogram per liter

PFOA - perfluorooctanoic acid

PFOS - perfluorooctane sulfonic acid

Samples analyzed by ALS Global Laboratories, Kelso, Washington.

Table 2

Summary of Groundwater Analytical Results - Conventional Chemistry
Limited Groundwater Assessment Electric Avenue Waste Disposal/Fire Training Area
Spokane International Airport

			EPA-8260C				**NWTPH-Dx DRO mg/L**		**EPA-6020B**
Sample ID	**Date Sampled**	**Depth to Water**	**Benzene ug/L**	**Toluene ug/L**	**Ethylbenzene ug/L**	**Total Xylenes ug/L**	**DRO mg/L**	**RRO mg/L**	**Arsenic mg/L**
MW-13B	3/27/2019	13.90	<0.4	<1.0	<1.0	<3.0	<0.23	<0.38	<0.0050
MW-14B	3/27/2019	16.25	<0.4	<1.0	<1.0	<3.0	0.34	<0.40	<0.0050
MTCA Method A Cleanup Level [a]			5	1000	700	1000	0.5	0.5	0.005

Notes:

a: MTCA = Model Toxics Control Act Method A cleanup level for unrestricted use. Method B value used where Method A value not established.
-- = Not Analyzed
DRO = Diesel-Range Organics.
RRO = Residual-Range Organics.
BTEX = benzene, toluene, ethylbenzene, (total) xylenes.
BOLD = Exceedance of cleanup level.

Samples Analyzed by TestAmerica, Spokane, WA

Table 3

Summary of Groundwater Analytical Results - PAH Toxicity Equiviency Factors
Limited Groundwater Assessment Electric Avenue Waste Disposal/Fire Training Area
Spokane International Airport

cPAH	MW-13B Measured Groundwater Concentration (ug/L)	Toxicity Equivilency Factor TEF (unitless)[1]	Toxicity Equivilent Concentration TEQ (ug/L)[2]
Benzo(a)pyrene	0.0455	1	0.0455
Benzo(a)anthracene	0.0455	0.1	0.00455
Benzo(b)flouranthene	0.0455	0.1	0.00455
Benzo(k)flouranthene	0.0455	0.1	0.00455
Chrysene	0.0455	0.1	0.00455
Dibenz(a,h)anthracene	0.0455	0.1	0.00455
indeno(1,2,3-cd)pyrene	0.0455	0.1	0.00455
Sum	0.3185	--	0.04095
Method A Cleanup Level (Table 720-1)			**0.1 ug/L**

cPAH	MW-14B Measured Groundwater Concentration (ug/L)	Toxicity Equivilency Factor TEF (unitless)[1]	Toxicity Equivilent Concentration TEQ (ug/L)[2]
Benzo(a)pyrene	0.0455	1	0.0455
Benzo(a)anthracene	0.0455	0.1	0.00455
Benzo(b)flouranthene	0.0455	0.1	0.00455
Benzo(k)flouranthene	0.0455	0.1	0.00455
Chrysene	0.0455	0.1	0.00455
Dibenz(a,h)anthracene	0.0455	0.1	0.00455
indeno(1,2,3-cd)pyrene	0.0455	0.1	0.00455
Sum	0.3185	--	0.04095
Method A Cleanup Level (Table 720-1)			**0.1 ug/L**

Notes:

1. Toxicity Equivilency Factor (TEF) from MTCA Table 720-1.
2. TEQ = cPAH measured concentration * TEF
cPAH = Carcinigenic Polycyclic Aromatic Hydrocarbons
MTCA = Model Toxics Control Act Method Table 720-1 cleanup level for unrestricted use.
BOLD = Exceedance of cleanup level.

Samples Analyzed by TestAmerica, Spokane, WA

Attachment – A

Boring Logs

RESOURCE PROTECTION WELL REPORT

START CARD NO. 57709

PROJECT NAME: SPOKANE AIRPORT BURN PIT
WELL INDENTIFICATION NO. MW13A
DRILLING METHOD: 4¼" HOLLOW STEM AUGER & AIR ROTARY
DRILLER: WILL HAYES (2035)
FIRM: RUEN DRILLING, INC (RUEN CDI 1759M)
SIGNATURE:
CONSULTING FIRM: LANDAU ASSOCIATES INC.
REPRESENTATIVE: DEB SUNELL

County
LOCATION: T 24N, R 42E, SEC. 6 ¼ NE ¼ NE
DISTANCE: (W) 112 FT. FROM N/S SECTION LINE
(S) 450 FT. FROM E/W SECTION LINE
DATUM: USGS monument 250' SOUTH OF RUNWAY
WATER LEVEL ELEVATION: (23') 2,357.1'
INSTALLED: 12/18/92
DEVELOPED: 12/22/92

AS–BUILT	WELL DATA		FORMATION DESCRIPTION	
See attached sheet				
		GM	Dark brown silty to sandy GRAVEL (med. dense, moist)	5
		SW	Dark brown gravelly medium to very coarse SAND (loose, moist)	10
		GM	Dark brown silty sandy GRAVEL (loose, moist)	15
		ML	Medium brown fine sandy SILT with trace charcoal and leaves (very stiff, damp)	20 25 30
		BASALT TO 42'	Weathered Basalt with small angular pebbles mixed with clay	35

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Will Hayes

RUEN DRILLING, INC.
BOX 267
CLARK FORK, ID 83811
(208) 266-1151

SCALE: 1"= 5'

PAGE 1 OF 2

End OF HOLE 42'

ECY 050-12

LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907 FAX (206) 778-6409

As-built Well Completion Form

Project: SPOKANE AIRPORT BURNPIT
Project No.: 207001.33
Well(s) No.: MW 13 A
Drilling Co.: RUEN DRILLING IN
Installation Start Date: 12|18|92 Hour: 1000
Installation Finish Date: 12|22|92 Hour: 1000 monumal
Well Type: ☒ Single ☐ Nested ☐ Clustered

WATER DISCHARGE MONITORING

Date: ____ Time: ____ PID(ppm) ____
Date: ____ Time: ____ PID(ppm) ____
Date: ____ Time: ____ PID(ppm) ____
Date: ____ Time: ____ PID(ppm) ____
Date: ____ Time: ____ PID(ppm) ____

EQUIPMENT USED

☒ Hollow Stem Auger 4¼"
☐ Cable Tool
☐ Air Rotary
☐ Other ____

MATERIALS USED

2 Sacks of 10 - 20 Sand
____ Sacks of ____ Concrete/Cement
3 Sacks of ____ Grout Mix Used
15 Sacks of ~~Powdered~~ Bentonite Chips
____ Pounds of Bentonite Pellets/Chips
40 Feet of ____ Inch PVC Blank Casing
10 Feet of ____ Inch PVC Slotted Screen

DEVELOPMENT

Method of Development: BAILER 1½" SS

Begin Date: 12|21|92 Time: 0800 BAIL 25 GALLONS
Finish Date: 12|22|92 Time: 1330 (≈ 10 GALLONS)

Yield: Time From: To: Date:

Estimate of Total Water Removed During Development: 35 [✓ Gallons]

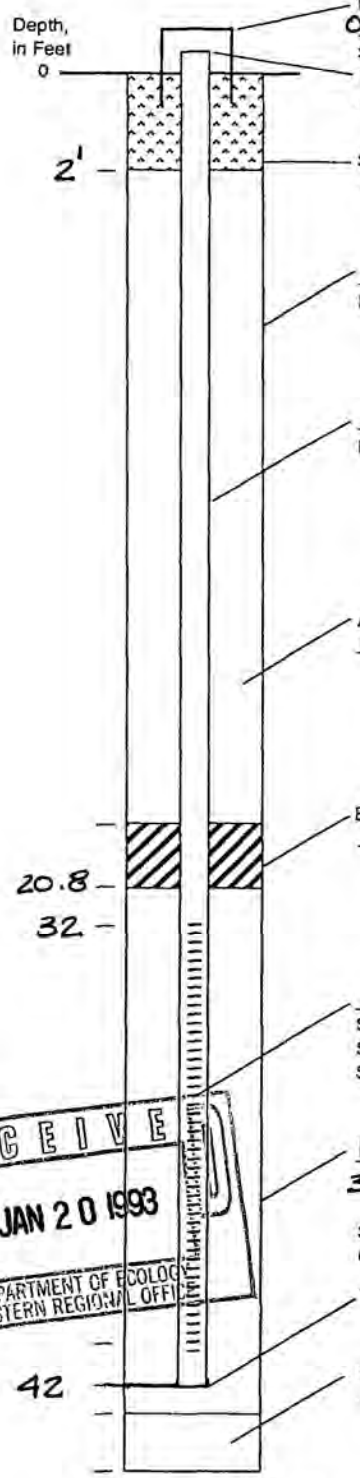
Description of Turbidity at End of Development: ☐ Clear ☒ Slightly Cloudy ☐ Mod. Turbid ☐ Very Cloudy

