APPENDIX J

LNAPL Bills-of-lading





BILL OF LADING AND GALLONAGE TICKET

5	HIPPER/GEN	IERATOR	NOCHL			CONTACT		JOB # 14	grand -	
A	DDRESS	11-	-00 UNDER	12 20		PHONE#		LOAD # /		
0	TY, STATE,	ZIP	- Words	da A				DATE O / D S / 10		
0	ARRIER	Æ	FG.			PHONE#		DOCUMENT #		
0	ONSIGNEE	the first	AC .			CONTACT		TRUCK # / 5 504		
A	DDRESS		and in the	al a	<i>w</i>	PHONE#		PRODUCT TYP	PE 100207	
C	TTY, STATE, 2	ZIP		0				EST. GALLONS	6	
	НМ	ITEM #		U.S. DOT D	DESCRIPTION		#	TYPE	QTY.	
		A	malet		197 1 1 m	n v m	1	07	0206	
		В			f	37-60-1-		1.72 1	hla (A)	
		С						X		
		D								
A. WPQ # DISP. CODE: C. WPQ # B. WPQ # DISP. CODE: D. WPQ #						NPQ #		DISP. CODE: DISP. CODE:		
					DISPOSAL					
						DUMP DELAY TIME	I			
	WASH OUT:	YES () NO	Ο()			TIME IN				
E.	WATER		GALLONS	LOCATION		TEST		DISP. CODE		
F.	SOLIDS		GALLONS	LOCATION		TEST	(DISP. CODE		
			% SUSPENDED	SOLIDS BY CENT	rrifuge +	GAL	S SEDIMENT			
G.	OIL/DIESEL/	GAS	GALLONS			TEST	(
	HOC'S		PCB'S		- B.S	S.&W	API .	L	AB: Y / N	

X CARRIER - DRIVER 1 (PRINT NAME)		DATE: DATE:	9.28.17
X CARRIER - DRIVER 2 (PRINT NAME)	XSIGNATURE	DATE:	<u></u>
X CONSIGNEE (PRINT NAME)	X	DATE:	
	CUSTOMER	100	G-



1704612.1461

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GEN	NERATOR U	NOCAL			CONTACT		JOB #	ana da f
ADDRESS	1120	DUNDLAL			PHONE#		LOAD #	
CITY, STATE,	ZIP Éch	Mon 19	mA				DATE G_	76-12
CARRIER	CARRIER EES						DOCUMENT # 21465	
CONSIGNEE	CONSIGNEE ERC				CONTACT		TRUCK #	1794
ADDRESS	1500	an put u	leans		PHONE#		PRODUCT TY	PE MG
CITY, STATE,	ZIP 🤇	sentle.	att	1			EST. GALLON	Sign La
НМ	ITEM #		U.S. DOT DESC	CRIPTION		#	TYPE	QTY.
	А	Tracel in	6 Biech	Bynn	T	1	BT	2000
	В		1 101					
	С							
	D							
A 11/20 //	as COI							
A. WPQ #	20 501	DISP. COD	DE:		/PQ #		DISP. CODE:	
B. WPQ #		DISP. COE	DE:	D. W	D. WPQ # DISP. CODE:			
			D	ISPOSAL				
				C	DUMP DELAY TIME			
WASH OUT	YES () N	0()		т	IME IN			
E. WATER	-	GALLONS	LOCATION	г	FST			
-								
F. SOLIDS	-	GALLONS	LOCATION	T	'EST		DISP. CODE	
	78	% SUSPENDE	D SOLIDS BY CENTRIFI	JGE +	GAL	S SEDIMENT		
G. OIL/DIESEL	_/GAS	GALLONS	LOCATION	1	EST		DISP. CODE	
HOC'S		PCB'S		B.S	.&W	API	1	LAB: Y / N

X Ricardo Castro SHIPPER (PRINT NAME) X CARRIER - DRIVER 1 (PRINT NAME) X CARRIER - DRIVER 2 (PRINT NAME) X	X SIGNATURE X SIGNATURE X SIGNATURE X SIGNATURE X	DATE: <u>9/38/17</u> DATE: <u>9/38/17</u> DATE: DATE:
CONSIGNEE (PRINT NAME)	SIGNATURE	G



81967

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GEN	NERATOR	Arca	dis	CONT	TACT		JOB # 17 00	11127111
ADDRESS	1172	0 JUno	co Rd	PHON	NE#		LOAD #	1
CITY, STATE,	ZIP	dmond	AW.				DATE 9-1	5.17
CARRIER	En	revald	Services	PHON	NE#			<u>, , , , , , , , , , , , , , , , , , , </u>
CONSIGNEE	A	PW Fa	cilita	CONT	CONTACT		TRUCK # 6	8194
ADDRESS	150	O AIVD	ort way	S PHON	RHONE#		68360	
CITY, STATE, 2	ZIP	Seatt	e (1)A				PRODUCT TYPE LIG	
НМ	ITEM #		U.S. DOT DESCRIP				EST. GALLON	s 16
-	A	Nou	Hazardo	us Philip		#	IYPE	QTY.
	В		hundar	Tasaland	-		[]	1434
	С		[Warter	<u>/</u>				
	D							
A. WPQ #		DISP. CO	DE: DE: DISF	C. WPQ # D. WPQ # POSAL			DISP. CODE: DISP. CODE:	
				DUMP DEL	AY TIME.			
WASH OUT:	YES () NO	D ()		TIME IN		т		
E. WATER		GALLONS	LOCATION	TEST		D	ISP. CODE	
F. SOLIDS		GALLONS	LOCATION	TEST		D	ISP. CODE	
		% SUSPENDE	D SOLIDS BY CENTRIFUGE	+	GALS	SEDIMENT		
G. OIL/DIESEL/	GAS	GALLONS	LOCATION	TEST		D	ISP. CODE	
HOC'S		PCB'S		B.S.&W		API	L	AB: Y / N
Shipper's Cert are classified, international ar Part 261 or 40	ification: I herel packed, marked nd national gov CFR Part 761	by declare that the d and labeled, and enment regulation	contents of this consignme are in all respects in prope is and this material is not re	ent are fully and accura r condition for transport egulated as a hazardou	ately deso t by high is waste	cribed above b way, vessel and in accordance	y proper shippi d rail according with WAC 173-	ng name and to applicable 303, 40 CFR.

X SHIPPER (PRINT NAME) X SIGNATURE X SIGNATURE	DATE: <u>9/15/17</u> DATE: <u>9/15-17</u> DATE: DATE: G-
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BILL OF LADING AND GALLONAGE TICKET

S	HIPPER/GEN	IERATOR	ARCADIS	CONTACT		JOB # 17/	442746
A	DDRESS	11720	UNOCO Road	PHONE#		LOAD #	1
C	ITY, STATE, Z	zip Zeh	nonche , Wa.	DISDAT	ch	DATE 9-	22-17
C	ARRIER	CM	sald Somvices	PHONE#	22-2020	DOCUMENT #	1
C	ONSIGNEE		ERS	CONTACT		TRUCK #	8794
A	DDRESS	1500	aconot was so.	PHONE#		PRODUCT TY	PE
С	ITY, STATE, 2	IP ARA	the filan O			EST. GALLON	S
	нм	ITEM #	U.S. DOT DESCRIPTION		#	TYPE	QTY.
		А	Mon Regulated inatt	5 . Penuid	1	TI	2721)
		В	The partice under	- Japprell			A1120 .
		С	· / pilit water	1			
		D	Long rouges	/			
А. В.	WPQ #		DISP. CODE: DISP. CODE:	C. WPQ #		DISP. CODE DISP. CODE	·
			DISPOSAL	•			
				DUMP DELAY TIME	,		
	WASH OUT:	YES () N	0()		ד ז		
E.	WATER		GALLONS LOCATION	TEST	C	DISP. CODE	
F.	SOLIDS		GALLONS LOCATION		(DISP. CODE	
				GALS	SEDIMENT		
G.	OIL/DIESEL	/GAS	GALLONS LOCATION	TEST	[
	HOC'S		PCB'S	B.S.&W	API .		LAB: Y / N

X Eric Keneger on beharf of CEMC SHIPPER (PRINT NAME) X CARRIER - DRIVER 1 (PRINT NAME) X CARRIER - DRIVER 2 (PRINT NAME) X CONSIGNEE (PRINT NAME)	X SIGNATURE SIGNATURE SIGNATURE SIGNATURE SIGNATURE SIGNATURE	DATE: <u>9-22-17</u> DATE: <u>9-22-17</u> DATE: DATE:
	CUSTOMER	



BILL OF LADING AND GALLONAGE TICKET

SHIPPER	R/GENERA	TOR A	RCADI	5		CONTACT	CONTACT		JOB#170442746	
ADDRES	S	11720	2 UNDCI	7 Rom	1	PHONE#		LOAD #	1 11	
CITY, STATE, ZIP Edmonds, Way, Disparch DA									26-17	
CARRIE	R	En	erald.	Sommore	D	PHONE#	22-300	DOCUMENT #	¥	
CONSIG	NEE		ER	5		CONTACT		TRUCK # 68794		
ADDRES	SS JF	500	2 inport	Way A	0,	PHONE#		PRODUCT TY	PE	
CITY, ST	ATE, ZIP	All	the a	way				EST. GALLON	IS	
НМ		ITEM #		U.S. DOT DE	SCRIPTION		#	TYPE	QTY.	
		А	MAN Re	rulated	1) atto -7	sand 2	1	And California and California	2817	
		В				D	,			
		С		(dily ,	vater>					
		D								
A. WPQ	#		DISP. COE	DE: G0010	7 c.	WPQ #		DISP. CODE		
B. WPQ	#		DISP. COD	DE:	D.	WPQ #		DISP. CODE	:	
					DISPOSAL					
						DUMP DELAY TIME	Ē			
WASH	I OUT: YE	S() N	Ο()			TIME IN				
E. WATE	R		GALLONS	LOCATION		TEST		DISP. CODE		
F. SOLI	DS		GALLONS	LOCATION		TEST		DISP. CODE -		
			% SUSPENDE	D SOLIDS BY CENTR	IIFUGE +	GAL	S SEDIMENT			
G. OIL/D	IESEL/GA	S	GALLONS	LOCATION		TEST		DISP. CODE		
HOC,	s		PCB'S		į . I	3.S.&W	AP		LAB: Y / N	

X <u>SHIPPER (PRINT NAME)</u> X <u>CARRIER - DRIVER 1 (PRINT NAME)</u>	X SIGNATURE	DATE: 9-26-17 DATE: 9-26-17
	X	DATE:
	X	DATE:
		G-:



BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GEN	NERATOR	ARCADIS	5	CONTACT		JOB # 177	5114741
ADDRESS	11720	I INOCO	Road	PHONE#		LOAD #	2724
CITY, STATE, 2	zip E	Imonals. 10	A.,	Disoa	Th	DATE OL	21-177
CARRIER	Eme	rald Spritt	Par	PHONE#	22-2000	DOCUMENT #	#
CONSIGNEE		FRS		CONTACT	12 AUD	TRUCK #	chail
ADDRESS	1501) Airport.	april 50.	PHONE#		PRODUCT TY	(PE
CITY, STATE,	ZIP AQ	attle la	July Der			EST. GALLON	IS
НМ	ITEM #	U.S.	DOT DESCRIPTION		#	ТҮРЕ	QTY.
	А	Non Regulati	of inatto of	i mil	1	TT	nont
	В		- in the second	D			- 301
	С	1 til	1 water				
	D						
A 14/PO #			107/17				/ .
B. WPO #		DISP. CODE:	<u>C. WF</u>	PQ #		DISP. CODE	:
D. WFQ#		DISP. CODE:	D. WF	PQ #		DISP. CODE	:
			DISPOSAL				
			DL	JMP DELAY TIME			
WASH OUT:	YES () N	Ο()	ווד	ME IN	т		
E. WATER		GALLONS LOCATIO	N TE	ST	C	ISP. CODE	
F. SOLIDS		GALLONS LOCATIO	N TE	ST	C	DISP. CODE	
				GALS	SEDIMENT		
G. OIL/DIESEL	/GAS	GALLONS LOCATIO	N TE	ST	C	ISP. CODE	
HOC'S		PCB'S	B.S.&		API _	(LAB: Y / N
					X.		
Shipper's Cer are classified, international a Part 261 or 40	tification: I here packed, marke and national go CFR Part 761.	eby declare that the contents of ad and labeled, and are in all re vernment regulations and this r	f this consignment are fully and spects in proper condition for t naterial is not regulated as a h	d accurately dea ransport by high azardous waste	scribed above t nway, vessel an in accordance	by proper shipp d rail accordin with WAC 173	ping name and g to applicable 3-303, 40 CFR.
· Sam W	iles on	BohulfofZEMS	X	27		G	21-12
SHIPPER (PRIM	NT NAME)	X	SIGNATURE	10	DA		4617
X	IVER 1 (PRINT NAM		SIGNATURE	. Dum	MON DA	те:	16-17
		X			DA	TE:	
X		<u></u> Х	SIGNATURE		DA	TE:	
CONSIGNEE (F	PRINT NAME)		SIGNATURE				G-2
			CUSTOMER				

81981



81982

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/	GENERATOR	ARCA	DIS		CONTACT	>	JOB # /17/	1442711
ADDRESS	1172	O LINO	CO ROD	N	PHONE#		LOAD #	1-12/70
CITY, STA	TE, ZIP Ed	monds,	wa.		DISOA	TAL		27-17
CARRIER	Er	nerald	Service	N	PHONE#	2-2000	DOCUMENT #	#
CONSIGN	EE	E	TRS		CONTACT		TRUCK #	8791
ADDRESS	1500	ainpar	+ Wall	20.	PHONE#		PRODUCT TY	PE
CITY, STA	TE, ZIP	attle w	a. U				EST. GALLON	IS
НМ	ITEM #		U.S. DOT DESCR	RIPTION		#	TYPE	QTY.
	А	Mon Re	andsted 1	Datta . 7	and D	1	TT	28117
	В		1	and dia	Dur			ajua 1
	С		(Dily us	ter	<u></u>			
	D		- Jan	<u> </u>				
B. WPQ#		DISP. COL	DIS	C. WF D. WF	na #		DISP. CODE: DISP. CODE:	:
				DU	MP DELAY TIME			
WASH C	DUT: YES () N	Ο()		TIN	/IE IN		TIME OUT	
E. WATER		GALLONS	LOCATION	ТЕ	ST		DISP. CODE	
F. SOLIDS		GALLONS	LOCATION	ТЕ	ST		DISP. CODE	
		% SUSPENDE	SOLIDS BY CENTRIFUG	E +	GALS	SEDIMENT		
G. OIL/DIE	SEL/GAS	GALLONS	LOCATION	TE	ST		DISP. CODE	
HOC'S		PCB'S		B.S.&	w	API	I	_AB: Y / N

