Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves	Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves	
$\gamma + 10 - 10.6 - 500 - 10.6 - 500 - 10.6 - $	-100.3 - 3800.30.3	

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

Page 11 of 19

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

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	

Analytical Report

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

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	

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

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

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	

	Analytical Report						
Client:	AECOM	Service Request: K	1705255				
Project:	SIA PFOA-PFOS Sampling/TBD	Date Collected: N	IA				
Sample Matrix:	Water	Date Received: N	IA				
Sample Name:	Method Blank	Units: n	g/L				
Lab Code:	KQ1707145-04	Basis: N	IA				

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	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:AECOMProject:SIA PFOA-PFOS Sampling/TBDSample Matrix:Water

Service Request: K1705255

SURROGATE RECOVERY SUMMARY

Analysis Method:	PFC/537M
Extraction Method:	EPA 3535A

		13C4-PFOA	13C4-PFOS	
Sample Name	Lab Code	13 - 142	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	

QA/QC Report

Client:	AECOM						Service R	equest:	K1705	255	
Project:	SIA PFOA-PFO	S Sampling/	TBD				Date Colle	ected:	05/23/	17	
Sample Matrix:	Water						Date Rece	ived:	05/24/	17	
							Date Anal	yzed:	06/9/1	7	
							Date Extr	acted:	06/5/1	7	
			Duplicat	te Matrix Sj	pike Sum	mary					
	Perfluorina	ated Sulfoni	ic Acids an	d Perfluori	nated Ca	rboxylic A	Acids by H	PLC/MS			
Sample Name:	MW-8							Units:	ng/L		
Lab Code:	K1705255-001]	Basis:	NA		
Analysis Method:	PFC/537M										
Prep Method:	EPA 3535A										
			Matri KQ170	x Spike 07145-01		Duplica K(ate Matrix \$ 01707145-02	Spike 2			
		Sample		Spike			Spike		% Rec		RPD
Analyte Name		Result	Result	Amount	% Rec	Result	Amount	% Rec	Limits	RPD	Limit
Perfluorooctanoic aci	d (PFOA)	ND U	133	143	93	113	143	79	72-130	16	30
Perfluorooctane sulfo	nic 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.

QA/QC Report

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 Sam	ple Summary				
	Perfluorinated Sulfonic Acids and Perfluor	inated 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



Notes: ALS Lab Group: K1705255

Page 1



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 <u>AECOM Job No.:60557313</u>

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 $1/100^{\text{th}}$ 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



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Source: Google Earth Pro, imagery dated 6/20/17

1,000 N 0 2,000 Scale in Feet





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-	🔶 MW-	.6			MW PFC	/-13 Nov. 2 DA 85 ng	017 g/L
	i de la cale				PF	OS 72 ng	g/L
1	52. A	🔶 MW-5		🔶 MW-1	3		
W-1	May 2017			-			3
	120 pg/l		MW-5	May 2017	Nov. 2017	200	
FOR	120 ng/L		PFOA	110 ng/L	66 ng/L	3	
-03	130 Hg/L	144	PFOS	140 ng/L	120 ng/l	-	
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Figure 1 Spokane International Airport **PFOA/PFOS Study Area**

> Spokane International Airport PFOA/PFOS Study Area Spokane, Washington

 Table 1:
 Summary of Groundwater Analytical Results

Table 1Summary of Groundwater Analytical ResultsPerfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS)Spokane International Airport

		Depth to Water	PFOA	PFOS
Well ID	Sample Date		(ng/L)	(ng/L)
	Groundwater Scree	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:

¹Groundwater 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

A=	cow	•					
STA	NEW	WELL			AECOM Project Number: 60557313	Spokane International Airports, New Wells PFOA-PFOS Assessment	Boring Number: MW-13 Well Tag: BKP-258
WWW MW	0-13	11-2-17			Equipment Type/ model #: Mobile G-24	400	Location NAD 83
10-11/2					A second terms of the second		47.6355 N, - 117.4977 W
Acta and	1		M Contractor		Contractor: Geologic Drill 11C		
Carlos a			and the		Sampling method: 2-inch SPT		Sheet 1 of 1
	17190		MASS	The second	Hammer Weight: 140 Lbs		Above-Grade
and the -	- And			Ne C	Free Fall: 30"		Monument
nts	y %	.	υ	ېل	Location of Boring: Approx. 185 feet W	of east property line.	Time 830
/ Cou	over	pth ⁻ eet	phi	Gra S	Surface conditions/ Topsoil Depth: Gra	ss-covered hillside.	Dato 11/2/17
Blow	Reco	De	Gra Log	Soil e USC:	Material Description		
226	100%	0		SM	Brown silty SAND with occasional grav	el. Loose, Moist. With organics.	
2-2-0	100%						
		1					
		-					
		3					
		Ŭ Ť					
		4					
5-6-6		5		SM	Brown silty SAND, Medium-dense, Moi	st.	
5-0-0	100%						
		6					
				GM	Brown, silty GRAVEL with sand, Mediu	m-dense, Wet.	
		8					
		Ŭ –					
		9		SP	Grey- brown SAND with trace silt, Medi	um-dense, Wet.	
10-13-37		10					
10-13-37	76%						
		11					
				RX	Basalt. Refusal at 11.5 feet by	gs.	
		12					
		13			Well constructed with 6-feet of 20-slot	screen.	
		14					
		15					
		└───┟					
		16					
		17					
		18					
		19					
		20					
		04					
					Boring Completed at 11.5 feet BGS. Gro	oundwater encountered at 6.8 feet	bgs.

A	ECON	1					
					AECOM Project Number: 60557313	Spokane International Airports, New Wells PFOA-PFOS Assessment	Boring Number: MW-14 Well Tag: BKP-259
	MW-	4 11-2-1	7		Equipment Type/ model #: Mobile G-24	400	Location NAD 83
	10-	-11/2			Auger type/diameter: 8-inch Hollow Ste	em	117.4981 W
	L	1.			Contractor: Geologic Drill, LLC		
Constantes to					Sampling method: 2-inch SPT		Sheet 1 of 1
				and the	Hammer Weight: 140 Lbs		Above-Grade
	%	10 1 20 20			Free Fall: 30"	l of aast proporty line	Monument Time 1330
ounts	ery '	h in et	hic	aph	Surface conditions/ Topsoil Depth: Gra	ass-covered.	1
Blow C	ecov	Dept Fe	rapl og	oil Gr SCS			Date 11/2/17
Ш	Å	0	ĽŮ	č ŭ	Material Description		
2-2-4		U		5111	Brown silty SAND with occasional grav	vel. Loose, Moist. With organics.	
		1					
		2					
		3					
		4					
		5		SP	Grey- brown SAND with trace silt, Loos	se, Moist.	
3-4-5							
		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			Hogying condo lost anneximately 0 fa	of of boring Doring terminated	ll cot
		10			Heaving sands-lost approximately 2-re	et of boring. Boring terminated, we	li set.
		17					
		10					
		10					
		19					
					Completed well depth is 14.5- feet bgs.		
		20			Well constructed with 10-feet of 20-slo	t screen.	
		21					
					Boring Completed at 16.5-feet BGS. Gr	roundwater encountered at 7.0 feet	bgs.

Attachment B: Analytical Results