Odor of Water: NONE

Water Discharged To: GROUND

Depth to Water After Development: 23.0 [✓ Feet]

3/91



Protective Steel Casing 0.2 ft. Above Ground Surface

Well Casing 0.0 ft. Above Ground Surface

Surface Seal Material CONCRETE

8 -inch Diameter Borehole (Nominal)

2 -inch Diameter PVC Pipe (Schedule 40)

Annular Seal BENTONITE CHIPS 3/8"

~~Bentonite Seal (material)~~

2 -inch Diameter, Schedule 40 PVC Screen(0.01 -inch Slot Size)

10-20 Sand Pack
3' SLOUGH IN BOTTOM

Stainless Steel Centralizing Devices

Threaded End Cap

Backfill (material) ____

Depth of Boring 42 feet

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EASTERN REGIONAL OFFICE

PAGE 2 OF 2

RESOURCE PROTECTION WELL REPORT

START CARD NO. 57709

PROJECT NAME: SPOKANE AIRPORT BURNPIT
WELL INDENTIFICATION NO. MW13B
DRILLING METHOD: 4¼" HOLLOW STEM AUGER
DRILLER: WILL HAYES (2035)
FIRM: RUEN DRILLING (RUENCDI175QM)
SIGNATURE:
CONSULTING FIRM: LANDAU ASSOCIATES INC.
REPRESENTATIVE: DEB SUWELL

County
LOCATION: T24N, R42E, SEC. 6 ¼ NE ¼ NE
DISTANCE: (W) 112 FT. FROM N/S SECTION LINE
(S) 450 FT. FROM E/W SECTION LINE
DATUM: USGS MONUMENT 250' SOUTH OF RUNWAY
WATER LEVEL ELEVATION: (14.7) 2,366.7'
INSTALLED: 12/17/92
DEVELOPED: 12/21/92

AS–BUILT	WELL DATA		FORMATION DESCRIPTION	
see attached sheet				
		GM	DARK brown silty to sandy GRAVEL (med. dense, moist)	5.0
		SW	Dark brown Gravelly medium to very coarse SAND (loose, moist)	10.0
		GM	Dark brown silty sandy GRAVEL (loose, moist)	15.0
		ML	Medium brown fine sandy SILT w/ trace charcoal and leaves (very stiff, damp)	20.0
			END OF HOLE 20 FT.	
				25.0
				30.0
				35.0

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Will Hayes
RUEN DRILLING, INC.
BOX 267
CLARK FORK, ID 83811
(208) 266-1151

SCALE: 1"= 5'

PAGE 1 OF 2

ECY 050-12

LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907 FAX (206) 778-6409

As-built
Well Completion Form

Project: SPOKANE AIRPORT BURNPIT
Project No.: 207001.33
Well(s) No.: MW 13 B
Drilling Co.: RUEN DRILLING INC.
Installation Start Date: 12/17/92 Hour:
Installation Finish Date: 12/22/92 Hour:
Well Type: ☒ Single ☐ Nested ☐ Clustered

WATER DISCHARGE MONITORING

Date:	Time:	PID(ppm)
Date:	Time:	PID(ppm)
Date:	Time:	PID(ppm)
Date:	Time:	PID(ppm)
Date:	Time:	PID(ppm)

EQUIPMENT USED

☐ Hollow Stem Auger
☐ Cable Tool
☐ Air Rotary
☐ Other

MATERIALS USED

4.5 Sacks of 10-20 Sand
2 Sacks of Concrete/Cement
Sacks of Grout Mix Used
2 Sacks of ~~Powdered~~ Bentonite CHIPS
Pounds of Bentonite Pellets/Chips
10 Feet of Inch PVC Blank Casing
10 Feet of Inch PVC Slotted Screen

DEVELOPMENT

Method of Development: HONDA PUMP

Begin Date: 12/18/92 Time: PURGE 25 Gall

Finish Date: 12/21/92 Time: PURGE 10 GAL.

Yield: Time From: To: Date:

Estimate of Total Water Removed During Development: 35 [✓ Gallons]

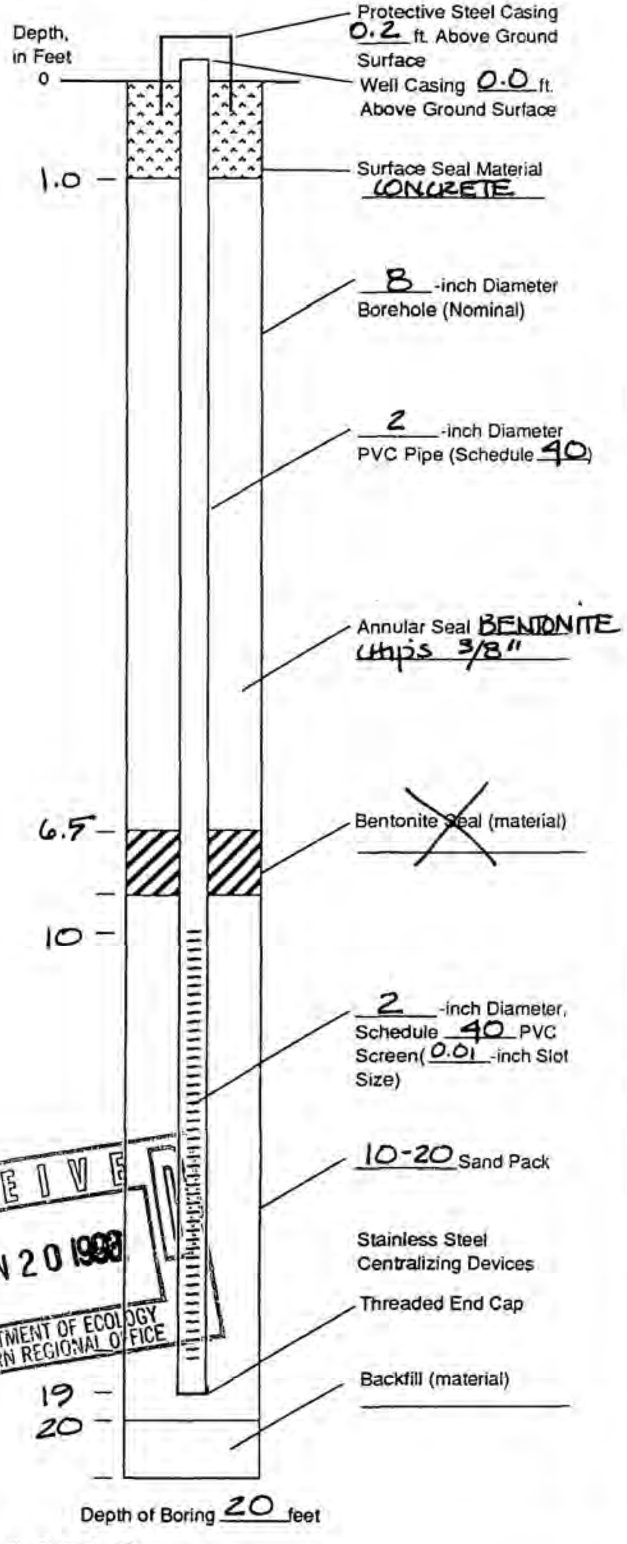
Description of Turbidity at End of Development: ☐ Clear ☒ Slightly Cloudy ☐ Mod. Turbid ☐ Very Cloudy

Odor of Water: NONE

Water Discharged To: GROUND

Depth to Water After Development: 14.7 [✓ Feet]