X SHIPPER (PRINT NAME) X CARRIER - DRIVER 1 (PRINT NAME) X CARRIER - DRIVER 2 (PRINT NAME) X CONSIGNEE (PRINT NAME)	X SIGNATURE X SIGNATURE X SIGNATURE X SIGNATURE X SIGNATURE	DATE: <u>9-27-17</u> DATE: <u>9-30-11</u> DATE: DATE:	
	CUSTOMER		



81983

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GEN	ERATOR	ARCADIS	CONTACT	CONTACT		JOB # 170442746	
ADDRESS	11720	UNOCO REAR	PHONE#		LOAD #		
CITY, STATE, Z	IP Ed	monds, Wa!	Dispa	Tch	DATE 9-27-117		
CARRIER		Emerald Servir	MAD PHONE# 8	12-3000	DOCUMENT #		
CONSIGNEE		ERS	CONTACT		TRUCK #	8794	
ADDRESS	150	o auport way	AO_ PHONE#		PRODUCT TY	PE	
CITY, STATE, Z	IP An	otto wa I			EST. GALLON	S	
НМ	ITEM #	U.S. DOT DES	CRIPTION	#	TYPE	QTY.	
	А	MAN Regulated in	late liquid		TI	2,800	
	В		8				
	С	1 Pily u	rater >				
	D						
A. WPQ #		DISP. CODE: (10070	C. WPQ #		DISP. CODE		
B. WPQ #		DISP. CODE:	D. WPQ #		DISP. CODE	:	
	1.2						
			DISPOSAL				
			DUMP DELAY TIM	E			
WASH OUT:	YES () N	Ο()	TIME IN	· ·		5-07. 	
E. WATER		GALLONS LOCATION	TEST	()	DISP. CODE		
F. SOLIDS -		GALLONS LOCATION	TEST		DISP. CODE		
-		% SUSPENDED SOLIDS BY CENTRI	FUGE +GAL	S SEDIMENT			
G. OIL/DIESEL	/GAS	GALLONS LOCATION	TEST		DISP. CODE		
HOC'S		PCB'S	B.S.&W	API		LAB: Y / N	

X SHIPPER (PRINT NAME) X CARRIER - DRIVER 1 (PRINT NAME) X CARRIER - DRIVER 2 (PRINT NAME) X CONSIGNEE (PRINT NAME)	X SIGNATURE X SIGNATURE X SIGNATURE X SIGNATURE X SIGNATURE	DATE: <u>9-27-17</u> DATE: <u>9-37-17</u> DATE: DATE: G
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81984

BILL OF LADING AND GALLONAGE TICKET

-	SHIPPER/GEN	ERATOR	ARCADIS		CONTACT		JOB # 171	011427111
1	ADDRESS	1720	UNOCO Rond		PHONE#		LOAD #	1 105/76
(CITY, STATE, Z	IP Pd	mondy, Da'		Dispa	Tch	DATE 9-	29-17
_	CARRIER	2	merald Servit	01)	PHONE#	20-2015	DOCUMENT #	+
(CONSIGNEE		ERS		CONTACT		TRUCK #	81911-182
1	ADDRESS	1500	airport way	10.	PHONE#		PRODUCT TY	PE / 60/
(CITY, STATE, Z	IP Au	attle was				EST. GALLON	IS
L	НМ	ITEM #	U.S. DOT DESCRIF	TION		#	ТҮРЕ	QTY.
		А	non Regulated W	atto of	inuid	1	TT	5000
		В			D			2,000
L		С	K sily soc	story				
L		D						
A. B.	WPQ #		DISP. CODE: DISP. CODE:	C. WP D. WP	Q#		DISP. CODE: DISP. CODE:	
			DISF	'OSAL Du	MP DELAY TIME		<i>#</i>	
	WASH OUT:	YES () NO	D ()	NIT	1E IN			
E.	WATER		GALLONS LOCATION	TE:	ST		DISP. CODE	
F.	SOLIDS		GALLONS LOCATION	TES	эт		DISP. CODE	
			% SUSPENDED SOLIDS BY CENTRIFUGE	+	GALS	SEDIMENT		
G.	OIL/DIESEL/	GAS	GALLONS LOCATION	TE:	эт		DISP. CODE	
	HOC'S		PCB'S	B.S.&\	N	API	<u> </u>	AB: Y / N

X Eric Krueger on behalf of CEMC SHIPPER (PRINT NAME) X CARRIER - DRIVER 1 (PRINT NAME) X	X SIGNATURE X SIGNATURE X	DATE: DATE: DATE:	9-29-17 9-29-17
CONSIGNEE (PRINT NAME) X	SIGNATURE X SIGNATURE CUSTOMER	DATE:	G-



81985

BILL OF LADING AND GALLONAGE TICKET

	SHIPPER/GEN	IERATOR					CONTACT		108 # 117	Ollan	11.
	ADDRESS	11720	LINDO	n Pi	a fl				JOB# 1/	09921	46.
1	CITY, STATE, 2		and i	ZDI	all all and a second se			1	LUAD #	d	
t	CARRIER	<u>. (a</u>	monas,	yra.			Dispet	ich	DATE G-	29-17	
F			_ Canolo	Ild'	Service-	1	PHONE# 8	12-3002	DOCUMENT	#	
H			E	RS			CONTACT		TRUCK #	8194-68	136
Ľ	ADDRESS	15	00 Gury	DOTE 1	Wail NO.		PHONE#		PRODUCT	YPE	20
-	CITY, STATE, Z	(IP	Seattle	, Way	.0				EST. GALLON	VS	
L	НМ	ITEM #	1	U.S. DO	OT DESCRIPTION			#	TYPE	QTY.	
L		А	Mm Roa	wated	1)atta o 7	lion	ed /	1	-11	LAUE	
		В			<u> </u>	The	(1 <u>1</u> ,2	1	11	-110-2	
		С		(Sila	install	- <u>V</u>					
		D		1000	ang un j						
Α.	WPQ #		DISP. COI	DE: <u>(70</u>	0707	C. WP	<u></u> #		DISP. CODE		
В.	WPQ #		DISP. COI	DE:		D. WP	ם #		DISP. CODE:		
									1 C		
					DISPOSAL						
						וווס		-			
	WASH OUT	VE0 ()									
	WASH OUT:	YES () NC) ()			TIM	E IN		TIME OUT		
E.	WATER		GALLONS	LOCATION		_ TES	атт		DISP. CODE		
F.	SOLIDS		GALLONS				-				
			GALLONG	LOCATION		- TES	il		DISP. CODE		
			% SUSPENDE	D SOLIDS BY C	ENTRIFUGE +		GAL	S SEDIMENT			
G.	OIL/DIESEL/	GAS	GALLONS	LOCATION		_ TES	т		DISP. CODE		
	HOC'S		DOPIO								
			FUB3			B.S.&V	V	API	I	LAB: Y / N	

X Eric Krueser on behauf of CEUC	X SIGNATURE	DATE: <u>9-29-17</u>
SHIPPER (PRINT NAME)	X SIGNATURE	DATE: <u>9-29-17</u>
X CARRIER - DRIVER 1 (PRINT NAME)	X SIGNATURE	DATE:
X CARRIER - DRIVER 2 (PRINT NAME)	X SIGNATURE	DATE:
X CONSIGNEE (PRINT NAME)	X SIGNATURE	G
	CUSTOMER	



7343 E. MARGINAL WAY SOUTH SEATTLE, WASHINGTON 98108 PH. (206) 832-3000 FAX (206) 832-3030 24 HOUR EMERGENCY PHONE: 1-888-832-3008

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81986

BILL OF LADING AND GALLONAGE TICKET

SHIPPER/GENI	ERATOR	ARCADIS	CONTACT		JOB # 170	1442746				
ADDRESS	1720	LINOCA RA	PHONE#		LOAD #	1				
CITY, STATE, Z	IP Pol	nonds, War.	Dison	Tch	DATE 10-2-17					
CARRIER	Ene	pald Services	PHONE#	22-300E	DOCUMENT	ŧ				
CONSIGNEE		ERS	CONTACT		TRUCK #	8751				
ADDRESS	1500	annort way	AO. PHONE#		PRODUCT TY	PE				
CITY, STATE, Z	IP ADA	the lina.			EST. GALLON	IS				
НМ	ITEM #	U.S. DOT DE	SCRIPTION	#	TYPE	QTY.				
	А	Non Repulsted	Water finied	1	TT	3.182				
	В									
	С	Coilis u	raters							
	D									
B. WPQ #		DISP. CODE:	D. WPQ #		DISP. CODE					
			DISPOSAL							
			DUMP DELAY TIME	I						
WASH OUT:	YES () N	Ο()	TIME IN	TIME IN TIME OUT						
E. WATER		GALLONS LOCATION	TEST		DISP. CODE					
F. SOLIDS -		GALLONS LOCATION	TEST		DISP. CODE -					
-		% SUSPENDED SOLIDS BY CENTF	NFUGE +GAL	S SEDIMENT						
G. OIL/DIESEL	/GAS	GALLONS LOCATION	TEST		DISP. CODE _					
HOC'S		PCB'S	B.S.&W	API		LAB: Y / N				
Shipper's Ce are classified international Part 261 or 4	Shipper's Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway, vessel and rail according to applicable international and national government regulations and this material is not regulated as a hazardous waste in accordance with WAC 173-303, 40 CFR. Part 261 or 40 CFR Part 761.									

X Sam Miloson Behalfol CEMC SHIPPER (PRINT NAME)	X SIGNATURE		0-2-17
X AIVIA D. SIMPSON CARRIER - DRIVER 1 (PRINT NAME)	X SIGNATURE	DATE:	0-2-17
x	X	DATE:	
CARRIER - DRIVER 2 (PRINT NAME)	SIGNATURE		
X	X	DATE:	
CONSIGNEE (PRINT NAME)	SIGNATURE		G-2
	CUSTOMER		02



81987

BILL OF LADING AND GALLONAGE TICKET

	SHIPPER/GEN	IERATOR	AT	RCADI'	S .	CONTACT		JOB # 117	NUU17111
4	DDRESS	11720	UNOC	O Roo	ad.	PHONE#		LOAD #	2 13.1.76
(CITY, STATE, 2	ZIP 2	monds	, Wa.	No. No. A	Disp.	arch	DATE IN	- 1-17
(CARRIER	En	erald	Service	N	PHONE# 9	37-2000	DOCUMENT	#
0	ONSIGNEE		ER	5		CONTACT	and the second	TRUCK #	8051
1	DDRESS	1500	Auno	it was	u An	PHONE#		PRODUCT	20 (PE
(CITY, STATE, 2	ZIP AOS	the li	Ja.	J			EST. GALLON	IS
L	НМ	ITEM #	,	U.S. DOT D	ESCRIPTION		#	ТҮРЕ	QTY.
L		А	MOA RI	aulated	1 1 atto	· Leand	1		2001
L		В	1	1	- wate	Thursday	+		- Jac I
		С		(silu	unster >	- V			
		D		TO -	as and f				
A. B.	WPQ #		DISP. CO	de: <u>4007</u> de:	07 c	WPQ #		DISP. CODE DISP. CODE	: :
					DISPOSAL				
						DUMP DELAY TIME			
	WASH OUT:	YES () NO	D ()			TIME IN	1		
E.	WATER		GALLONS	LOCATION		TEST	t	DISP. CODE	
F.	SOLIDS		GALLONS	LOCATION		TEST	C	DISP. CODE	
			% SUSPENDE	D SOLIDS BY CENTI	RIFUGE +	GALS	SEDIMENT		
G.	OIL/DIESEL/	GAS	GALLONS	LOCATION		TEST		DISP. CODE	
	HOC'S		PCB'S			3.S.&W	API _	1	LAB: Y / N

X <u>Eric Kancger on behaff of CEM</u> SHIPPER (PRINT NAME) X <u>CARRIER - DRIVER 1 (PRINT NAME)</u> X <u>CARRIER - DRIVER 2 (PRINT NAME)</u> X	X SIGNATURE	DATE: DATE: DATE: DATE:	10-2-17
CONSIGNEE (PRINT NAME)	SIGNATURE	Drift.	
	CUSTOMER		



BILL OF LADING AND GALLONAGE TICKET

S	SHIPPER/GENERATOR ARCADIS					CONTACT		JOB # 170442741		161
A	ADDRESS 11720 UNOCO ROAD							LOAD #		01
С	ITY, STATE, Z	IP &d	monds	, Da.		DISOA	Tch	DATE 10-	-3-17	
С	ARRIER	Emeri	ald 5	VSr		PHONE#	37-2000	DOCUMENT #	ŧ į	1
C	ONSIGNEE		ERS	<u>)</u>		CONTACT	9	TRUCK #	8751	
A	DDRESS	500	airport	- Wall -	AQ	PHONE#		PRODUCT TY	PE	1
C	ITY, STATE, Z	IP Alat	the u	Da.				EST. GALLON	IS	1
	нм	ITEM #		U.S. DOT DE	SCRIPTION		#	TYPE	QTY.	
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В.	WPQ #		DISP. COD)E:	D. V	VPQ #		DISP. CODE	:	-
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						DUMP DELAY TIME				
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E.	WATER		GALLONS	LOCATION		TEST DISP. CODE				_
F.	F. SOLIDS GALLONS LOCATION			·	TEST		DISP. CODE -		_	
	-		% SUSPENDE	D SOLIDS BY CENTR	RIFUGE +	GAL	S SEDIMENT			
G.	OIL/DIESEL	/GAS	GALLONS	LOCATION		TEST		DISP. CODE		
HOC'SPCB'S B.S.&W						API		LAB: Y / N		