3/91



Protective Steel Casing 0.2 ft. Above Ground Surface

Well Casing 0.0 ft. Above Ground Surface

Surface Seal Material CONCRETE

8-inch Diameter Borehole (Nominal)

2-inch Diameter PVC Pipe (Schedule 40)

Annular Seal BENTONITE chips 3/8"

Bentonite ~~Seal~~ (material)

2-inch Diameter, Schedule 40 PVC Screen(0.01-inch Slot Size)

10-20 Sand Pack

Stainless Steel Centralizing Devices

Threaded End Cap

Backfill (material)

Depth of Boring 20 feet

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EASTERN REGIONAL OFFICE

PAGE 2 OF 2

RESOURCE PROTECTION WELL REPORT

START CARD NO. 77709

PROJECT NAME: SPOKANE AIRPORT BURNPIT
WELL INDENTIFICATION NO. MW 14B
DRILLING METHOD: 4¼" HOLLOW STEM AUGER
DRILLER: WILL HAYES (2039)
FIRM: RUEN DRILLING (RUENCDI 175ΦM)
SIGNATURE:
CONSULTING FIRM: LANDAU ASSOCIATES INC.
REPRESENTATIVE: DEB SCHNELL

County
LOCATION: T 24N, R 42E, SEC. 6 ¼ NE ¼ NE
DISTANCE: (W) 165 FT. FROM N/S SECTION LINE
(S) 555 FT. FROM E/W SECTION LINE
DATUM: USGS MONUMENT 250' SOUTH OF RUNWAY
WATER LEVEL ELEVATION: (18.5) 2,362.9
INSTALLED: 12/21/92
DEVELOPED: 12/22/92

AS-BUILT	WELL DATA	FORMATION DESCRIPTION
see attached sheet	SW	Brown to grey silty and fine to coarse SAND with trace gravel (loose moist)
CL	Red-brown CLAY with trace Gravel (stiff, wet)	
SW	Dark Grey medium to coarse SAND with Gravel (medium dense, wet)	
CL	Brown CLAY with trace Gravels to brown sandy CLAY with silt and trace Organics (stiff, wet)	
		END OF HOLE 20.5'

5
10
15
20
25
30
35

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EASTERN REGIONAL OFFICE

Will Hayes

RUEN DRILLING, INC.
BOX 267
CLARK FORK, ID 83811
(208) 266-1151

SCALE: 1"= 5'

PAGE 1 OF 2

ECY 050-12

LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907 FAX (206) 778-6409

As-built Well Completion Form

Project: SAS - BuenPIT
Project No.: 207001.33
Well(s) No.: MW 14B
Drilling Co.: RUEN DRILLING INC.
Installation Start Date: 12/21/92 Hour: 1515
Installation Finish Date: 12/21/92 Hour: 1015
Well Type: ☒ Single ☐ Nested ☐ Clustered
120 monument

WATER DISCHARGE MONITORING

Date:		Time:		PID(ppm)	
Date:		Time:		PID(ppm)	
Date:		Time:		PID(ppm)	
Date:		Time:		PID(ppm)	
Date:		Time:		PID(ppm)	

EQUIPMENT USED

☐ Hollow Stem Auger
☐ Cable Tool
☐ Air Rotary
☐ Other

MATERIALS USED

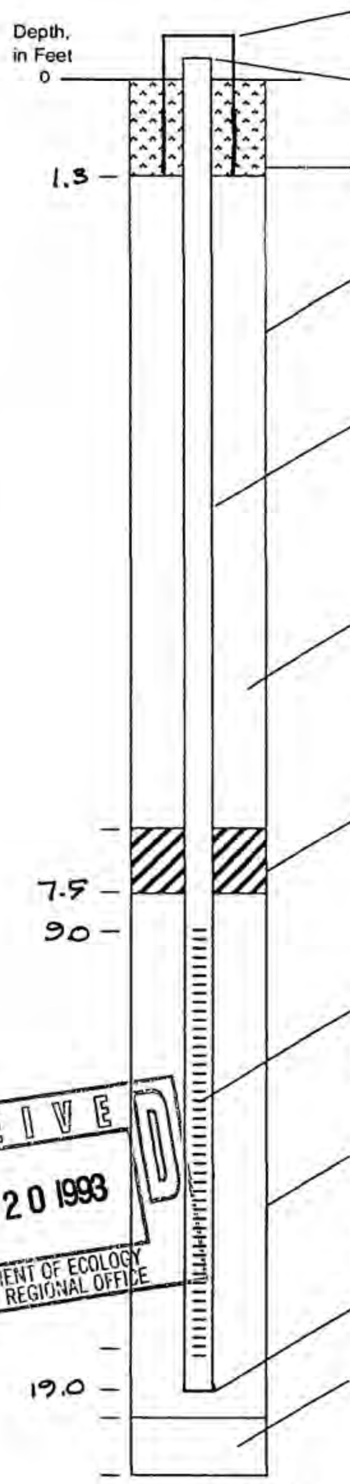
5 Sacks of 10 - 20 Sand
2 Sacks of Concrete/Cement
Sacks of Grout Mix Used
3 Sacks of Powdered Bentonite CHIPS
Pounds of Bentonite Pellets/Chips
10 Feet of 2 Inch PVC Blank Casing
10 Feet of 2 Inch PVC Slotted Screen

DEVELOPMENT

Method of Development: BAILER 1½" SS
Begin Date: 12/22/92 Time: 20 GALS SLIGHT SLTY
Finish Date: Time:
Yield: Time From: To: Date:
Estimate of Total Water Removed During Development: 20 [✓ Gallons]
Description of Turbidity at End of Development: ☐ Clear ☒ Slightly Cloudy ☐ Mod. Turbid ☐ Very Cloudy
Odor of Water: NONE
Water Discharged To: GROUND
Depth to Water After Development: 13.49 TOP PVC [✓ Feet]

3/91

RECEIVED
JAN 20 1993
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE



Protective Steel Casing 1.5 ft. Above Ground Surface
Well Casing 1.0 ft. Above Ground Surface
Surface Seal Material CONCRETE
8 -inch Diameter Borehole (Nominal)
2 -inch Diameter PVC Pipe (Schedule)
Annular Seal BENTONITE CHIPS 3/8"
~~Bentonite~~ Seal (material)
2 -inch Diameter, Schedule 40 PVC Screen(0.01 -inch Slot Size)
10 -20 Sand Pack
~~Stainless Steel Centralizing Devices~~
Threaded End Cap
Backfill (material) 10 - 20 SAND

Depth of Boring 20.5 feet

PAGE 2 OF 2

Attachment – B

Photographs

Photo No. 1

Direction Photo Taken:

Southeasterly

Description:

View of MW-7. The well cap has been cemented in-place. Potentially an easy fix.

Photo No. 2

Direction Photo Taken:

Westerly

Description:

View of the broken monument lid on MW-8b. The entire monument should be replaced.

Photo No.
3

Direction Photo Taken:

NA

Description:
View of MW-14. The soil supporting the monument has compacted and/or there is evidence of burrowing which has further removed support. The concrete monuments are supported by the well casings. This will eventually cause the casings to break. The monuments

Photo No.
4

Direction Photo Taken:

Northwesterly

Description:

View of the MW-14 well pair. SES replaced the locks on the well caps.

Attachment – C

Analytical Results

April 19, 2019 Service Request No:K1902735

Gary Panther
Spokane Environmental Solutions, LLC
3810 E. Boone Avenue, Ste 101
Spokane, WA 99202

Laboratory Results for: Burn Pits

Dear Gary,

Enclosed are the results of the sample(s) submitted to our laboratory March 29, 2019
For your reference, these analyses have been assigned our service request number **K1902735.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3275. You may also contact me via email at Chris.Leaf@ALSGlobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

C. Leaf

Chris Leaf
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Spokane Environmental Solutions, LLC
Service Request: K1902735
Project: Burn Pits
Date Received: 03/29/2019
Sample Matrix: Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Five water samples were received for analysis at ALS Environmental on 03/29/2019. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Organic LC:

Method PFC/537M, 04/08/2019: Samples MW-13B and MW-14B required dilution due to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution.