X SHIPPER (PRINT NAME) X CARRIER - DRIVER 1 (PRINT NAME)	X SIGNATURE	DATE: 10-3-17
X	X	DATE:
CARRIER - DRIVER 2 (PRINT NAME) X	SIGNATURE	DATE
CONSIGNEE (PRINT NAME)	SIGNATURE	G-2
	CUSTOMER	0.2



7343 E. MARGINAL WAY SOUTH SEATTLE, WASHINGTON 98108 PH. (206) 832-3000 FAX (206) 832-3030 24 HOUR EMERGENCY PHONE: 1-888-832-3008

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BILL OF LADING AND GALLONAGE TICKET

SHIPP	ER/GEN	ERATOR	ARADI	1		CONTACT		100 11 1 100	dila la
ADDR	ESS	11720	1 hinro	Dart				JOB # ///	142746
CITY, S	TATE 7	1P 20	CINUCO	nead		PHONE#		LOAD #	2
CAPPI	ED	o CAI	upnas, i	Va.		DISPA	Tch	DATE 10-	3-17
CANNI		- Emer	ald Si	rotcas		PHONE# 8	22-2000	DOCUMENT	#
CONSI	GNEE		ER	S		CONTACT		TRUCK #	1 81751
ADDRE	ESS	1500 (Wiport	Way So).	PHONE#		PRODUCT TY	/PE
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HM	Л	ITEM #		U.S. DOT DI	ESCRIPTION		#	ТҮРЕ	QTY.
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F. SOLI	DS		GALLONS	LOCATION	TE	ST	[DISP. CODE	
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G. OIL/D	IESEL/0	GAS	GALLONS	LOCATION	TE	ST	C	DISP. CODE	
HOC'	s		PCB'S		B.S.&	W	API _	L	AB: Y / N

X Enckrueger on behalf of CEMC SHIPPER (PRINT NAME) XCARRIER - DRIVER 1 (PRINT NAME) XCARRIER - DRIVER 2 (PRINT NAME) X	X SIGNATURE X SIGNATURE X SIGNATURE X SIGNATURE	DATE: DATE: DATE:	10-3-17
CONSIGNEE (PRINT NAME)	SIGNATURE	DATE.	
	CUSTOMER		G-2



BILL OF LADING AND GALLONAGE TICKET

5	HIPPER/GEN	ERATOR	ARPANI	<	CONTACT		JOB # 1 21	nummer.
1	DDRESS	11720	UNDED T	Poal	PHONE#		LOAD #	1442146
0	CITY, STATE, 2	IP Pln	nonda ida.	- Later C	Dican	-1	DATE LO	1
(CARRIER	Emisa	ld Services)	PHONE#	22.2000	DOCUMENT	#
(CONSIGNEE		ERS		CONTACT	9-2000	TRUCK #	0-1-1
A	DDRESS	1500 1	Aliport inn	1.10	PHONE#		PRODUCT	20101
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	НМ	ITEM #	U.S	. DOT DESCRIPTION		#	TYPE	QTY.
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F.	SOLIDS		GALLONS LOCATI	ON	TEST	C	DISP. CODE	
			% SUSPENDED SOLIDS	BY CENTRIFUGE +	GALS	SEDIMENT		
G.	OIL/DIESEL/	GAS	GALLONS LOCATI	ON	TEST	c	DISP. CODE	
	HOC'S		PCB'S		B.S.&W	API _	I	LAB: Y / N
SI ar in Pa	hipper's Cerl e classified, ternational a art 261 or 40	ification: I here packed, marke nd national gov CFR Part 761.	by declare that the contents d and labeled, and are in all rernment regulations and this	of this consignment are ful respects in proper condition material is not regulated a	ly and accurately de n for transport by high as a hazardous waste	scribed above t way, vessel an in accordance	by proper shipp of rail accordin with WAC 173	ping name and g to applicable 3-303, 40 CFR.
x		Ins on b	ebilt or cruc	X		DA	те: _/0-	4.17
х	CARRIER - DRI	VER 1 (PRINT NAM	Simpson		B. Simp	101 DA	те: <u>10-</u>	4-17
X	CARRIER - DRI	VER 2 (PRINT NAM	E)			DA	TE:	
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CONSIGNEE (PRINT NAME)

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_ SIGNATURE DATE:

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BILL OF LADING AND GALLONAGE TICKET

SH	IPPER/GEN	ERATOR	ARCI	ADIS		CONTACT		JOB # / 7/	0442741
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CIT	Y, STATE, 2	IP Edi	nonds.	war.		Dispat	Tch	DATE 10	-4-17
CA	RRIER		Emoral	2 Serv	ica	PHONE#	2-7000	DOCUMENT	#
co	NSIGNEE			ERS		CONTACT		TRUCK #	68751
AD	DRESS	1500	airpo	to Wal	AO.	PHONE#		PRODUCT T	(PE
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	НМ	ITEM #		U.S. DOT DE	SCRIPTION		#	ТҮРЕ	QTY.
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А. V В. V	VPQ #		DISP. CO	DE: <u>670070</u> DE:	27 c. w	PQ #		DISP. CODE DISP. CODE	: <u> </u>
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v	VASH OUT:	YES () NO	D ()		т	IME IN	1		
E. V	VATER		GALLONS	LOCATION	т	EST		DISP. CODE	
F. S	OLIDS		GALLONS	LOCATION	т	EST	, [DISP. CODE	
			% SUSPENDE	D SOLIDS BY CENTR	NFUGE +	GALS	SEDIMENT		
G. C	DIL/DIESEL/	GAS	GALLONS	LOCATION	т	EST	(DISP. CODE	
H	IOC'S		PCB'S		B.S.	&W	API .		LAB: Y / N

X CARRIER - DRIVER 1 (PRINT NAME) X CARRIER - DRIVER 1 (PRINT NAME) X CARRIER - DRIVER 2 (PRINT NAME) X CONSIGNEE (PRINT NAME)	X SIGNATURE X SIGNATURE X SIGNATURE X SIGNATURE X SIGNATURE	DATE: <u>10-4-17</u> DATE: <u>40-4-17</u> DATE: DATE:
	CUSTOMER	G-2

An Environmental Company	Day & Date: Sales Order #:	170	144	2746	<u>t</u> . <u>t</u>		Job Comp	ete: Yes	/ No	(Circle	One)
Job Description / Comments:	er Clelin	er tr	AC	>()				Y			
t with come						2					
Customer:		PO#/COD	Amount			1					
Billing Address:		Per Diem:	Yes /	No (Circle	One) If	yes, how	many?:				
		Change Ord	ler Initiate	ed: Yes /	No (Cir	cle One)					
	24	Ta	isk # / De	scription	Та	sk # / Des	scription	Та	sk # / Des	scription	
Contact:			-			-)	1				
Job Location: 1720 Unoro 6	2d			1 V			· · · · · · · · · · · · · · · · · · ·	5 m			
Edwards Wa -					7.						
Component Type		Task Comp (Circle One	lete: `	Yes / No	Task Comp (Circle One	lete:)	/es / No	Task Compl (Circle One	ete: Y	'es /	No
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Alun Mile		51			01	01				14	
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			1000								
Disposal Write Descri	otion/Destination	Mani	est#	Amount	Mani	fest#	Amount	Manif	est#	Amo	ount
SOLID: Bulk / Drum											
Equipment Type		Quantity	Flee	t # # of Hr/Da	y Quantity	Flee	t # # of Hr/Day	Quantity	Fleet	# # of	Hr/Da
Pickup / Van / Car / Crew Cab		-							-		
Vacuum Trailer											
Vacuum Truck Small		1	ila	A	-				-		
Tripod (CSE Gear)		1									
Guzzler / Vactor (Circle One)											
Air Compressor (185 / 375 / 1600 CFM)											
Super Macs									1		
Blower / Tank Fan											
Gear Truck	the second s	1 <u>2</u>	-	Are-manine	the state	14 14 14 14 14 14 14 14 14 14 14 14 14 1	Contraction of the second	1	nierz Mart		a de la constante de la constan La constante de la constante de
Pressure Washer (PSI:) Hot / Cold (Circle O	ne)			<u> </u>		-					
Hydro Blaster											
Fresh Air Machine							2			19	
Power Pac						5 M			1		
Rental Equipment:					<u> </u>	1					
Blowers											
		1		70							
		<i>a</i> :	17								
Material Description		Quar	ntity	Size	Qua	ntity	Size	Quar	ntity	Siz	ze
Degreaser Type:											
Polycoated Rain Gear, 22mil					20 CT						
Poly Sheet, 6mil, 20ft x 100ft											
Poly Bags, 6mil, per roll											
Absorbent Pad (101 Grade) 100/bale					-						
Rags				1-	-						
				1					_		
				and the second sec							
Container Management	ircle (Doo)	Si	ze	Fleet #	Si	ze	Fleet #	Si	ze	Flee	et#
Rolloff / Intermodal / Frac Tank / Tanker (C	ircle One)									1	
PPE SetsTask 1	Task 2 Task 3	Туре	Qty	Type Qty	Туре	Qty	Type Qty	Туре	Qty	Туре	Qty
# of Complete Sets of PPE Used:		PPED1		PPEB2	PPED1		PPEB2	PPED1		PPEB2	
PED1=Level D w/(Tyrek, boots, gloves) PPEC2=Level C w/	CPF1,2 or Poly Tyvek suit)	PPEC2		PPEB3	PPEC2	4	PPEB3	PPEC2	0	PPEB3	
PPEC3=Level C w/(CPF3 or Saranex suit) PPEC4=Level C w/ PPEB2=Level B w/(CPF2 or Poly Tyvek suit) PPEB3=Level B w/ PPEB4=Level B w/(CPF4 or Barrierde suit) PPEB54=Level B w/	CPF4,or Barricade suit) CPF3 or Saranex suit) Responder suit)	PPEC4		PPEB5	PPEC4		PPEB5	PPEC4		PPEB5	
PPE Items Used in Addition to Sets	Above	Qua	intity	Туре	Qua	antity	Туре	Qua	ntity	Ту	уре
Cartridge											
Respirator											
Inner Gloves											
Outer Gloves				X.							
Breathing Air Bottle											
Analytical - Analysis Description	n	# of Tes	sts	Lab Name	# of Te	sts	Lab Name	# of Tes	sts	Lab Na	me
Subcontractor Name		1	Descriptio	on of Service	1	Descriptio	on of Service	Description of Service			
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and the second se	water and the second		-								A REAL PROPERTY AND INCOME.
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		Field Se	ervices Mu	lti-Task Workshe	eet				5,8	142
	Day & Date:	9-0	26-1	2	,		Job Comp	lete: Yes	/ No (C	Circle One)
An Environmental Company	Sales Order #:	110	44	27461				and the second	Mar + A and	<u></u>
Description / Comments:	£ 1						and an and the first start of the	the same	and the second states	1). 1915
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				p.B.	-				- Antonio	in an
stomer: ARCADIS		PO#/COD	Amount:		Pres.	-	and the second second	a. Sales	week the	
ling Address:		Per Diem:	Yes /	No (Circle (One) If y	es, how m	nany?:	1	and a	- <u>-</u>
		Change Ord	er Initiated	: Yes /	No *(Circ	le One)	a shering	and the second s		1997 (A)
		Ta	sk # / Des	cription	Tas	k#/Desc	cription	Tas	k # / Descript	tion
history LIPD & LIPD & P			-16-18-1871	¥	(And And And And And And And And And And	-				
Elimon 11 120 UNDCO KA)	-	and the	and the second s						
Component Time	1	Task Compl	ete: Ye	es / No	Task Comple	ete: Ye	es / No	Task Comple	te: Yes	/ No
Labor	andi. Na sana kana sa kana s	(Circle One)) <u>an an a</u>		(Circle One)	1		(Circle One)		
Name Title	ID 1	ST	OT	DT	ST	OT	DT	ST	OT	DT
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							1	and the second s		
Disposal Write Description	n/Destination	Manif	est#	Amount	Manife	est#	Amount	Manife	st#	Amount
QUID: Bulk / Drum	ĥ						1	N.	1	
DLID: Bulk / Drum Equipment Type		Quantity	Fleet	# # of Hr/Day	Quantity	Fleet	# # of Hr/Day	Quantity	Fleet #	# of Hr/Day
ckup / Van / Car / Crew Cab						1		1	de la companya de la	
acuum Trailer						-				
actor		1	1.070	2.1.4	1-1	1				
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uzzler / Vactor (Circle One)					1					
r Compressor (185 / 375 / 1600 CFM)	ji									
uper Macs	1							1		
ear Truck	LEX -	41		a second of	1	and the second	land sport of	in the second		1
ump	- Laf			-						the second second
ressure Washer (PSI:) Hot / Cold (Circle One)										1
lydro Blaster	199 St.	-							+	
Power Pac	1	100,100								
Rental Equipment:					1					
Air Compressor			_					_		
Diowers					-				4°	
	1									
	-									
Material Description	*	Quar	ntity	Size	Quan	tity	Size	Quant	aty	Size
Degreaser Type:										
Polycoated Rain Gear, 22mil										
roly Sheet, 6mil, 20ft x 100ft			1							
by bags, onlin, per roll Absorbent Pad (101 Grade) 100/bale				5.						
Rags	and the second	<i>k</i>			11					
Duct Tape	a de la companya de l					Sealer and State				
7	R. S. C.									
Container Management		Siz	ze	Fleet #	Siz	e	Fleet #	Size	e	Fleet #
Rolloff / Intermodal / Frac Tank / Tanker (Circle Rolloff / Intermodal / Frac Tank / Tanker (Circle	e One)	+	1			3.5 A.		1		
PPE Sets Task 1 Ta:	sk 2 Task 3	Туре	Qty	Type Qty	Туре	Qty	Type Qty	Туре	Qty T	ype Qty
f of Complete Sets of PPE Used:		PPED1		PPEB2	PPED1		PPEB2	PPED1	PP	EB2
PPED1=Level D w/(Tyvek, boots, gloves) PPEC2=Level C w/(CPF	1,2 or Poly Tyvek suit)	PPEC2		PPEB3	PPEC2		PPEB3 PPEB4	PPEC2	PP	EB3
PPEC4=Level C w/(CPF PPEB2=Level B w/(CPF or Poly Tyvek suit) PPEB3=Level B w/(CPF or Barricade suit) PPE64=Level B w/(CPF or Barricade suit) PPE64=Level B w/(CPF or Barricade suit)	4, or Barricade suit) 3 or Saranex suit) bonder suit)	PPEC4		PPEB5	PPEC4		PPEB5	PPEC4	PP	ÈB5
PPE Items Used in Addition to Sets Abo	ove	Qua	intity	Туре	Qua	ntity	Туре	Quar	itity	Туре
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Analytical - Analysis Description	1	# of Tes	sts	Lab Name	# of Test	ts	Lab Name	# of Test	s La	ab Name
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Subcontractor Name	i i i i i i i i i i i i i i i i i i i		rescription	of Service	D	escription	of Service	D	escription of	Service
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CUSIONER (FINIL) SAM MAILES ANA		Custome	r (Sign)	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	-	2	1	Date: 6	1-26	-17-
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Job Description / Comments: Promp Witste Waster Customer: ARCAROIS Billing Address: Por Dem: Yes / No (Circle One) If yes, how many?: Change Order Initiated: Yes / No (Circle One) Task # / Description Task # / Description Task # / Description Task Complete: Yes / No (Circle One) Contact: Job Location: I I 1720 UNDCO Rd Component Type Task Complete: Yes / No (Circle One) Component Type Task Complete: Yes / No (Circle One) Component Type Component Type Component Type Component Type Component Type Component Type Contact: A Write Description/Destination Mark to the Drower Component Type Contact: Disposal Mark to the Drower Component Type Contact <th>Task # / Des nplete: Ye or OT</th> <th>es / No</th>	Task # / Des nplete: Ye or OT	es / No
Pump Witche Waster Customer: ARCAROIS Billing Address: Per Diem: Yes / No (Circle One) Change Order Initiated: Yes / No Contact: Job Location: Image Order Initiated: Yes / No Component Type Component Type Component Type Component Type Task Complete: Yes / No Component Type Component Type Component Type Task Complete: Yes / No Component Type Component Type Constant Disposal Write Description/Destination Manifest # Amount Manifest #	Task # / Des	cription es / No
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Eduardal S. UA Component Type Task Complete: Yes / No (Circle One) Task Complete: -Yes / No 	nplete: Ye	es / No
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Main and a state of the secret prior / Disposal Write Description / Destination Manifest # Amount Manifest # Amount Manifest #	nifest#	
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Pickup / Van / Car / Crew Cab	iy Tieet	# # OF TH/Day
Vacuum Trailer		
Tractor		
Vacuum Truck, Small		
Guzzler (Vactor (Circle Ope)		
Air Compressor (185/ 375 / 1600 CFM)		
Super Macs		
Blower / Tank Fan		
Gear Truck		
Pump		
Hydro Blaster		
Fresh Air Machine		
Power Pac		
Rental Equipment:		
Air Compressor		
Material Description Quantity Size Quantity Size Qu	antity	Size
Degreaser Type:		1944 1944
Polycoated Rain Gear, 22mil		
Poly Sheet, 6mil, 20ft x 100ft		
Poly Bags, bmil, per roll Absorbent Part (101 Grade) 100/bale		
Rags		
Duct Tape		
Container Management Size Elect # Size Elect #	Size	Elect #
Rolloff Intermodal Frac Tank Circle One) Circle One	5120	11001#
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)		Time
PPE Sets Iask 1 Task 2 Task 3 Iype Qty Type Qty	Qty 1	PPEB2 Qty
# of People in PPE: PPEC2 PPEB3 PPEC2 PPEB3 PPEC2 PPEB3 PPEC	2	PPEB3
PPED1=Level D w/(Tyvek, boots, gloves) PPEC2=Level C w/(CPF1,2 or Poly Tyvek suit) PPEC3 PPEB4 PPEC3 PPEC3=Level C w/(CPF3 or Saranex suit) PPEC4=Level C w/(CPF3 or Barricade suit) PPEC4=Level C w/(CPF3 or Barricade suit) PPEC3 PPEB4 PPEC3	3	PPEB4
PPEB4=Level B wi(CPF4 or Barricade suit) PPEA5=Level A wi(Responder suit) PPEC4 PPEB5 PPEC5 PPEC4 PPEB	4	PPEB5
Cartridge	activity	Type
Respirator		
Suit		
Outer Gloves		
Breathing Air Bottle		
Analytical - Analysis Description # of Tests Lab Name # of Tests Lab Name # of Tests	ests	Lab Name
Subcontractor Name Description of Service Description of Service	Description	of Service
	2.300112101	
A A A A A A A A A A A A A A A A A A A	0	
Emerald Rep (Print) A LVIN Do DIM DSDA Emerald Rep (Sign) / WWD Do ACMPAIDM Date: Customer (Print) Fair Knows and behaving	1-12-	1-11_