Approved by ______________________ Date 04/19/2019

SAMPLE DETECTION SUMMARY

CLIENT ID: MW-13A **Lab ID: K1902735-001**

Analyte	Results	Flag	MDL	MRL	Units	Method
Perfluorooctane sulfonic acid (PFOS)	480			4.2	ng/L	PFC/537M
Perfluorooctanoic acid (PFOA)	60			1.7	ng/L	PFC/537M

CLIENT ID: MW-13B **Lab ID: K1902735-002**

Analyte	Results	Flag	MDL	MRL	Units	Method
Perfluorooctane sulfonic acid (PFOS)	5200			420	ng/L	PFC/537M
Perfluorooctanoic acid (PFOA)	1100			17	ng/L	PFC/537M

CLIENT ID: MW-14B **Lab ID: K1902735-003**

Analyte	Results	Flag	MDL	MRL	Units	Method
Perfluorooctane sulfonic acid (PFOS)	860			43	ng/L	PFC/537M
Perfluorooctanoic acid (PFOA)	230			1.7	ng/L	PFC/537M

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Spokane Environmental Solutions, LLC **Service Request:**K1902735
Project: Burn Pits

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K1902735-001	MW-13A	3/26/2019	
K1902735-002	MW-13B	3/26/2019	
K1902735-003	MW-14B	3/26/2019	

ALS Environmental

CHAIN OF COUSTODY

97372

001

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

SR# K1902735
COC Set____of____
COC#________
Page 1 of 1

Project Name BURN PITS
Project Number
Project Manager GARY PANTHER
Company Spokane Environmental Solutions
Address 3810 E. Boone Ave, STE 101, Spokane, WA 99202
Phone # 509-954-5090
email Gary@SpokaneEnvironmental.com
Sampler Signature
Sampler Printed Name GARY PANTHER

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	14D PFC/537M / PFOA	1	2	3	4	5	Remarks
1. MW-13 A		3-26-19			2	X						
2. MW-13 B		3-26-19			2	X						
3. MW-14 B		3-26-19			2	X						
4. MW-8 B		3-26-19			2							HOLD
5. MW-7		3-26-19			2							HOLD
6.												
7.												
8.												
9.												
10.												

Report Requirements

- ☒ I. Routine Report: Method Blank, Surrogate, as required
- __ II. Report Dup., MS, MSD as required
- __ III. CLP Like Summary (no raw data)
- __ IV. Data Validation Report
- __ V. EDD

Invoice Information

P.O.# 0270-003
Bill To: GARY PANTHER
Spokane Environmental

Turnaround Requirements

__ 24 hr. __ 48 hr.
__ 5 Day
X Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments:

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name Gary D. Panther	Printed Name ALS	Printed Name	Printed Name	Printed Name	Printed Name
Firm SpokaneEnv. Solutions	Firm 3/29/19 0930	Firm	Firm	Firm	Firm
Date/Time 3/27/19 1500	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

ALS

PC Cv

Cooler Receipt and Preservation Form

Client Spokane Environmental Service Request K19 02735

Received: 3/29/19 Opened: 3/29/19 By: Km Unloaded: 3/29/19 By:

1. Samples were received via? *USPS* [✓ *Fed Ex*] *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other* ______ *NA*
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? 1F + 1B

   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N

Raw Cooler Temp	Corrected. Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
4.0	3.8	3.6	3.4	-0.2	390	97372	480832279040	

4. Packing material: *Inserts* *Baggies* [✓ *Bubble Wrap*] ~~*Gel Packs*~~ KM [✓ *Wet Ice*] *Dry Ice* *Sleeves* ______
5. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA [✓ Y] N

   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA [✓ Y] N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* [✓ NA] Y N
12. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions:______

7/25/16

***Page*____ *of*____**

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analyst Summary report

Client: Spokane Environmental Solutions, LLC
Service Request: K1902735
Project: Burn Pits/

Sample Name: MW-13A
Date Collected: 03/26/19
Lab Code: K1902735-001
Date Received: 03/29/19
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
PFC/537M	KPETERSEN	CMULLER

Sample Name: MW-13A
Date Collected: 03/26/19
Lab Code: K1902735-001.R01
Date Received: 03/29/19
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
PFC/537M	KPETERSEN	CMULLER

Sample Name: MW-13B
Date Collected: 03/26/19
Lab Code: K1902735-002
Date Received: 03/29/19
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
PFC/537M	KPETERSEN	CMULLER

Sample Name: MW-13B
Date Collected: 03/26/19
Lab Code: K1902735-002.R01
Date Received: 03/29/19
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
PFC/537M	KPETERSEN	CMULLER

Sample Name: MW-13B
Date Collected: 03/26/19
Lab Code: K1902735-002.R02
Date Received: 03/29/19
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
PFC/537M	KPETERSEN	CMULLER

Analyst Summary report

Client: Spokane Environmental Solutions, LLC
Service Request: K1902735
Project: Burn Pits/

Sample Name: MW-14B
Date Collected: 03/26/19
Lab Code: K1902735-003
Date Received: 03/29/19
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
PFC/537M	KPETERSEN	CMULLER

Sample Name: MW-14B
Date Collected: 03/26/19
Lab Code: K1902735-003.R01
Date Received: 03/29/19
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
PFC/537M	KPETERSEN	CMULLER

Sample Name: MW-14B
Date Collected: 03/26/19
Lab Code: K1902735-003.R02
Date Received: 03/29/19
Sample Matrix: Water

Analysis Method	**Extracted/Digested By**	**Analyzed By**
PFC/537M	KPETERSEN	CMULLER

Sample Results

ALS Environmental—Kelso Laboratory
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Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Organic Compounds by HPLC

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1902735
Project:	Burn Pits	**Date Collected:**	03/26/19
Sample Matrix:	Water	**Date Received:**	03/29/19 09:30
Sample Name:	MW-13A	**Units:**	ng/L
Lab Code:	K1902735-001	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	**480**	4.2	1	04/03/19 16:30	4/1/19	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	**60**	1.7	1	04/03/19 16:30	4/1/19	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOS	97	25 - 121	04/03/19 16:30	
13C4-PFOA	87	22 - 130	04/03/19 16:30	

Analytical Report

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1902735
Project:	Burn Pits	**Date Collected:**	03/26/19
Sample Matrix:	Water	**Date Received:**	03/29/19 09:30
Sample Name:	MW-13B	**Units:**	ng/L
Lab Code:	K1902735-002	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	**5200**	420	100	04/08/19 12:37	4/1/19	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	**1100**	17	10	04/08/19 12:27	4/1/19	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOS	87	25 - 121	04/08/19 12:37	
13C4-PFOA	86	22 - 130	04/08/19 12:27	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1902735
Project:	Burn Pits	**Date Collected:**	03/26/19
Sample Matrix:	Water	**Date Received:**	03/29/19 09:30
Sample Name:	MW-14B	**Units:**	ng/L
Lab Code:	K1902735-003	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	**860**	43	10	04/08/19 12:48	4/1/19	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	**230**	1.7	1	04/03/19 16:51	4/1/19	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOS	91	25 - 121	04/08/19 12:48	
13C4-PFOA	85	22 - 130	04/03/19 16:51	

QC Summary Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Organic Compounds by HPLC

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Spokane Environmental Solutions, LLC **Service Request:** K1902735
Project: Burn Pits
Sample Matrix: Water

SURROGATE RECOVERY SUMMARY

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Extraction Method: EPA 3535A

Sample Name	Lab Code	13C4-PFOS 25-121	13C4-PFOA 22-130
MW-13A	K1902735-001	97	87
MW-13B	K1902735-002	87	86
MW-14B	K1902735-003	91	85
Method Blank	KQ1904177-04	93	80
Lab Control Sample	KQ1904177-03	90	82

Analytical Report

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1902735
Project:	Burn Pits	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KQ1904177-04	**Basis:**	NA

Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method: PFC/537M
Prep Method: EPA 3535A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Perfluoroalkane Sulfonic Acids						
Perfluorooctane sulfonic acid (PFOS)	ND U	5.0	1	04/03/19 14:04	4/1/19	
Perfluoroalkane Carboxylic Acids						
Perfluorooctanoic acid (PFOA)	ND U	2.0	1	04/03/19 14:04	4/1/19	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
13C4-PFOS	93	25 - 121	04/03/19 14:04	
13C4-PFOA	80	22 - 130	04/03/19 14:04	

Client:	Spokane Environmental Solutions, LLC	**Service Request:**	K1902735
Project:	Burn Pits	**Date Analyzed:**	04/03/19
Sample Matrix:	Water	**Date Extracted:**	04/01/19

Lab Control Sample Summary
Perfluorinated Sulfonic Acids and Perfluorinated Carboxylic Acids by HPLC/MS

Analysis Method:	PFC/537M	**Units:**	ng/L
Prep Method:	EPA 3535A	**Basis:**	NA
		Analysis Lot:	630513

Lab Control Sample
KQ1904177-03

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Perfluorooctane sulfonic acid (PFOS)	35.0	29.7	118	71-139
Perfluorooctanoic acid (PFOA)	42.7	32.0	133	74-146

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ANALYTICAL REPORT

Eurofins TestAmerica, Spokane
11922 East 1st Ave
Spokane, WA 99206
Tel: (509)924-9200

Laboratory Job ID: 590-10668-1
Client Project/Site: SIA Burn Pits

For:
Spokane Environmental Solutions LLC
3810 E. Boone Avenue
Suite #101
Spokane, Washington 99202

Attn: Gary Panther

Randee Arrington

Authorized for release by:
4/10/2019 11:38:58 AM

Randee Arrington, Project Manager II
(509)924-9200
randee.arrington@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Case Narrative

Job ID: 590-10668-1

Laboratory: Eurofins TestAmerica, Spokane

Narrative

Receipt
The samples were received on 3/26/2019 5:07 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 12.6º C.

Receipt Exceptions
The following sample was submitted for analysis; however, it was not listed on the Chain-of-Custody (COC): Trip Blank (590-10668-5)

The following samples were received at the laboratory outside the required temperature criteria: MW-14b (590-10668-1), MW-13b (590-10668-2), MW-8b (590-10668-3), MW-7 (590-10668-4) and Trip Blank (590-10668-5). The samples are considered acceptable since they were collected and submitted to the laboratory on the same day and there is evidence that the chilling process has begun.

The following samples were put on hold by the client on 03/27/2019: MW-8b (590-10668-3), MW-7 (590-10668-4).

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC/MS Semi VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC Semi VOA
Method NWTPH-Dx: Detected hydrocarbons appear to be due to heavily weathered diesel and/or biogenic interference in the following sample: MW-14b (590-10668-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

VOA Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: Spokane Environmental Solutions LLC
Project/Site: SIA Burn Pits

Job ID: 590-10668-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
590-10668-1	MW-14b	Water	03/26/19 14:00	03/26/19 17:07
590-10668-2	MW-13b	Water	03/26/19 14:45	03/26/19 17:07

Definitions/Glossary

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: Spokane Environmental Solutions LLC
Job ID: 590-10668-1
Project/Site: SIA Burn Pits

Client Sample ID: MW-14b

Lab Sample ID: 590-10668-1
Date Collected: 03/26/19 14:00
Matrix: Water
Date Received: 03/26/19 17:07

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40		ug/L			03/27/19 21:57	1
Ethylbenzene	ND		1.0		ug/L			03/27/19 21:57	1
m,p-Xylene	ND		2.0		ug/L			03/27/19 21:57	1
o-Xylene	ND		1.0		ug/L			03/27/19 21:57	1
Toluene	ND		1.0		ug/L			03/27/19 21:57	1
Xylenes, Total	ND		3.0		ug/L			03/27/19 21:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*80 - 120*		*03/27/19 21:57*	*1*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*		*03/27/19 21:57*	*1*
Dibromofluoromethane (Surr)	*103*		*80 - 120*		*03/27/19 21:57*	*1*
Toluene-d8 (Surr)	*105*		*80 - 120*		*03/27/19 21:57*	*1*

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
2-Methylnaphthalene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Acenaphthene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Acenaphthylene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Anthracene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Benzo[a]anthracene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Benzo[a]pyrene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Benzo[b]fluoranthene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Benzo[g,h,i]perylene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Benzo[k]fluoranthene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Chrysene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Dibenz(a,h)anthracene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Fluoranthene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Fluorene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Indeno[1,2,3-cd]pyrene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Naphthalene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Phenanthrene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1
Pyrene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:27	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl (Surr)	*55*		*44 - 120*	*03/28/19 13:33*	*03/28/19 15:27*	*1*
Nitrobenzene-d5	*49*		*36 - 126*	*03/28/19 13:33*	*03/28/19 15:27*	*1*
p-Terphenyl-d14	*71*		*51 - 121*	*03/28/19 13:33*	*03/28/19 15:27*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	**0.34**		0.24		mg/L		04/05/19 10:17	04/05/19 16:42	1
Residual Range Organics (RRO) (C25-C36)	ND		0.40		mg/L		04/05/19 10:17	04/05/19 16:42	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*86*		*50 - 150*	*04/05/19 10:17*	*04/05/19 16:42*	*1*
n-Triacontane-d62	*87*		*50 - 150*	*04/05/19 10:17*	*04/05/19 16:42*	*1*

Client Sample ID: MW-14b

Lab Sample ID: 590-10668-1

Date Collected: 03/26/19 14:00
Date Received: 03/26/19 17:07
Matrix: Water

Method: 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0050		mg/L		04/08/19 17:43	04/09/19 15:50	5

Client Sample ID: MW-13b

Lab Sample ID: 590-10668-2

Date Collected: 03/26/19 14:45
Date Received: 03/26/19 17:07
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40		ug/L			03/27/19 22:18	1
Ethylbenzene	ND		1.0		ug/L			03/27/19 22:18	1
m,p-Xylene	ND		2.0		ug/L			03/27/19 22:18	1
o-Xylene	ND		1.0		ug/L			03/27/19 22:18	1
Toluene	ND		1.0		ug/L			03/27/19 22:18	1
Xylenes, Total	ND		3.0		ug/L			03/27/19 22:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*102*		*80 - 120*		*03/27/19 22:18*	*1*
4-Bromofluorobenzene (Surr)	*98*		*80 - 120*		*03/27/19 22:18*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 120*		*03/27/19 22:18*	*1*
Toluene-d8 (Surr)	*105*		*80 - 120*		*03/27/19 22:18*	*1*

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
2-Methylnaphthalene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Acenaphthene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Acenaphthylene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Anthracene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Benzo[a]anthracene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Benzo[a]pyrene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Benzo[b]fluoranthene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Benzo[g,h,i]perylene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Benzo[k]fluoranthene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Chrysene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Dibenz(a,h)anthracene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Fluoranthene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Fluorene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Indeno[1,2,3-cd]pyrene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Naphthalene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Phenanthrene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1
Pyrene	ND		0.091		ug/L		03/28/19 13:33	03/28/19 15:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl (Surr)	*70*		*44 - 120*	*03/28/19 13:33*	*03/28/19 15:54*	*1*
Nitrobenzene-d5	*69*		*36 - 126*	*03/28/19 13:33*	*03/28/19 15:54*	*1*
p-Terphenyl-d14	*86*		*51 - 121*	*03/28/19 13:33*	*03/28/19 15:54*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		0.23		mg/L		04/05/19 10:17	04/05/19 17:01	1

Client Sample ID: MW-13b

Lab Sample ID: 590-10668-2

Date Collected: 03/26/19 14:45

Matrix: Water

Date Received: 03/26/19 17:07

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Residual Range Organics (RRO) (C25-C36)	ND		0.38		mg/L		04/05/19 10:17	04/05/19 17:01	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*89*		*50 - 150*	*04/05/19 10:17*	*04/05/19 17:01*	*1*
n-Triacontane-d62	*88*		*50 - 150*	*04/05/19 10:17*	*04/05/19 17:01*	*1*

Method: 6020B - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0050		mg/L		04/04/19 14:09	04/05/19 13:11	5

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 590-21494/5
Matrix: Water
Analysis Batch: 21494