An Environmental Company	Day & Date:	Field Se	-27-	Aulti-Task Workshe	eet		Job Comp	olete: Yes	/ No	(Circle	e One)
ob Description / Comments:	Sales Order #.	170		12 1961							
	et gue	ruck	-								
					:					1	
Silling Address		PO# / COD Per Diem:	Amount	/ No (Circle (One) If v	es how m	anv?				
		Change Ord	er Initiate	ed: Yes /	No (Circ	le One)					
		Ta	sk # / De	escription	Tas	k # / Desc	ription	Та	sk # / De	scription	
Contact:											
Job Location: 11720 UNDCO RC	l							د (
Edmands, Wg		Task Compl	ete:	Yes / No	Task Comple	ete: Ye	s / No	Task Comp	lete:	Yes /	No
Component Type Labor		(Circle One))		(Circle One)			(Circle One)	- An	
Name Title	ID	ST	TO	DT	ST	OT	DT	ST	01		DT
JAN MI DING											
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											\$4.
	inere a		-					1			
Disposal - Write Descrip	tion/Destination	Manif	est#	Amount	Manife	est#	Amount	Manif	est#	Am	nount
SOLID: Bulk / Drum			-			-				-	
Equipment Type		Quantity	Flee	et # # of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Flee	t# # o	of Hr/Da
Pickup / Van / Car / Crew Cab			-						1		
Tractor	/									· ·	
Vacuum Truck, Small		1	68	794						1	
Tripod (CSE Gear)											
Air Compressor (185 / 375 / 1600 CFM)						12.1	1 /				
Super Macs		*									
Blower / Tank Fan					1	. 1	a second				-
Pump								đ	9		
Pressure Washer (PSI:) Hot / Cold (Circle On	e)						81	1			
Hydro Blaster							1				
Power Pac		· Je									
Rental Equipment:			-					1			
Air Compressor											
Blowers			_		-			1			
	1										
Drum Type:		Quan	tity	Size	Quant	tity	Size	/Quar	ntity	Si	ze
Degreaser Type:	N. S. S. S.	-					1				
Polycoated Rain Gear, 22mil			_		-						
Poly Bags, 6mil, per roll	. 1										
Absorbent Pad (101 Grade) 100/bale	1.7										
Rags											-
Duct tape			-								
Container Management Rolloff / Intermodal / Frac Tank / Tanker (Cir	cle One)	Siz	e	Fleet #	Size	9	Fleet #	Si	ze	Fle	et#
Rolloff / Intermodal / Frac Tank / Tanker (Cir	rcle One)										
PPE Sets Task 1 # of Complete Sets of PPE Used:	Task 2 Task 3	Type PPED1	Qty	Type Qty PPEB2	Type PPED1	Qty	PPEB2 Qty	Type PPED1	Qty	Type PPEB2	Qty
# of People in PPE:		PPEC2		PPEB3	PPEC2	1	PPEB3	PPEC2		PPEB3	
PPED1=Level D w/(Tyvek, boots, gloves) PPEC2=Level C w/(C PPEC3=Level C w/(CPF3 or Saranex suit) PPEC4=Level C w/(C PPEB2=Level B w//CPE2 or Polv Tyvek suit) PPEB3=Level D w//C	PF1,2 or Poly Tyvek suit) PF4,or Barricade suit) PF3 or Saranex suit)	PPEC3		PPEB4	PPEC3	1	PPEB4	PPEC3		PPEB4	
PPEB4=Level B w/(CPF4 or Barricade suit) PPEA5=Level A w/R PPE Items Used in Addition to Sets A	esponder suit)	Qua	ntity	Туре	PPEC4 Quar	ntity	Туре	PPEC4 Qua	ntity	T	уре
Cartridge		*						-			
Respirator								-			
Inner Gloves	}							1			
Outer Gloves		-									
Breathing Air Bottle Analytical - Analysis Description	1	# of Tes	ts	Lab Name	# of Test	S	Lab Name	# of Tes	sts	Lab Na	ame
		1 01 105		of Oran inc			of Convice		Docariati	on of Car	lico
Subcontractor Name			escriptio	DI OI SERVICE	De	escription	UI SERVICE	l	Jescriptio	on or Serv	nce
A				AA)				
Emerald Rep (Print) ALVIN S. Sin	ndson	Emerald	Rep (Sig	n Alin	Dog.~	imp	SON	Date: C	1-9	17-1	7
Customer (Find Eric Krueser on b	chait	Custome		con 12				Date.	- 27	17	

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A statement of the stat			h'						51	865	
A EMERALD	Field Ser	vices Mult	-Task Wo	rkshee	et		Job Compl	ete: Yes /	No	(Circle Or	ne)
An Environmental Company Sales Order #:	170	140	274	61			1777 A.A.				
Job Description / Comments:	Tod	DI	14			1					_
I amp : inte	10 0	gan	and an								
Take Rubber B.	oots				***			n'			_
Customer: <u>AICadis</u>	PO# / COD.A	Yes /	No (C	ircle O	ne) If yes	s, how ma	any?:		1		
Billing Address.	Change Orde	r Initiated:	Yes	. /	No (Circle	One)		1			
	Tas	k # / Desc	ription		Task	# / Desci	ription	Task	k#/Desc	ription	
Contact:											
Job Location: 11120 UNOCO KO		~	_			mag	1				
Component Type	Task Comple	ete: Ye	s / No		Task Complet (Circle One)	e: Ye	s / No	Task Comple (Circle One)	te: Ye	s / No	0
Labor Name Title ID	ST	OT	D	r	ST	ОТ	DT	ST	OT	D	т
Greg M Driver OSSERY	6:00										
		,									
<i>i</i>											
			¥						<u>ه</u> ۲		
								1	ot #	Arres	unt
Disposal Write Description/Destination	Manife	est#	Amou	unt	Manifes	st #	Amount	Manife	51#	Amou	unt
SOLID: Bulk / Drum	Quantity	Electr	t # of L	r/Dav	Quantity	Fleet	# # of Hr/Day	Quantity	Fleet	# # of I	Hr/Day
Pickup / Van / Car / Crew Cab	Quantity	Tieeti		mbay	Quantity	110001					
Vacuum Trailer											
Vacuum Truck, Small	1	6879	4								
Tripod (CSE Gear)	-								-		Ŷ
Guzzler / Vactor (Circle One) Air Compressor (185 / 375 / 1600 CFM)											
Super Macs											
Blower / Tank Fan									-		-
Pump											
Pressure Washer (PSI:) Hot / Cold (Circle One)					2.5						
Fresh Air Machine			- 6- 1	-						-	
PowerPac											
Air Compressor											
Blowers											
									*		
	000	stitu	Size		Quan	tity	Size	Quar	ntity	Siz	e
Drum Type:	Qual		OIZE		Cuan						
Degreaser Type:					Constant of the second						
Polycoaled Rain Gear, 22min Poly Sheet, 6mil, 20ft × 100ft						•					
Poly Bags, 6mil, per roll									<i>d</i>		
Absorbent Pad (101 Grade) 100/bale Rags											<i>1</i> . ²
Duct Tape								_			
Container Management Rolloff / Intermodal / Frac Tank / Tanker (Circle One)	Si	ze	Flee	et #	Siz	e	Fleet #	Siz	ze	Flee	<u>ət #</u>
Rolloff / Intermodal / Frac Tank / Tanker (Circle One)			Tran	01	Tree	01	Turno	Type	Otv	Type	Otv
PPE Sets Task 1 Task 2 Task # of Complete Sets of PPE Used:	PPED1	Qty	PPEB2		PPED1	Qty	PPEB2	PPED1	Qly	PPEB2	. Gry
# of People in PPE: PPEC2= evel C w//CPE1.2 or Poly Tweek suit PPEC2= evel C w//CPE1.2 or Poly Tweek suit	PPEC2		PPEB3		PPEC2		PPEB3	PPEC2 PPEC3		PPEB3 PPEB4	
PPEC3=Level G w/(CPF3 or Saranex sui) PPEB2=Level B w/(CPF3 or Saranex sui) PPEB2=Level B w/(CPF3 or Poly Tyvek sui) PPEB3=Level B w/(CPF3 or Saranex sui) PPEB3=Level B w/(CPF3 or Saranex sui) PPEB3=Level B w/(CPF3 or Saranex sui)	PPEC3 PPEC4		PPEB4 PPEB5		PPEC4		PPEB5	PPEC4		PPEB5	
PPE Items Used in Addition to Sets Above	Qua	antity	Ту	pe	Qua	ntity	Туре	Qua	intity	Ту	/pe
Respirator											
Suit		N				2					
Outer Gloves	1				- 3				-		
Breathing Air Bottle	# of T-	ste	Lah Na	me	# of Tes	ts	Lab Name	# of Te	sts	Lab Na	me
	# 01 10	Doggrinti	n of Cond	C.C.	r)escriptio	on of Service	-	Descripti	on of Serv	vice
Subcontractor Name		Descriptio	in or Servi	00	-				p - i		
	Emorale	Ren (Sig	1)				#	Date:	3		
Emerald Rep (Print) Customer (Print)	Custom	er (Sign)	K	~	27		si)	Date:	9.2	8.14	7
Provide Production		CLICT	OME	200	PV	-					

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An Environmental Com	pany	Day & Date: Sales Order #	10-0	3-(1)	12	24	61			Job Comp	lete: Yes	/ No	(Cir	cle One)
lob Description / Comments:			110	74	0	1-1	01					-		-
	unp w	der					1999 kg							
	V													
Customer: Arcadis			PO# / COD	Amount:										
Billing Address:			Per Diem:	Yes /	No) (Circle C	One) If y	es, how i	many?:					
		the states	Change Ord	er Initiate	d:	Yes /	No (Circ	le One)						1
			Ta	sk # / Des	scripti	ion	Tas	k#/Des	cription		Tas	sk # / Des	scriptio	on
Contact:									-					
Job Location:					34 28								-	+
Compone	ant Type		Task Comple	ete: Y	'es /	No	Task Comple	ete: Y	'es /	No	Task Comple	ete: Y	'es /	No
Lab	ior		(Circle One)	07			(Circle One)	07					-	DT
AUM	Driver	U	SI	01		DI	51				51	01	1	
1											•			
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				the sector					-	· · · · · ·	and the second second second	- Coloran Pa		
a galla	12.4		19.3. 27				Part - Carton - Carton						100	~.~~
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		and a series				1							1-	
·		-		118.93	eiter of	John					and and a second se	and the second		
Disposal	Write Description/	Destination	Manife	est#		Amount 1	Manife	est#	A	mount	Manife	est#	1	Amount
SQLID: Bulk / Drum			1997 - 19	Contraction of the second	100	14				1				
Equipme	ent Type	and served the of	Quantity	Fleet	#	# of Hr/Day	Quantity	Fleet	# #	of Hr/Day	Quantity	Fleet	# 1	# of Hr/D
Pickup / Van / Car / Crew Cab	and the second s			- santil	die m		1		4		1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1			
Tractor					-			1						
Vacuum Truck, Small			1	687	51	and the second		(•	
Tripod (CSE Gear)	······································		•			-								
Guzzler / Vactor (Circle One)	ENA)	*				arten Gebe	1	Arriver .					A.	
Super Macs	101)	and the second		-			The second					1	1	
Blower / Tank Fan							1				5	1.1.1	1	
Gear Truck		to strange	a and a star which a star	-	• and the second	and a start of the	1	1 1 2	A constant	-1	1	¥		in sector
Pump Pressure Washer (PSI:) Hot	(Cold (Circle One)									*				
Hydro Blaster											1			
Fresh Air Machine														
Power Pac														11
Air Compressor							7.5%							
Blowers											ang sa			
1.5		alk week												
							-							
Material	Description		Quan	itity		Size	Quan	tity		Size	Quan	tity	-	Size
Drum Type:										-				
Polycoated Rain Gear, 22mil														
Poly Sheet, 6mil, 20ft x 100ft						1.02							100	
Poly Bags, 6mil, per roll														1911
Absorbent Pad (101 Grade) 100/ba	e	1.40									-			
Duct Tape							_							
Container	Management		Siz	10		Elect #	Siz	0	F	leet #	Siz	0		Fleet #
Rolloff / Intermodal / Frac Tan	< / Tanker (Circle)	One)	012			11001#	UIL	<u> </u>		100111				Tiedern
Rolloff / Intermodal / Frac Tan	C / Tanker (Circle)	One)	Tuno	01	Typ	01	Tuna	Otre	Tupo	Otu	Type	Otv	Tun	0
# of Complete Sets of PPE Used:	lask i lask	a lask 3	PPED1	QIY	PPE	EB2	PPED1	Qly	PPEB	2	PPED1	aly	PPE	B2
# of People in PPE:		an Dahu Trasak avril)	PPEC2		PPE	EB3	PPEC2		PPEB	3	PPEC2		PPE	B3
PPED1=Level D w/(Tyvek, boots, gloves) PPEC3=Level C w/(CPF3 or Saranex suit) PPEB2=Level B w/(CPF2 or Poly Tyvek suit)	PPEC2=Level C w/(CPF1,2 PPEC4=Level C w/(CPF4,0 PPEB3=Level B w/(CPF3 0	or Barricade suit) or Saranex suit)	PPEC3		PPE	EB4	PPEC3		PPEB	4	PPEC3		PPE	B4
PPEB4=Level B w/(CPF4 or Barricade suit) PPE Items Used in	Addition to Sets Abov	nder suit) 'e	Qua	ntity	1110	Туре	Quar	ntity	1700	Туре	Qua	ntity		Туре
Cartridge	×													
Respirator														
Inner Gloves														-
Outer Gloves														
Breathing Air Bottle	alveis Description		# -67-	to	1.05	Nome	# of Tool	te	Loh	lame	# of Tee	te	Lab	Name
Analytical - Al	arysis Description		# of les	10	Lac	o maine	# UI IES		LaD	GILE	# OF Tes		Lau	Hame
Subcon	tractor Name		C	escriptio	n of S	Service	D	escriptio	n of Se	rvice	C	Descriptio	on of S	Service
	~		1											
	<u>``</u>)				
Emerald Rep (Print)	Basimos	SON	Emerald	Rep (Sigr	n)	Alun	P.B.	Ain	10	m)	Date:	0-2	b-1	7

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A EMEDALD	الجريد الم	Field Se		Iti-Task Worksh	A statement				5	923	
CITICICALD An Environmental Company	Day & Date:	10-3	>-17				Job Comp	lete: Yes	/ No	(Circle One)	
Job Description / Comments:	Sales Order #:	1702	442	7461		to the second second second					
Pury20	ily week	er, de	lives	to At	22				190		
		,							4		
Customer: Accoult's		PO#/COD	Amount:		,						
Billing Address:		Per Diem:	Yes /	No (Circle)	One) If y	ves, how ma	iny?:		ź		
		Change Orde	er Initiated:	: Yes /	No (Circ	cle One)					
Contact:		Tas	sk # / Desc	cription	Tas	sk # / Descri	ption	Tas	sk # / Des	cription	
Job Location: [1720 Unoco 1	2d		*								
Edmonds, US		T 1 0 1									
Component Type		Task Comple (Circle One)	ete: Ye	s / No	Task Compl (Circle One)	ete: Yes	/ No	Circle One)			
Name Title	ID	ST	ОТ	DT	ST	OT	DT	ST	ОТ	DT	
vyivin unog				-							
							4				
		10-10-									
Disposal Write Description	on/Destination	Monife	hot #	Amount	Monif	pot #	Amount	Mapifa	ot #	Amount	
LIQUID: Bulk / Drum	JI/Destillation	Ivialine	351#	Amount	Ivialine	351#	Amount	Warnie	51 <i>#</i>	Amount	
SOLID: Bulk / Drum Equipment Type		Quantity	Fleet #	# # of Hr/Day	Quantity	Fleet #	# of Hr/Day	Quantity	Fleet	# # of Hr/Day	
Pickup / Van / Car / Crew Cab								2			
Vacuum Trailer Tractor								<u></u>			
Vacuum Truck, Small		1	6875	-1							
Tripod (CSE Gear)									5		
Air Compressor (185 / 375 / 1600 CFM)											
Super Macs											
Blower / Tank Fan						/				-	
Pump											
Pressure Washer (PSI:) Hot / Cold (Circle One)									<u></u>	
Fresh Air Machine					1				**		
Power Pac											
Air Compressor											
Blowers											
	5 5							-			
Material Description		Quant	tity	Size	Quan	tity	Size	Quant	tity	Size	
Degreaser Type:	-										
Polycoated Rain Gear, 22mil Poly Sheet 6mil 20ft x 100ft					_						
Poly Bags, 6mil, per roll			-								
Absorbent Pad (101 Grade) 100/bale		1									
Rags Duct Tape						2 martine					
				. single			1			-	
Container Management		Siz	e	Fleet #	Siz	e	Fleet #	Size	e	Fleet #	
Rolloff / Intermodal / Frac Tank / Tanker (Circ	e One)				الم الم	in the second		65.8			
PPE Sets Task 1 Ta	sk 2 Task 3	Туре	Qty	Type Qty	Туре	Qty	Type Qty	Туре	Qty	Type Qty	
# of Complete Sets of PPE Used: # of People in PPE:		PPED1 PPEC2	F	PPEB2 PPEB3	PPED1 PPEC2	P	PEB2	PPED1 PPEC2		PPEB2 PPEB3	
PPED1=Level D w/(Tyvek, boots, gloves) PPEC3=Level C w/(CPF3 or Saranex suit) PPEC4=Level C w/(CPF	1,2 or Poly Tyvek suit) 4,or Barricade suit)	PPEC3	F	PPEB4	PPEC3	P	PEB4	PPEC3		PPEB4	
PPEB3=Level B w/(CPF2 or Poly Tyvek suit) PPEB3=Level B w/(CPF PPEB4=Level B w/(CPF4 or Barricade suit) PPEA5=Level A w/(Res PPE I Items Lised in Addition to Set Ab	3 or Saranex suit) ponder suit) OVE	PPEC4	F	Type	PPEC4	P	PEB5	PPEC4	tity	PPEB5	
Cartridge		Qual		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Qual		.,,,,,	Qual		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Respirator Suit					-					1	
Inner Gloves								1	1.	×	
Outer Gloves								1	1	J. N	
Analytical - Analysis Description		# of Test	s	Lab Name	# of Test	s L	ab Name	# of Test	S	Lab Name	
Subcontractor Name		D	escription	of Service	D	escription o	f Service	D	escription	n of Service	
	l						1		197	4	
Emerald Rep (Print)		Emerald F	Rep (Sign)	AIVI	B.	Aim	PARA	Date:	0- 3	3-17	
Customer (Print) Eric Krueger		Customer	(Sign)	Enth	- Cr	Nu .	1	Date: 10	1-3-1	4	

Job Description / Comments:						. 1								
Dung	Truck													
		1		the		-								
Putamar Dage alte			Amount:						_				-	
Rilling Address:		Per Diem	Yes /	No	(Circle (One) If v	es how i	many?						
Sinning Address.		Change Ord	er Initiate	d.)	(es /	No (Circ	le One)							
		Ta	sk # / De	scription		Tas	k # / Des	cription		Tar	sk # / Des	scription		
Contact		10	SK#1 DC	Scription									-	
lob location: 1/1720 / 1/10000	0													
Filman 1 100	CO				-									
Eumonias, ug		Task Compl	ete: \	res /	No	Task Comple	ask Complete: Yes / No 7				ete: Y	'es / I	No	
Component Type		(Circle One) (Circ							-	(Circle One)				
Name	e ID	ST	OT		DT	ST	OT		DT S	ST	OT		DT	
Aluin Urive	1									-				
										-				
										and the second second				
Discost	peoription /Destingtion		not #		ou unt	Marit	hot #		ount	Mare 10	oct #	0	Num*	
LIQUID Bulk / Drum	escription/Destination	Manif	est#	Arr	nount	Ivianite	est#	Amo	Sunt	Ivianite	est#	Amo	Junt	
SOLID: Bulk / Drum									2					
Equipment Type		Quantity	Flee	t# # o	f Hr/Day	Quantity	Fleet	t# # of	Hr/Day	Quantity	Fleet	# # of	Hr/Da	
Pickup / Van / Car / Crew Cab			-											
Vacuum Trailer	•										-			
Vacuum Truck Small		4	100	-1					2					
Tripod (CSE Gear)			667	2									1	
Guzzler / Vactor (Circle One)	and the second				-									
Air Compressor (185 / 375 / 1600 CFM)						200		1.1						
Super Macs														
Blower / Tank Fan												1		
Gear Truck	•											7.		
Pump													N.	
Pressure Washer (PSI:) Hot / Cold (Cir	cle One)												1	
Hydro Blaster														
Power Pac									175					
Rental Equipment:						1.20			-					
Air Compressor													5.5	
Blowers														
											_		1	
Motorial Depaription		Ouar	atity		70	Quan	tity	Si	70	Quar	ntity	Siz	(P	
Drum Type:		Qual	inty		26	Quan	uty	01	20	Quui	icity	012	-	
Degreaser Type:														
Polycoated Rain Gear, 22mil														
Poly Sheet, 6mil, 20ft x 100ft					-									
Poly Bags, 6mil, per roll														
Absorbent Pad (101 Grade) 100/bale														
Rags														
Duct tape														
22														
Container Manageme	nt (Oincle On)	Siz	ze	Fle	eet#	Siz	e	Fle	et#	Siz	(e	Flee	et #	
Rolloff / Intermodal / Frac Tank / Tanke	(Circle One)							10					-	
PPE Sets Task 1	Task 2 Task 3	Туре	Qty	Туре	Qty	Туре	Qty	Туре	Qty	Туре	Qty	Туре	Qt	
# of Complete Sets of PPE Used:		PPED1		PPEB2		PPED1		PPEB2		PPED1		PPEB2	1 1	
# of People in PPE:	C w//CPE1.2 or Poly Tarok and	PPEC2		PPEB3		PPEC2		PPEB3		PPEC2	1	PPEB3		
PPEC3=Level C w/(CPF3 or Saranex suit) PPEC3=Level C w/(CPF3 or Saranex suit) PPEC3=Level C w/(CPF2 or Polv Twek suit)	I C w/(CPF4,or Barricade suit) I B w/(CPF3 or Saranex suit)	PPEC3		PPEB4		PPEC3		PPEB4		PPEC3	-	PPEP5	F	
PPEB4=Level B w/(CPF4 or Barricade suit) PPEA5=Level PPE Items Lised in Addition to	TA w/(Responder suit)	Qua	ntity	T	уре	Qua	ntity	T	/pe	Qua	ntity	T	pe	
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- Strategier

 Field Services Multi-Task Worksheet

 Day & Date:
 10-4-17

 Sales Order #:
 1764427461

Job Complete: Yes / No (Circle One)