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40		ug/L			03/27/19 14:59	1
Ethylbenzene	ND		1.0		ug/L			03/27/19 14:59	1
m,p-Xylene	ND		2.0		ug/L			03/27/19 14:59	1
o-Xylene	ND		1.0		ug/L			03/27/19 14:59	1
Toluene	ND		1.0		ug/L			03/27/19 14:59	1
Xylenes, Total	ND		3.0		ug/L			03/27/19 14:59	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*96*		*80 - 120*		*03/27/19 14:59*	*1*
4-Bromofluorobenzene (Surr)	*100*		*80 - 120*		*03/27/19 14:59*	*1*
Dibromofluoromethane (Surr)	*95*		*80 - 120*		*03/27/19 14:59*	*1*
Toluene-d8 (Surr)	*108*		*80 - 120*		*03/27/19 14:59*	*1*

Lab Sample ID: LCS 590-21494/1003
Matrix: Water
Analysis Batch: 21494

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	10.0	9.35		ug/L		93	80 - 126
Ethylbenzene	10.0	10.2		ug/L		102	80 - 120
m,p-Xylene	10.0	10.0		ug/L		100	80 - 120
o-Xylene	10.0	9.77		ug/L		98	80 - 120
Toluene	10.0	10.2		ug/L		102	80 - 123

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*100*		*80 - 120*
4-Bromofluorobenzene (Surr)	*97*		*80 - 120*
Dibromofluoromethane (Surr)	*99*		*80 - 120*
Toluene-d8 (Surr)	*105*		*80 - 120*

Lab Sample ID: LCSD 590-21494/6
Matrix: Water
Analysis Batch: 21494

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	10.0	8.86		ug/L		89	80 - 126	5	25
Ethylbenzene	10.0	10.0		ug/L		100	80 - 120	1	25
m,p-Xylene	10.0	10.0		ug/L		100	80 - 120	0	25
o-Xylene	10.0	9.75		ug/L		97	80 - 120	0	25
Toluene	10.0	9.74		ug/L		97	80 - 123	5	25

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*98*		*80 - 120*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*
Dibromofluoromethane (Surr)	*99*		*80 - 120*
Toluene-d8 (Surr)	*108*		*80 - 120*

QC Sample Results

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM)

Lab Sample ID: MB 590-21528/1-A
Matrix: Water
Analysis Batch: 21519

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 21528

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1-Methylnaphthalene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
2-Methylnaphthalene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Acenaphthene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Acenaphthylene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Anthracene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Benzo[a]anthracene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Benzo[a]pyrene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Benzo[b]fluoranthene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Benzo[g,h,i]perylene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Benzo[k]fluoranthene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Chrysene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Dibenz(a,h)anthracene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Fluoranthene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Fluorene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Indeno[1,2,3-cd]pyrene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Naphthalene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Phenanthrene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1
Pyrene	ND		0.090		ug/L		03/28/19 13:33	03/28/19 14:08	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl (Surr)	*72*		*44 - 120*	*03/28/19 13:33*	*03/28/19 14:08*	*1*
Nitrobenzene-d5	*85*		*36 - 126*	*03/28/19 13:33*	*03/28/19 14:08*	*1*
p-Terphenyl-d14	*93*		*51 - 121*	*03/28/19 13:33*	*03/28/19 14:08*	*1*

Lab Sample ID: LCS 590-21528/2-A
Matrix: Water
Analysis Batch: 21519

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 21528

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1-Methylnaphthalene	1.60	1.06		ug/L		66	49 - 120
2-Methylnaphthalene	1.60	1.04		ug/L		65	44 - 120
Acenaphthene	1.60	1.11		ug/L		69	54 - 120
Acenaphthylene	1.60	1.11		ug/L		69	57 - 120
Anthracene	1.60	1.19		ug/L		74	66 - 120
Benzo[a]anthracene	1.60	1.21		ug/L		76	68 - 120
Benzo[a]pyrene	1.60	1.20		ug/L		75	70 - 120
Benzo[b]fluoranthene	1.60	1.22		ug/L		76	63 - 120
Benzo[g,h,i]perylene	1.60	1.13		ug/L		71	56 - 120
Benzo[k]fluoranthene	1.60	1.31		ug/L		82	67 - 120
Chrysene	1.60	1.32		ug/L		82	69 - 120
Dibenz(a,h)anthracene	1.60	1.11		ug/L		69	58 - 120
Fluoranthene	1.60	1.26		ug/L		79	64 - 120
Fluorene	1.60	1.11		ug/L		70	59 - 120
Indeno[1,2,3-cd]pyrene	1.60	1.11		ug/L		70	58 - 120
Naphthalene	1.60	1.04		ug/L		65	52 - 120
Phenanthrene	1.60	1.19		ug/L		74	57 - 120
Pyrene	1.60	1.26		ug/L		79	52 - 120

QC Sample Results

Method: 8270D SIM - Semivolatile Organic Compounds (GC/MS SIM) (Continued)

Lab Sample ID: LCS 590-21528/2-A
Matrix: Water
Analysis Batch: 21519

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 21528

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorobiphenyl (Surr)	*64*		*44 - 120*
Nitrobenzene-d5	*84*		*36 - 126*
p-Terphenyl-d14	*86*		*51 - 121*

Lab Sample ID: LCSD 590-21528/3-A
Matrix: Water
Analysis Batch: 21519

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 21528

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1-Methylnaphthalene			1.60	1.11		ug/L		69	49 - 120	4	35
2-Methylnaphthalene			1.60	1.06		ug/L		66	44 - 120	2	35
Acenaphthene			1.60	1.15		ug/L		72	54 - 120	3	30
Acenaphthylene			1.60	1.15		ug/L		72	57 - 120	3	30
Anthracene			1.60	1.34		ug/L		84	66 - 120	12	30
Benzo[a]anthracene			1.60	1.24		ug/L		78	68 - 120	3	30
Benzo[a]pyrene			1.60	1.32		ug/L		82	70 - 120	9	30
Benzo[b]fluoranthene			1.60	1.37		ug/L		85	63 - 120	12	30
Benzo[g,h,i]perylene			1.60	1.22		ug/L		76	56 - 120	7	35
Benzo[k]fluoranthene			1.60	1.40		ug/L		87	67 - 120	7	30
Chrysene			1.60	1.35		ug/L		85	69 - 120	3	24
Dibenz(a,h)anthracene			1.60	1.16		ug/L		73	58 - 120	5	30
Fluoranthene			1.60	1.33		ug/L		83	64 - 120	5	30
Fluorene			1.60	1.17		ug/L		73	59 - 120	5	30
Indeno[1,2,3-cd]pyrene			1.60	1.17		ug/L		73	58 - 120	5	30
Naphthalene			1.60	1.07		ug/L		67	52 - 120	3	30
Phenanthrene			1.60	1.27		ug/L		79	57 - 120	6	30
Pyrene			1.60	1.39		ug/L		87	52 - 120	10	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
2-Fluorobiphenyl (Surr)	*66*		*44 - 120*
Nitrobenzene-d5	*85*		*36 - 126*
p-Terphenyl-d14	*96*		*51 - 121*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 590-21626/1-A
Matrix: Water
Analysis Batch: 21628

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 21626

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics (DRO) (C10-C25)	ND		0.24		mg/L		04/05/19 10:17	04/05/19 13:06	1
Residual Range Organics (RRO) (C25-C36)	ND		0.40		mg/L		04/05/19 10:17	04/05/19 13:06	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*81*		*50 - 150*	*04/05/19 10:17*	*04/05/19 13:06*	*1*
n-Triacontane-d62	*84*		*50 - 150*	*04/05/19 10:17*	*04/05/19 13:06*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 590-21626/2-A
Matrix: Water
Analysis Batch: 21628

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 21626

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Diesel Range Organics (DRO) (C10-C25)			1.60	1.31		mg/L		82	50 - 150		
Residual Range Organics (RRO) (C25-C36)			1.60	1.50		mg/L		94	50 - 150		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*89*		*50 - 150*
n-Triacontane-d62	*88*		*50 - 150*

Lab Sample ID: LCSD 590-21626/3-A
Matrix: Water
Analysis Batch: 21628

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 21626

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Diesel Range Organics (DRO) (C10-C25)			1.60	1.27		mg/L		79	50 - 150	3	25
Residual Range Organics (RRO) (C25-C36)			1.60	1.42		mg/L		89	50 - 150	6	25