Job Description / Comments:			-							
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		<u>(</u>			-					
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Billing Address:			Per Diem:	Yes /	No (Circle	One) If	yes, how	many?:		
ir			Change Ord	er Initiate	ed: Yes /	No (Cir	cle One)			
			Та	sk # / De	scription	Та	sk # / De	scription	Task # / De	escription
Contact: ⁷										
Job Location: 11720 (Luco Ro	l								100
Edwards a)g									
Compor	nent Type		Task Compl	ete:	res / No	Task Comp	lete:	Yes / No	Task Complete:	Yes / No
La	abor))			
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Pickup / Van / Car / Crew Cab										
Vacuum Trailer			ý.							
Tractor										
Vacuum Truck, Small			4	687	51					<u> </u>
Tripod (CSE Gear)										
Guzzler / Vactor (Circle One)		<u>}</u>								
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Hydro Blaster										
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Rental Equipment:						4				
Air Compressor										
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Drum Type:	Description		Quan	tity	Size	Quar	nuty	Size	Quantity	Size
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Poly Sheet, 6mil, 20ft x 100ft										
Poly Bags, 6mil, per roll					-					
Absorbent Pad (101 Grade) 100/ba	ale									
Rags										
Duct Tape										
Container	Management		Siz	'e	Eleet #	Si	76	Fleet #	Size	Fleet #
Rolloff / Intermodal / Frac Tar	nk / Tanker (Circle	One)	012		Ticel #	012		10000	0120	TIGOL #
Rolloff / Intermodal / Frac Tar	nk / Tanker (Circle	One)		2						
PPE Sets	Task 1 Task	k 2 Task 3	Туре	Qty	Type Qty	Туре	Qty	Type Qty	Type Qty	Type Qty
# of Complete Sets of PPE Used:			PPED1		PPEB2	PPED1		PPEB2	PPED1	PPEB2
# OT People In PPE: PPED1=Level D w/(Tyvek, boots, gloves)	PPEC2=Level C w/(CPF1)	2 or Poly Tyvek suit)	PPEC2		PPEB3	PPEC2		PPEB3	PPEC2	PPEB3
PPEC3=Level C w/(CPF3 or Saranex suit) PPEB2=Level B w/(CPF2 or Poly Tyvek suit)	PPE©4=Level C w/(CPF4, PPEB3=Level B w/(CPF3)	or Barricade suit) or Saranex suit)	PPEC3		PPEB5	PPEC4		PPEB5	PPEC4	PPEB5
PPEB4=Level B w/(CPF4 or Barricade suit) PPE Items Used in	Addition to Sets Abov	/e	Quai	ntity	Туре	Qua	intity	Туре	Quantity	Туре
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Inner Gloves										
Outer Gloves				1	-1					
Breathing Air Bottle			# 17	1	Lob Mars	# -67	to	Lob Nome	th of Tooto	Lah Nama
Analytical - A	analysis Description		# of Tes	IS	Lao Name	# of les	SIS	Lab Name	# OT TESTS	Lap Name
Subcor	ntractor Name		D	escriptio	n of Service	[Descriptio	on of Service	Descripti	on of Service
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Emerald Rep (Print)		17	Emerald I	Rep (Sig	" Alui	ND.	XU	mpson	Date: 10-	1.11-
Customer (Print) Eric	Krueser		Customer	(Sign)	gent /			0	Dale: 0 - C	-14

APPENDIX K

TWT System Treated Water Field Notes



Sampler; Date: AM Notes: Totalizer Reading: Yesterday's Daily Totalizer Reading: Beginning of Day Discharge Joe Latham -ree (9-13-2017 ather Dissolved O₂ Temperature Parameters Turbidity (NTU) AM Time: (mg/L) (°C) PH POINT 7.38 4.56 2 15.8°C axtE. t995 6.99 NTU Upstream (MW-530) Die K 1 Parsnetices toda · Cint Discharge Point (OUTFALL#002) <21,600 gal (Y/N) **NPDES** Compliant Last 24 Hours: Water Discharged in No Discharge 11/1 sollected Location collect 704 If sample collected, chitosan screening results (positive, negative): Com (50' from outflow) NPDES Compliance Sample Collected Today? (sample name, time): from Willow 6.15 15.8°C 17.92 NTU Downstream 2667 < thall Former Unocal Edmonds Terminal 11720 Unoco Road, Edmonds, WA WATER MONITORING FORM PM Notes: 40stream 1440 Dissolved O₂ Temperature Parameters Turbidity (NTU) Turbidimeter Calibrated Today: YSI pH Meter Calibrated Today; (mg/L) excave toin (°C) PH (time, initials) (time, initials) Sample 4.58v2 2.85 17.8°C (MW-530) 39 point inaccessable 4.58NTU 4.30NTU 77 58'S 7.39 OutfAll#002) 100 1100, 34 Location NA NA L 1 6.69 2 717 18.2°C (50' from outflow) Downstream ano

Date: Sampler: AM Notes: Totalizer Reading: 5667 Yesterday's Daily Totalizer Reading: Beginning of Day AM Time: 7-14-17 Joe Latham Dissolved O₂ Temperature Parameters Turbidity (mg/L) (NTU) (°C) PH 21413 736 2,59 NTU | 2,92 NTU 4,35 NTU 5,61 2,45 mer 5,87 mer 14.8°C (MW-530) Upstream NPDES Compliant <21,600 gal (Y/N) Last 24 Hours: Water Discharged in 15.6°C 7.36 **Discharge** Point (OUTFALL#002) Location If sample collected, chitosan screening results (positive, negative): 15.8. NPDES Compliance Sample Collected Today? (sample name, time): 6.93 (50' from outflow) 15.746 Downstream Yes Former Unocal Edmonds Terminal 11720 Unoco Road, Edmonds, WA WATER MONITORING FORM PM Notes: PM Time: Dissolved O₂ Temperature Parameters Turbidity (NTU) Turbidimeter Calibrated Today: YSI pH Meter Calibrated Today: (mg/L) (°C) PH (time, initials) (time, initials) 5,57 - 5,03 - 5,88 m 14.7°C 7.77 -70 NTU 1.82 NTU 1.29 NTU (MW-530) 1045 OUTFALL#002-091417, 1630 negative 045, 16.7°C 14.2°C 7.70 **Discharge Point** (OUTFALL#002) Location 7.76 (50' from outflow) Downstream

Date: Sampler: Beginning of Day Yesterday's Daily **Totalizer Reading: Totalizer Reading:** AM Notes: Temperature AM TIME: Parameters Dissolved O₂ Turbidity (NTU) (mg/L) PH (°C) 52 レールのシー Water Discharged in Last 24 Hours: 21,413 2.54 -(MW-530) 14.2 7.34 2 NPDES Compliant <21,600 gal (Y/N) **Discharge** Point (OUTFALL#002) 6. 75 18.7 17.8 Location HQ If sample collected, chitosan screening results (positive, negative): NPDES Compliance Sample Collected Today? (sample name, time): (50' from outflow) 6.39 88936 Downstream 13.8 7.31 in 11720 Unoco Road, Edmonds, WA Former Unocal Edmonds Terminal 30 WATER MONITORING FORM PM Notes: Temperature (°C) YSI pH Meter Calibrated Today: Turbidimeter Calibrated Today: Dissolved O₂ Parameters PM Time: Turbidity (NTU) (mg/L) PH (time, initials) (time, initials) unable to access Jar c, Lu i Upstream (MW-530) bre Kill . 1 105 11 50 1050 Discharge Point (OUTFALL#002) NO Discharg Location NIA AD UV (50' from outflow) C Downstream 7.70 14.0 -93 63

AM Notes:	(NTU)	(mg/L) Turbidity	(°C) Dissolved O ₂	Temperature	рН	Parameters	Beginning of Day Totalizer Reading: Yesterday's Daily Totalizer Reading:	
	4/10	11/11	11.216	1. 1	(MW-530)	Upstream	2 563/1	
	1.66	1.63	14.5	1.11	(OUTFALL#002)	Location Discharge Point	Water Discharged Last 24 Hours: NPDES Compliant <21,600 gal (Y/N)	
	5.04	5.12	12.7	6.87	(50' from outflow)		11720 Unoc NPDES Compliance Sa If sample collected, ch in 15 , 0 10 $\dot{\gamma}$	Former Uno
PM Notes:	Turbidity (NTU)	(mg/L)	(°C)	рн	Parameters	PM Time:	o Road, Edmonds, WA mple Collected Today? (samp tosan screening results (posi tosan screening results (posi today? YSI pH Meter YSI pH Meter (time Turbidimeter (time	IONITORING FORM cal Edmonds Terminal
	2.57	6.20	16.1	7.30	Upstream (MW-530)		le name, time): tive, negative): calibrated Today; , initials) , initials)	
			1		20			
	1.64	7.05	8 71	7.55	ischarge Point DUTFALL#002)	Location	P580 2580 VIN	

Date: Sampler: AM Notes: **Totalizer Reading:** Beginning of Day Yesterday's Daily **Totalizer Reading:** Temperature (°C) Dissolved O₂ AM Time: Parameters Turbidity (NTU) (mg/L) PH 19 D 7.24 5.43 2.06 t1578 Upstream (MW-530) 4277 13.2 Last 24 Hours: NPDES Compliant <21,600 gal (Y/N) Water Discharged in Discharge Point (OUTFALL#002) 6.90 1.20 51 Location 52 w If sample collected, chitosan screening results (positive, negative): NPDES Compliance Sample Collected Today? (sample name, time): (50' from outflow) 5635 5.93 5 Downstream 14.0 0 20 23 11720 Unoco Road, Edmonds, WA Former Unocal Edmonds Terminal WATER MONITORING FORM PM Notes: PM Time: tra Dissolved O₂ Temperature River Parameters Turbidity (NTU) Turbidimeter Calibrated Today: YSI pH Meter Calibrated Today: (mg/L) (°C) PH (time, initials) (time, initials) 20 attracts 7.05 6.90 4.67 16.4 (MW-530) CCAUPE 2 No Disdery **Discharge Point** (OUTFALL#002) 1110 0111 Location dec NIA NIA AD AP to 3.31 44 S (50' from outflow) 16.7 Downstream 1.20

AM Notes:	Turbidity (NTU)	(mg/L)	Temperature (°C)	рН	Parameters	AM Time: JU/0	Beginning of Day Totalizer Reading: Vesterday's Daily Totalizer Reading:	dy yol	
	1.65	5.00	13.6	714	Upstream (MW-530)		94/030		
	1.22	7.15	14.5	7.27	Discharge Point (OUTFALL#002)	Location	Water Discharged Last 24 Hours: NPDES Compliant <21,600 gal (Y/N)		
	2.55	5.40	12.9	6.92	Downstream (50) from outflow)		т 11,118	NPDES Compliance If sample collected,	WATER Former U 11720 Un
PM Notes:	Turbidity (NTU)	Dissolved O ₂	Temperature (°C)	рн	Parameters	PM Time:	YSI pH Meter C (time, Turbidimeter C (time,	ample Collected Today? (sample hitosan screening results (positi	MONITORING FORM ocal Edmonds Terminal co Road, Edmonds, WA
	2.13	5.47	15 4	(MW-530)	Upstream		alibrated Today: initials) alibrated Today: initials)	e name, time): ve, negative):	
		+	Discharge	(OUTFALL#002)	Discharge Point	Location	V ani	NIN	
	68 °C	1 01	0.9	(50' from out	Downstrea		41	A	

Date: Sampler: AM Notes: **Totalizer Reading: Totalizer Reading:** Beginning of Day Yesterday's Daily 9-21-17 Temperature Dissolved O₂ Turbidity (NTU) Parameters AM Time: (mg/L) (°C) pH THE A 3.02 NT4 7.33 94,030 thorn 5.10 2 13.4°C Upstream (MW-530) 105224 <21,600 gal (Y/N) NPDES Compliant Last 24 Hours: Water Discharged in No Oisch **Discharge Point** (OUTFALL#002) Location If sample collected, chitosan screening results (positive, negative): 2.60 NTW NPDES Compliance Sample Collected Today? (sample name, time): 4.19 2 11,144 (50' from outflow) 82,836 6.87 14.0°C X Downstream 11720 Unoco Road, Edmonds, WA Former Unocal Edmonds Terminal WATER MONITORING FORM PM Notes: Temperature (°C) Dissolved O₂ Turbidity (NTU) Parameters PM Time: Turbidimeter Calibrated Today: YSI pH Meter Calibrated Today: (mg/L) PH (time, initials) (time, initials) 7.85 2.84/1 2.59 2 3.06 NTU 5.912 14.6°C Upstream (MW-530) 7.21 2 CH X 16.4ºC Discharge Point (OUTFALL#002) 1050 1050 ALLA Location NA 5.35 12 (50' from outflow) 6.89 0,121 Downstream

Date: Sampler: AM Notes: **Totalizer Reading: Totalizer Reading:** Yesterday's Daily Beginning of Day Dissolved O₂ Temperature Turbidity (NTU) Parameters AM Time: (mg/L) (°C) pH 0 2 5 14.8 Upstream (MW-530) -14,846 00 NPDES Compliant イクラ、よよビー <21,600 gal (Y/N) 107 6 Last 24 Hours: NO ischarge Water Discharged in Discharge Point (OUTFALL#002) Location If sample collected, chitosan screening results (positive, negative): NPDES Compliance Sample Collected Today? (sample name, time): (50' from outflow) 5.63 w. 15.6 7.15 Downstream 2623 13 < 11720 Unoco Road, Edmonds, WA Former Unocal Edmonds Terminal WATER MONITORING FORM PM Notes: Temperature (°C) Dissolved O₂ Turbidity (NTU) 1700 Parameters PM Time: Turbidimeter Calibrated Today: (mg/L) YSI pH Meter Calibrated Today: PH (time, initials) (time, initials) 6.17 726 Upstream (MW-530) 200 12.9 No Discharge Discharge Point (OUTFALL#002) 1145 145 Location XIN XIX AP (50' from outflow) 0 12,5 218 N Downstream 2/4 70