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*83*		*50 - 150*
n-Triacontane-d62	*83*		*50 - 150*

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 580-298011/22-A
Matrix: Water
Analysis Batch: 298231

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 298011

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010		mg/L		04/04/19 14:09	04/05/19 11:40	1

Lab Sample ID: LCS 580-298011/23-A
Matrix: Water
Analysis Batch: 298231

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 298011

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Arsenic			1.00	1.00		mg/L		100	80 - 120		

Lab Sample ID: LCSD 580-298011/24-A
Matrix: Water
Analysis Batch: 298231

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 298011

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			1.00	1.03		mg/L		103	80 - 120	3	20

Method: 6020B - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 580-298224/22-A
Matrix: Water
Analysis Batch: 298325

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 298224

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010		mg/L		04/08/19 17:43	04/09/19 14:18	1

Lab Sample ID: LCS 580-298224/23-A
Matrix: Water
Analysis Batch: 298325

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 298224

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Arsenic			1.00	1.05		mg/L		105	80 - 120		

Lab Sample ID: LCSD 580-298224/24-A
Matrix: Water
Analysis Batch: 298325

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 298224

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			1.00	1.05		mg/L		105	80 - 120	0	20

Lab Chronicle

Client: Spokane Environmental Solutions LLC
Project/Site: SIA Burn Pits

Job ID: 590-10668-1

Client Sample ID: MW-14b

Date Collected: 03/26/19 14:00
Date Received: 03/26/19 17:07

Lab Sample ID: 590-10668-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	43 mL	43 mL	21494	03/27/19 21:57	MRS	TAL SPK

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			246.5 mL	2 mL	21528	03/28/19 13:33	NMI	TAL SPK
Total/NA	Prep	3510C			246.5 mL	2 mL	21528	03/28/19 13:33	NMI	TAL SPK
Total/NA	Analysis	8270D SIM		1			21519	03/28/19 15:27	NMI	TAL SPK
Total/NA	Prep	3510C			252.3 mL	2 mL	21626	04/05/19 10:17	NMI	TAL SPK
Total/NA	Analysis	NWTPH-Dx		1			21628	04/05/19 16:42	NMI	TAL SPK
Total Recoverable	Prep	3005A			50 mL	50 mL	298224	04/08/19 17:43	T1H	TAL SEA
Total Recoverable	Analysis	6020B		5	50 mL	50 mL	298325	04/09/19 15:50	FCW	TAL SEA

Client Sample ID: MW-13b

Date Collected: 03/26/19 14:45
Date Received: 03/26/19 17:07

Lab Sample ID: 590-10668-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	43 mL	43 mL	21494	03/27/19 22:18	MRS	TAL SPK
Total/NA	Prep	3510C			247.5 mL	2 mL	21528	03/28/19 13:33	NMI	TAL SPK
Total/NA	Analysis	8270D SIM		1			21519	03/28/19 15:54	NMI	TAL SPK
Total/NA	Prep	3510C			265.2 mL	2 mL	21626	04/05/19 10:17	NMI	TAL SPK
Total/NA	Analysis	NWTPH-Dx		1			21628	04/05/19 17:01	NMI	TAL SPK
Total Recoverable	Prep	3005A			50 mL	50 mL	298011	04/04/19 14:09	JKM	TAL SEA
Total Recoverable	Analysis	6020B		5	50 mL	50 mL	298231	04/05/19 13:11	FCW	TAL SEA

Laboratory References:

TAL SEA = Eurofins TestAmerica, Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310
TAL SPK = Eurofins TestAmerica, Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

Accreditation/Certification Summary

Client: Spokane Environmental Solutions LLC Job ID: 590-10668-1
Project/Site: SIA Burn Pits

Laboratory: Eurofins TestAmerica, Spokane

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Washington	State Program	10	C569	01-06-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte

Laboratory: Eurofins TestAmerica, Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-20
ANAB	DoD / DOE		L2236	01-19-22
ANAB	ISO/IEC 17025		L2236	01-19-22
California	State Program	9	2901	11-05-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-20

Method Summary

Client: Spokane Environmental Solutions LLC
Project/Site: SIA Burn Pits

Job ID: 590-10668-1

Method	Method Description	Protocol	Laboratory
8260C	Volatile Organic Compounds by GC/MS	SW846	TAL SPK
8270D SIM	Semivolatile Organic Compounds (GC/MS SIM)	SW846	TAL SPK
NWTPH-Dx	Northwest - Semi-Volatile Petroleum Products (GC)	NWTPH	TAL SPK
6020B	Metals (ICP/MS)	SW846	TAL SEA
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL SEA
3510C	Liquid-Liquid Extraction (Separatory Funnel)	SW846	TAL SPK
5030C	Purge and Trap	SW846	TAL SPK

Protocol References:

NWTPH = Northwest Total Petroleum Hydrocarbon

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SEA = Eurofins TestAmerica, Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

TAL SPK = Eurofins TestAmerica, Spokane, 11922 East 1st Ave, Spokane, WA 99206, TEL (509)924-9200

TestAmerica Spokane
11922 East 1st Ave
Spokane, WA 99206
Phone (509) 924-9200 Fax (509) 924-9290

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: GP	Lab PM: Arrington, Randee E	Carrier Tracking No(s):	COC No: 590-4399-1421.1
Client Contact: Gary Panther	Phone: 509-954-5090	E-Mail: randee.arrington@testamericainc.com		Page: Page 1 of 1
Company: Spokane Environmental Solutions LLC				Job #:
Address: 3810 E. Boone Avenue Suite #101	Due Date Requested:			
City: Spokane	TAT Requested (days): STD			
State, Zip: WA, 99202				
Phone: 509-954-5090(Tel)	PO #: Advance Payment Required			
Email: gary@spokaneenvironmental.com	WO #:			
Project Name:	Project #: 59001518			
Site: SIA Burn Pits	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2O3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - pH 4-5
Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6020B - Arsenic	NWTPH_Dx - DRO and RRO	8260C - BTEX	8270D_SIM - Polycyclic Aromatic Hydrocarbons	Total Number of containers	Special Instructions/Note:
				Preservation Code:			D	A	A	N		
MW-14b	3-26-19	1400	G	Water								
MW-13b		1445	G	Water								
MW-8b		1530	G	Water								
MW-7		1615	G	Water								
				Water								

590-10668 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ________ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time: 3-26-19 1807	Company: SES	Received by: Randee Arrington	Date/Time: 3/26/19 1707	Company: TASPO
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 12.6°C IRon9

TestAmerica Spokane
11922 East 1st Ave
Spokane, WA 99206
Phone (509) 924-9200 Fax (509) 924-9290

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Arrington, Randee E	Carrier Tracking No(s):	COC No: 590-4214.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: randee.arrington@testamericainc.com	State of Origin: Washington	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): State Program - Washington		Job #: 590-10668-1
Address: 5755 8th Street East,	**Due Date Requested:** 4/5/2019			
City: Tacoma	**TAT Requested (days):**			
State, Zip: WA, 98424				
Phone: 253-922-2310(Tel) 253-922-5047(Fax)	PO #:			
Email:	WO #:			
Project Name: SIA Burn Pits	Project #: 59001518			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6020B/3005A (MOD) Arsenic	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
MW-14b (590-10668-1)	3/26/19	14:00 Pacific		Water			X	1	
MW-13b (590-10668-2)	3/26/19	14:45 Pacific		Water			X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:		Time:	Method of Shipment:	
Relinquished by: Maria OToole	Date/Time: 3/28/19 14:34	Company TASPC	Received by:	Date/Time: 3-29-19 0930	Company TASea
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: 5=-0.2/-0.1		

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: Spokane Environmental Solutions LLC

Job Number: 590-10668-1

Login Number: 10668

List Source: Eurofins TestAmerica, Spokane

List Number: 1

Creator: O'Toole, Maria C

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	Received same day of collection; chilling process has begun.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Received Trip Blank(s) not listed on COC.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	No analysis requiring residual chlorine check assigned.