Date: Sampler: **Totalizer Reading:** AM Notes: Totalizer Reading: Yesterday's Daily Beginning of Day Willow Creek AM Time: 9-25-17 Westura Temperature (°C) Dissolved O₂ Parameters Turbidity (NTU) (mg/L) PH Flan atham 20972 Last 24 Hours: 14846 Upstream (MW-530) pestere. offer NPDES Compliant <21,600 gal (Y/N) Deren 892 Water Discharged in 16.3°C 2.19 NTU 2.79 NTU 6,60 - 5,63 mg **Discharge** Point (OUTFALL#002) Location Renoved 13.600 7.14 If sample collected, chitosan screening results (positive, negative): NPDES Compliance Sample Collected Today? (sample name, time): (50' from outflow) F Downstream monut 11720 Unoco Road, Edmonds, WA Former Unocal Edmonds Terminal WATER MONITORING FORM 20 PM Notes: Ce Dissolved O₂ Temperature Parameters Turbidity (NTU) Turbidimeter Calibrated Today: PM Time: YSI pH Meter Calibrated Today: (mg/L) (°C) Discharge PH (time, initials) (time, initials) Upstream (MW-530) No Pine **Discharge** Point (OUTFALL#002) 0940 1460 Location nard 1 0 (50' from outflow) Downstream
Date: Sampler: **Totalizer Reading:** AM Notes: **Yesterday's Daily Totalizer Reading:** Beginning of Day Temperature (°C) 9/22/12 Dissolved O₂ AM Time: ノンロリ Turbidity (NTU) Parameters (mg/L) PH AZ 120, 972 140,980 (MW-530) NPDES Compliant
<21,600 gal (Y/N)</pre> Water Discharged in Last 24 Hours: Discharge Point (OUTFALL#002) 5.02 7.80 12.1 Location 2-NPDES Compliance Sample Collected Today? (sample name, time): If sample collected, chitosan screening results (positive, negative): (50' from outflow) Downstream 30,008 11720 Unoco Road, Edmonds, WA Former Unocal Edmonds Terminal WATER MONITORING FORM PM Notes: Dissolved O₂ Temperature PM Time: Turbidity (NTU) Parameters YSI pH Meter Calibrated Today: Turbidimeter Calibrated Today: (mg/L) (°C) PH (time, initials) (time, initials) Upstream (MW-530) Discharge Point (OUTFALL#002) OUTFALL #002-092617 No Dirche 1150 1150 Location NEGATIVE 41> 4/2 (50' from outflow) Downstream

Date: Sampler: **Totalizer Reading:** Yesterday's Daily **Totalizer Reading:** Beginning of Day AM Notes: 9/27/17 Java Listle Dissolved O₂ Temperature 010 Parameters Turbidity (NTU) AM Time: (mg/L) (°C) PH 151,543 140,980 Upstream (MW-530) NPDES Compliant 21,600 gal (Y/N) 10,563 Last 24 Hours: 10,563 Discharge Point (OUTFALL#002) 6.60 7.15 12.6 7.38 Location If sample collected, chitosan screening results (positive, negative): NPDES Compliance Sample Collected Today? (sample name, time): (50' from outflow) Downstream 11720 Unoco Road, Edmonds, WA Former Unocal Edmonds Terminal WATER MONITORING FORM PM Notes: 1530 Temperature (°C) Dissolved O₂ Parameters **Turbidimeter Calibrated Today:** YSI pH Meter Calibrated Today: Turbidity (NTU) PM Time: (mg/L) PH (time, initials) (time, initials) Upstream (MW-530) No dischart No Sor 0840 Discharge Point (OUTFALL#002) 0830 Location (50' from outflow) Downstream

Date: Sampler: AM Notes: **Totalizer Reading: Yesterday's Daily Totalizer Reading:** Beginning of Day Dissolved O₂ Temperature Parameters 1030 Turbidity (NTU) AM Time: (mg/L) (°C) PH 26 1 164193 NPDES Compliant (5) りょう、21,600 gal (Y/N) Upstream (MW-530) Water Discharged in Last 24 Hours: Discharge Point (OUTFALL#002) NO Dischurge Location If sample collected, chitosan screening results (positive, negative): NPDES Compliance Sample Collected Today? (sample name, time): (50' from outflow) Downstream 12,650 Former Unocal Edmonds Terminal 11720 Unoco Road, Edmonds, WA WATER MONITORING FORM PM Notes: Dissolved O₂ 1530 Temperature Turbidity (NTU) PM Time: Parameters Turbidimeter Calibrated Today: (time, initials) YSI pH Meter Calibrated Today: (mg/L) (°C) PH (time, initials) Upstream (MW-530) No Discharge Discharge Point (OUTFALL#002) Location IA X (50' from outflow) Downstream

Sampler: Date: AM Notes: **Totalizer Reading:** Yesterday's Daily **Totalizer Reading:** Beginning of Day Dissolved O2 Temperature Turbidity (NTU) Parameters (mg/L) 1100 AM Time: (°C) pH 129/17 Þ D 169442 164193 Upstream (MW-530) NPDES Compliant <21,600 gal (Y/N) Water Discharged in Last 24 Hours: Na **Discharge** Point (OUTFALL#002) Descharge Location (50' from outflow) If sample collected, chitosan screening results (positive, negative): NPDES Compliance Sample Collected Today? (sample name, time): Downstream 5,249 11720 Unoco Road, Edmonds, WA Former Unocal Edmonds Terminal WATER MONITORING FORM PM Notes: Dissolved O₂ Temperature Turbidity (NTU) Parameters PM Time: (mg/L) Turbidimeter Calibrated Today: (time, initials) YSI pH Meter Calibrated Today: (°C) PH (time, initials) Upstream (MW-530) **Discharge Point** (OUTFALL#002) 1340 2.73 6.65 18:4 7.66 1340 Location NA AP AP (50' from outflow) Downstream

Week y Dischare Maitmin
Week y Dischare Maitmin
VA0991007 (Dir GH002)
Week 4/10-2 +0 10-0

$$H - 7.29$$

 $H - 7.29$
 $H - 7.20$
 $H - 6.97$
 $Tuckkty - 1.05 NTU$

Chiloson
action
 $H - 8.02$
 $Turbidity - 3.18 MTU
o UTFALLHOOZ
NPDES$

Date: Sampler: AM Notes: **Totalizer Reading:** Yesterday's Daily Totalizer Reading: Beginning of Day Temperature Dissolved O₂ 1030 Parameters Turbidity (NTU) AM Time: (mg/L) (°C) PH 21/8/0 AP 3.65 125181 Upstream (MW-530) Last 24 Hours: Water Discharged in Discharge Point (OUTFALL#002) 1.75 8.47 7.65 14.5 Location If sample collected, chitosan screening results (positive, negative): NPDES Compliance Sample Collected Today? (sample name, time): (50' from outflow) 4.60 Downstream 1 879 11720 Unoco Road, Edmonds, WA Former Unocal Edmonds Terminal WATER MONITORING FORM PM Notes: Dissolved O₂ Temperature Parameters PM Time: Turbidity (NTU) Turbidimeter Calibrated Today: YSI pH Meter Calibrated Today: (mg/L) (°C) PH (time, initials) (time, initials) Upstream (MW-530) NO D-scharge **Discharge** Point (OUTFALL#002) OUTPALL # CU2 - 1003207 1010, AP 1010 AP Location negative (50' from outflow) Downstream

Date: Sampler: AM Notes: **Totalizer Reading:** Yesterday's Daily **Totalizer Reading:** Beginning of Day Dissolved O₂ Temperature Parameters AM Time: Turbidity (NTU) 1090 (mg/L) (°C) pH w 193 181321 Upstream (MW-530) 729 NPDES Compliant <21,600 gal (Y/N) Last 24 Hours: Water Discharged in Discharge Point (OUTFALL#002) 7.77 14.6 7.61 166 Location If sample collected, chitosan screening results (positive, negative): NPDES Compliance Sample Collected Today? (sample name, time): (50' from outflow) Downstream 12,408 Former Unocal Edmonds Terminal 11720 Unoco Road, Edmonds, WA WATER MONITORING FORM PM Notes: Dissolved O₂ Temperature Turbidity (NTU) Parameters PM Time: Turbidimeter Calibrated Today: YSI pH Meter Calibrated Today: (mg/L) (°C) PH (time, initials) (time, initials) Upstream (MW-530) No **Discharge Point** (OUTFALL#002) 1030 Location Discharge 1030, AP AD (50' from outflow) Downstream

AM Notes:	(NTU)	(mg/L)	Temperature (°C)	рН	Parameters	AM Time:	Beginning of Day Totalizer Reading: Yesterday's Daily Totalizer Reading:	10/4/ AP	
					Upstream (MW-530)		206115	71/	
)			NO Dischay	Discharge Point (OUTFALL#002)	Location	Water Discharged i Last 24 Hours: NPDES Compliant <21,600 gal (Y/N)	1	
				- Ar	Downstream (50' from outflow)		" 1d, 386	NPDES Compliance S If sample collected, c	WATER I Former Und 11720 Unod
PM Notes:	Turbidity (NTU)	Dissolved O ₂ (mg/L)	Temperature (°C)	рН	Parameters	PM Time: うう	YSI pH Meter Ca (time, i Turbidimeter Ca (time, i	mple Collected Today? (sample litosan screening results (positiv	10NITORING FORM cal Edmonds Terminal o Road, Edmonds, WA
					Upstream (MW-530)		librated Today: nitials) librated Today: nitials)	name, time): e, negative):	
	1.96	7.08	15.9	7.56	Discharge Point (OUTFALL#002)	Location	1300, 1	N	
					Downstream (50' from outflo		AP	A A	

Date: Sampler: AM Notes: Totalizer Reading: **Totalizer Reading:** Yesterday's Daily Beginning of Day Dissolved O₂ Temperature AM TIME: Parameters Turbidity (mg/L)(NTU) (°C) FULLEN PH pr0 005 306115 e m (MW-530) 9 batter 15 12 Water Discharged in Last 24 Hours: DD 23 NPDES Compliant <21,600 gal (Y/N) SLM Discharge Point (OUTFALL#002) 234 1.63 6. Location DEDO UNA VA: 14 ble 0 14 0/5X If sample collected, chitosan screening results (positive, negative): Kee NPDES Compliance Sample Collected Today? (sample name, time): (50' from outflow) 9.097 Downstream the 1.145 Former Unocal Edmonds Terminal 11720 Unoco Road, Edmonds, WA WATER MONITORING FORM PM Notes: Dissolved O₂ Temperature 1500 PM Time: Turbidity (NTU) Parameters YSI pH Meter Calibrated Today: Turbidimeter Calibrated Today: (mg/L) (°C) PH Taken (time, initials) (time, initials) 150 Margo -Kom Upstream (MW-530) balteries Paint Willow 1445 1.50 **Discharge Point** (OUTFALL#002) 6.46 1445 7.73 16 1001 Location 10016600 V N AP AP out fall was (50' from outflow) Downstream Vead has



APPENDIX L

TWT System Treated Water Laboratory Analytical Reports and Chain of Custody Documents



Appendix L Laboraty Reports Index Former Unocal Terminal 11720 Unoco Road Edmonds, Washington

Laboratory	Sample Date	Data Validation	Sample	Analyzes performed	Samples D	escription
Report ID		Memorandum	Matrix		Sample	Trip Blank
Temporary Wa	ter Treatment Sys	ments (Appendiz	k L)			
580-71163-1	09/11/17	Available in Appendix P	Water	GRO, DRO, HO, cPAHs, Benzene	1	1
580-71291-2	09/14/17	Available in Appendix P	Water	GRO, DRO, HO, cPAHs, Benzene	1	1
580-71420-1	09/19/17	Available in Appendix P	Water	GRO, DRO, HO, cPAHs, Benzene	1	1
580-71583-1	09/26/17	Available in Appendix P	Water	GRO, DRO, HO, cPAHs, Benzene	1	1
580-71756-1	10/02/17	Available in Appendix P	Water	GRO, DRO, HO, cPAHs, Benzene	1	*
				Total	5	5

Notes:

GRO = Gasoline by Washington State Department of Ecology (Ecology) Method NWTPH-Gx

DRO = diesel range organics by Ecology Method NWTPH-Dx (after silica gel cleanup)

HO = heavy oil range organics by Ecology Method NWTPH-Dx (after silica gel cleanup)

Benzene by Method United States Environmental Protection Agency (USEPA) 8260C.

Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs) analyzed by USEPA 8270D SIM: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene,

benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. Samples with detectable DRO and/or HO concentrations were also analyzed for cPAHs.

Quality Assurance Sample:

A total of 4 water trip blanks were collected for water samples (one per cooler containing samples that will be analyzed for volatile compounds). * for this event, the soil trip blank reported in 580-71754-2 was associated with the water sample.



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle 5755 8th Street East Tacoma, WA 98424 Tel: (253)922-2310

TestAmerica Job ID: 580-71163-1

Client Project/Site: Edmonds Terminal Edmonds, WA Revision: 1

For:

ARCADIS U.S. Inc 1100 Olive Way Suite 800 Seattle, Washington 98101

Attn: Samuel Miles

Knistine D. allen

Authorized for release by: 9/18/2017 4:04:32 PM Kristine Allen, Manager of Project Management (253)248-4970 kristine.allen@testamericainc.com

Designee for Elaine Walker, Project Manager II (253)248-4972 elaine.walker@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.



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Job ID: 580-71163-1

Laboratory: TestAmerica Seattle

Narrative

Report was revised 9-18-17 to change the analyte list for method 625.

CASE NARRATIVE Client: ARCADIS U.S. Inc Project: Edmonds Terminal Edmonds, WA Report Number: 580-71163-1

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

Two samples were received on 9/11/2017 2:27 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.1° C.

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

VOLATILE ORGANIC COMPOUNDS (GC-MS)

Samples OUTFALL#002-091117 (580-71163-1) and TB-09112017 (580-71163-2) were analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 09/12/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample OUTFALL#002-091117 (580-71163-1) was analyzed for semivolatile organic compounds (GC-MS) in accordance with EPA Method 625. The samples were prepared and analyzed on 09/11/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GASOLINE RANGE ORGANICS (GRO)

Samples OUTFALL#002-091117 (580-71163-1) and TB-09112017 (580-71163-2) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 09/12/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

DIESEL AND MOTOR OIL RANGE ORGANICS

Sample OUTFALL#002-091117 (580-71163-1) was analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared and analyzed on 09/12/2017.