Login Sample Receipt Checklist

Client: Spokane Environmental Solutions LLC

Job Number: 590-10668-1

Login Number: 10668
List Number: 2
Creator: Hobbs, Kenneth F

List Source: Eurofins TestAmerica, Seattle
List Creation: 03/30/19 09:17 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	IR5=-0.2/-0.1
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

GSI Job No.: 6892
Issued: 13 August 2024

SITE ASSESSMENT REPORT
Spokane International Airport
Spokane, WA

APPENDIX C

Response to Comments Received from Ecology on Draft Site Assessment Report

Appendix C Table 1
Response to Ecology Comments of 30 July 2024 Regarding Draft Site Assessment Report

Spokane International Airport
Spokane, WA

ECOLOGY COMMENT NO.	DOCUMENT SECTION NO.	ECOLOGY COMMENT	RESPONSE
Main Body – Revised Text Comments			
1	2.2	Please correct the formatting errors.	Corrected.
2	2.5	Please complete the final sentence.	The complete sentence has been revised.
3	4.1.1	Please note that not all airports transitioned to C6 foam.	Sentence has been revised.
4	4.2.2	Page 15, first full paragraph: Please correct the volume for the 1,500- gallon truck.	Corrected.
5	4.2.3	The text indicates “These fire trainings were not led by SIA nor was SIA ARFF equipment used.” Ecology finds it difficult to accept this assertion when SIA’s institutional knowledge only goes back to 1999.	The institutional knowledge retained by SIA is not strictly limited to a finite date but rather to what is documented or reliably recalled by former SIA personnel. In this instance, the former SIA Fire Chief was able to recall information he received upon starting his employment at SIA pertaining to fire training exercises held in the Joint Training Area.
6	6.2	Figure 6.1: Ecology is not aware that gas stations are potential sources of PFAS. The ITRC guidance indicates that uses of PFAS associated with the oil and gas industry are related to well production and drilling, neither of which is occurring at gas stations in the vicinity of the Spokane Airport.	The gas stations (Flying J, Harper Conoco, and Hilltop Conoco & Grocery) have all been removed and Figure 6.1 and Table 6.1 have been updated accordingly.
7	7.2	Please correct the references that are switched in Appendix B2, with AECOM 2017b first and AECOM 2017a following (mislabeled).	Corrected.
8	10.0	If the fuel farm has a foam distribution system, the area should be included in the evaluation.	The fuel farm does not have a foam distribution system. While the fuel farm has the piping infrastructure in place for a foam distribution system, there is no foam reserve in place, nor have there been any past events where foam been used in the system.

Notes:
1) Table summarizes response to Ecology comments issued 30 July 2024, for the Draft Site Assessment Report dated 12 July 2024.
2) Document Section Number = Section number of the Draft Site Assessment Report submitted on 12 July 2024.

Appendix C Table 1
Response to Ecology Comments of 30 July 2024
Regarding Draft Site Assessment Report

Spokane International Airport
Spokane, WA

ECOLOGY COMMENT NO.	DOCUMENT SECTION NO.	ECOLOGY COMMENT	RESPONSE
June 28, 2024 Comments from Ecology			
1	Comment #31	The comment was not addressed. Please include the complete ERIS environmental data package as an appendix to the report or indicate that the complete ERIS environmental data package will be included in the draft Remedial Investigation Work Plan.	The ERIS package will be included in the draft Remedial Investigation Work Plan.
2	Comment #32	The comment was not addressed. However, Ecology is amenable to including a preliminary assessment of groundwater flow direction in the draft Preliminary PFAS Investigation Work Plan.	We appreciate Ecology's consideration on this topic - flow directions will be presented in the Preliminary PFAS Investigation Work Plan.
3	Comment #33	The comment was not addressed. The data gaps listed in section 3.4 are listed as "the foundation for building the Preliminary PFAS Investigation Workplan." Please redefine the purpose of this section or include nature and extent of contamination as a data gap.	We have revised to indicate that the listed data gaps are specific lines of inquiry. An additional sentence has been added to reflect that this information goes to support both the Preliminary PFAS Investigation Work Plan and the Remedial Investigation Work Plan to characterize the nature and extent of any PFAS contamination on the Site.

Notes:
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Appendix C Table 1
Response to Ecology Comments of 30 July 2024
Regarding Draft Site Assessment Report

Spokane International Airport
Spokane, WA

ECOLOGY COMMENT NO.	DOCUMENT SECTION NO.	ECOLOGY COMMENT	RESPONSE
4	Comment #55	Ecology recognizes that all information regarding the stormwater system on site may not be available at this time; a comprehensive discussion of this topic will be expected in the draft Remedial Investigation Work Plan. Reports in Appendix B indicate that deicer is considered a likely source of PFAS impacts to groundwater from Alpha Outfall, but this is not discussed in Section 5.1. Please discuss the components of the airport's deicer or indicate further discussion of deicer will be included in the draft Remedial Investigation Work Plan.	A discussion of the stormwater system will be included in the RI Work Plan. The mention of deicer fluid in Appendix B.2 (AECOM, 2017a) states that, "these chemicals include aviation-related products such as lubricants, hydraulic oils, detergents, firefighting agents and deicing compounds" (page 2 of the report). The statement provides no reference for the assertion of PFAS in deicer fluids, either for general use in aviation or, specifically, as a component in the deicing fluid used by SIA. There were past assertions that aircraft deicing fluids contained PFAS however several reports have shown that aircraft deicer fluids do not contain PFAS: •In 2012, the U.S. EPA identified surfactants used in aircraft deicing and anti-icing fluid (ADF) none of which are fluorinated, and hence not PFAS. (https://www.epa.gov/sites/default/files/2015-06/documents/airport-deicing_environmental-impact-and-benefit-assessment-final-2012.pdf). •ITRC PFAS Guidance does not list ADF as a PFAS source. •Additional reports from the National Academies (https://nap.nationalacademies.org/catalog/23325/formulations-for-aircraft-and-airfield-deicing-and-anti-icing-aquatic-toxicity-and-biochemical-oxygen-demand) and the Transportation Research Board's Airport Cooperative Research Program (ACRP) (https://nap.nationalacademies.org/catalog/22962/alternative-aircraft-anti-icing-formulations-with-reduced-aquatic-toxicity-and-biochemical-oxygen-demand) further support that ADF is not a source of PFAS. A statement has been added to the main report (Section 5.1) to indicate that ADF is not a source of PFAS.

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Spokane International Airport
Spokane, WA

ECOLOGY COMMENT NO.	DOCUMENT SECTION NO.	ECOLOGY COMMENT	RESPONSE
5	Comment #57	The reports in Appendix B indicate that groundwater flow direction at the airport has been studied to support the Stormwater Discharge Permit. Please provide a short, preliminary description of groundwater flow direction in this report.	Information on groundwater flow direction has been added to Section 5.1 for the two areas studied: Land Treatment Area and the Stormwater Recovery Area.
Appendix A			
1	3	Section 3 and throughout Appendix A: The word "hydrologically" typically refers to surface water. Presumably this should say "hydrogeologically," when the section is discussing hydrogeology. Please revise.	Corrected.
2	3.1.1	More than 350 lava flows comprise the CRBG (rather than "the CBRG comprises more than 350 lava flows"). Please revise.	Revised.
3	Comment #19	This comment was not addressed. Information on the paleochannels is included in existing references and needs to be discussed along with the rest of the geologic context.	This section has been expanded upon to include information pertaining to paleochannels in the West Plains including the addition of approximated paleochannel locations on Figure 1. Additionally, subsections describing the two paleochannels nearest to the Site (to the west and to the northeast) have been added. The paleochannel to the west of the Site has been studied more extensively and information structure, groundwater flow direction and hydraulic conductivity was added. The paleochannel to the northeast of the Site has not been studied as extensively, so existing information on structure and potential unconfined aquifer thickness was added but additional information on this paleochannel is needed to understand the hydrogeology in the area.
4	Comment #26	This comment was not addressed. Please put the geochemical dating of groundwater in the area within context, as has been discussed in literature.	This section has been expanded upon to include the conclusions of both NLW, 2012 and NLW, 2014. These studies included isotope age dating of select wells in the West Plains and Lower Hangman Creek watershed and concluded that while basalt hosted aquifer water is significantly older than paleochannel water, there is some influence of 'younger' water mixing at depth.

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