1 2 3 4 5 6 7 8 9 10

Job ID: 580-71163-1 (Continued)

Laboratory: TestAmerica Seattle (Continued)

Please note - the laboratory is unable to process the reverse surrogate used in the Silica Gel Cleanup for NWTPH-Dx as it contains a 1-point calibration and the associated samples are run with a 5-point calibration. This surrogate will not be present in the forms for the Level IV report; however this surrogate is reported in the raw data section for this analysis.

#2 Diesel (C10-C24) was detected in method blank MB 580-255886/1-B at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples were not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client: ARCADIS U.S. Inc Project/Site: Edmonds Terminal Edmonds, WA

Limit of Detection (DoD/DOE)

Method Detection Limit

Minimum Level (Dioxin)

Practical Quantitation Limit

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Not Calculated

Quality Control

Limit of Quantitation (DoD/DOE)

Minimum Detectable Activity (Radiochemistry)

Minimum Detectable Concentration (Radiochemistry)

Reporting Limit or Requested Limit (Radiochemistry)

Not Detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Qualifiers

LOD

LOQ

MDA

MDC

MDL

ML

NC

ND

PQL

QC RER

RL

RPD

TEF

TEQ

GC/MS Sem	ii VOA	1
Qualifier	Qualifier Description	-
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.	5
GC Semi VO	Α	
Qualifier	Qualifier Description	
В	Compound was found in the blank and sample.	
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.	
Glossary		8
Abbreviation	These commonly used abbreviations may or may not be present in this report.	0
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis	3
%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)	

Client Sample ID: OUTFALL#002-091117

Lab Sample ID: 580-71163-1 Matrix: Water

Date Collected: 09/11/17 11:30 Date Received: 09/11/17 14:27

Method: 624 - Volatile Orga	anic Compoun	ds (GC/MS	5)						
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			09/12/17 04:30	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	95		74 - 123					09/12/17 04:30	1
Toluene-d8 (Surr)	100		79 - 122					09/12/17 04:30	1
4-Bromofluorobenzene (Surr)	109		78 - 119					09/12/17 04:30	1
Dibromofluoromethane (Surr)	100		70_120					09/12/17 04:30	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 120					09/12/17 04:30	1
- Method: 625 - Semivolatile	Organic Com	oounds (G	C/MS)						
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.1	0.020	ug/L		09/11/17 16:21	09/11/17 21:01	1
Chrysene	ND		0.61	0.010	ug/L		09/11/17 16:21	09/11/17 21:01	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		09/11/17 16:21	09/11/17 21:01	1
Indeno[1,2,3-cd]pyrene	ND		1.0	0.051	ug/L		09/11/17 16:21	09/11/17 21:01	1
Dibenz(a,h)anthracene	ND		0.61	0.020	ug/L		09/11/17 16:21	09/11/17 21:01	1
Benzo[k]fluoranthene	ND		1.0	0.020	ug/L		09/11/17 16:21	09/11/17 21:01	1
Benzo[b]fluoranthene	ND		1.0	0.051	ug/L		09/11/17 16:21	09/11/17 21:01	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	79		60 - 135				09/11/17 16:21	09/11/17 21:01	1
- Method: NWTPH-Gx - Nort	hwest - Volatil	e Petroleu	m Products (GC)					
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			09/12/17 11:55	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		58 - 133					09/12/17 11:55	1
Trifluorotoluene (Surr)	107		77 - 128					09/12/17 11:55	1
Method: NWTPH-Dx - Norti	hwest - Semi-V	olatile Pet	troleum Prod	ucts (G	C)				
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.028	JB	0.10	0.019	mg/L		09/12/17 08:05	09/12/17 16:24	1

Motor Oil (>C24-C36)	ND		0.25	0.078 mg/L	09/12/17 08:05	09/12/17 16:24	1
Surrogate o-Terphenyl	%Recovery 78	Qualifier	Limits 43 - 119		Prepared 09/12/17 08:05	Analyzed 09/12/17 16:24	Dil Fac

Client Sample Results

Client: ARCADIS U.S. Inc Project/Site: Edmonds Terminal Edmonds, WA

Lab Sample ID: 580-71163-2 Matrix: Water

5

Client Sample ID: TB-09112017
Date Collected: 09/11/17 00:00
Date Received: 09/11/17 14:27

Method: 624 - Volatile Orga	anic Compoun	ds (GC/MS	5)						
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			09/12/17 04:05	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	94		74 - 123					09/12/17 04:05	1
Toluene-d8 (Surr)	100		79 - 122					09/12/17 04:05	1
4-Bromofluorobenzene (Surr)	110		78 - 119					09/12/17 04:05	1
Dibromofluoromethane (Surr)	98		70 - 120					09/12/17 04:05	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 120					09/12/17 04:05	1
- Method: NWTPH-Gx - Nort	hwest - Volatil	e Petroleu	m Products (GC)					
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			09/12/17 12:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	90		58 - 133			-		09/12/17 12:27	1
Trifluorotoluene (Surr)	107		77 - 128					09/12/17 12:27	1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-2558 Matrix: Water Analysis Batch: 255871						Client Sam	ple ID: Method Prep Type: To	l Blank otal/NA	
	MB	МВ							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			09/12/17 02:50	1
	MB	MB							
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	96		74 - 123					09/12/17 02:50	1
Toluene-d8 (Surr)	100		79 - 122					09/12/17 02:50	1
4-Bromofluorobenzene (Surr)	112		78 - 119					09/12/17 02:50	1
Dibromofluoromethane (Surr)	97		70 - 120					09/12/17 02:50	1
1,2-Dichloroethane-d4 (Surr)	107		70 - 120					09/12/17 02:50	1
Lab Sample ID: LCS 580-255 Matrix: Water Analysis Batch: 255871	871/6					Client	Sample ID	: Lab Control S Prep Type: To	Sample otal/NA
			Spiko		2			%Pac	

		Spike	LCS	LCS				%Rec.	
		Added	Result	Qualifier	Unit	D	%Rec	Limits	
		10.0	9.35		ug/L		93	37 - 151	
LCS	LCS								
%Recovery	Qualifier	Limits							
95		74 - 123							
99		79 - 122							
110		78_119							
97		70 - 120							
105		70 - 120							
	LCS %Recovery 95 99 110 97 105	LCS LCS %Recovery Qualifier 95 99 110 97 105	Ke Added LCS LCS %Recovery Qualifier Limits 95 74 - 123 99 79 - 122 110 78 - 119 97 70 - 120 105 70 - 120	Spike LCS Added Result 10.0 9.35 LCS LCS %Recovery Qualifier Limits 95 74 - 123 99 79 - 122 110 78 - 119 97 70 - 120 105 70 - 120	Spike LCS LCS LCS Added Result Qualifier 10.0 9.35 Qualifier Kecovery Qualifier Limits 95 74 - 123 79 99 79 - 122 110 100 78 - 119 70 - 120 105 70 - 120 105	Spike LCS LCS Added Result Qualifier Unit 10.0 9.35 Qualifier Unit LCS LCS CS Value Value %Recovery Qualifier Limits Value Value Value 95 74-123 79 79-122 Value Value Value 110 78-119 70-120 Value Value Value Value 105 70-120 Value Value Value Value Value	Spike LCS LCS LCS Added Result Qualifier Unit D 10.0 9.35 Qualifier Unit D LCS LCS %Recovery Qualifier Limits </td <td>Spike LCS LCS LCS Added Result Qualifier Unit D %Rec Unit 9.35 Unit Unit D %Rec Unit 9.35 Unit Unit D %Rec %Recovery Qualifier Limits 10.0 9.35 Unit Unit D %Rec 95 74 - 123 99 79 - 122 110 78 - 119 110 78 - 119 105 70 - 120 105 100 - 120 105 100 - 120 105 100 - 120 10</td> <td>Spike LCS LCS WRec. Added Result Qualifier Unit D %Rec Limits 10.0 9.35 Qualifier Unit D %Rec Limits LCS LCS 74.123 37.151 37.151 %Recovery Qualifier Limits 74.123 79.122 110 78.119 97 70.120 70.120 105 70.120 105 10.120</td>	Spike LCS LCS LCS Added Result Qualifier Unit D %Rec Unit 9.35 Unit Unit D %Rec Unit 9.35 Unit Unit D %Rec %Recovery Qualifier Limits 10.0 9.35 Unit Unit D %Rec 95 74 - 123 99 79 - 122 110 78 - 119 110 78 - 119 105 70 - 120 105 100 - 120 105 100 - 120 105 100 - 120 10	Spike LCS LCS WRec. Added Result Qualifier Unit D %Rec Limits 10.0 9.35 Qualifier Unit D %Rec Limits LCS LCS 74.123 37.151 37.151 %Recovery Qualifier Limits 74.123 79.122 110 78.119 97 70.120 70.120 105 70.120 105 10.120

Lab Sample ID: LCSD 580-255871/7 Matrix: Water Analysis Batch: 255871

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

			Spike	LCSD	LCSD				%Rec.		RPD
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Benzene			10.0	8.40		ug/L		84	37 - 151	11	30
	LCSD	LCSD									
Surrogate	%Recovery	Qualifier	Limits								
Trifluorotoluene (Surr)	95		74 - 123								
Toluene-d8 (Surr)	101		79 - 122								
4-Bromofluorobenzene (Surr)	108		78_119								
Dibromofluoromethane (Surr)	97		70 - 120								
1,2-Dichloroethane-d4 (Surr)	104		70 - 120								

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-255 Matrix: Water Analysis Batch: 255876					Client Samp	le ID: Method Prep Type: To Prep Batch: 3	l Blank otal/NA 255859		
	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		09/11/17 16:21	09/11/17 18:55	1
Chrysene	ND		0.60	0.010	ug/L		09/11/17 16:21	09/11/17 18:55	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		09/11/17 16:21	09/11/17 18:55	1

RL

1.0

0.60

1.0

1.0

Limits

60 - 135

MDL Unit

0.050 ug/L

0.020 ug/L

0.020 ug/L

0.050 ug/L

Lab Sample ID: MB 580-255859/1-A

Matrix: Water

Indeno[1,2,3-cd]pyrene

Dibenz(a,h)anthracene

Benzo[k]fluoranthene

Benzo[b]fluoranthene

Analyte

Surrogate

Analyte

Benzo[a]anthracene

Terphenyl-d14

Analysis Batch: 255876

Client Sample ID: Method Blank

09/11/17 16:21 09/11/17 18:55

09/11/17 16:21 09/11/17 18:55

09/11/17 16:21 09/11/17 18:55

Client Sample ID: Lab Control Sample

17 - 168

17 - 163

1 - 171

1 - 227

11 - 162 24 - 159

84

100

98

106

114

102

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 255859

Dil Fac

1

1

1

Analyzed

6

09/11/17 16:21	09/11/17 18:55	1
Prepared	Analyzed	Dil Fac
09/11/17 16:21	09/11/17 18:55	1

Lab Sample ID: LCS 580-255859/2-A	
Matrix: Water	
Analysis Batch: 255876	

						Prep Type: Total/NA	
						Prep Batch: 255859	
Spike	LCS	LCS				%Rec.	
Added	Result	Qualifier	Unit	D	%Rec	Limits	
2.00	1.85	J	ug/L		93	33 - 143	

D

Prepared

Chrysene	2.00	1.68	ug/L
Benzo[a]pyrene	2.00	1.99	ug/L
Indeno[1,2,3-cd]pyrene	2.00	1.97	ug/L
Dibenz(a,h)anthracene	2.00	2.11	ug/L
Benzo[k]fluoranthene	2.00	2.29	ug/L
Benzo[b]fluoranthene	2.00	2.05	ug/L
LCS LCS			

Method: 625 - Semivolatile Organic Compounds (GC/MS) (Continued)

MB MB

ND

ND

ND

ND

91

%Recoverv

MB MB

Qualifier

Result Qualifier

	200	200	
Surrogate	%Recovery	Qualifier	Limits
Terphenyl-d14	86		60 - 135

Lab Sample ID: LCSD 580-255859/3-A Matrix: Water

Prep Type: Total/NA Analysis Batch: 255876 Prep Batch: 255859 Spike LCSD LCSD %Rec. RPD Analyte Added **Result Qualifier** Unit D %Rec Limits RPD Limit Benzo[a]anthracene 2.00 2.00 J 100 33 - 143 8 50 ug/L 2.00 1.79 Chrysene ug/L 90 17 - 168 6 50 2.00 2.12 ug/L 106 17 - 163 6 50 Benzo[a]pyrene 2.06 2.00 103 5 50 Indeno[1,2,3-cd]pyrene ug/L 1 - 171 2.00 2.05 103 1 - 227 50 Dibenz(a,h)anthracene ug/L 3 Benzo[k]fluoranthene 2.00 2.23 ug/L 112 11 - 162 2 50 Benzo[b]fluoranthene 2.00 2.36 ug/L 118 24 - 159 14 50 LCSD LCSD

Surrogate	%Recovery	Qualifier	Limits
Terphenyl-d14	85		60 - 135

RL

0.25

Limits 58 - 133

77 - 128

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

MB MB

ND MB MB

%Recovery Qualifier

92

107

98

Result Qualifier

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Type: Total/NA

2 3 4 5 6

0 0	MDL Unit	<u>D</u>	Prepared	Analyzed 09/12/17 10:20	Dil Fac	6
			Prepared	Analyzed	Dil Fac	
				- <u>09/12/17 10:20</u> 09/12/17 10:20	<u> </u>	8
		Client	: Sample ID:	: Lab Control S	Sample	9
				Prep Type: To	otal/NA	
LCS Result	LCS Qualifier	Unit	D %Rec	%Rec. Limits		

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCS 580-255887/7 Matrix: Water

Lab Sample ID: MB 580-255887/6

Matrix: Water

Analyte

Gasoline

Surrogate

Analysis Batch: 255887

Analysis Batch: 255887

4-Bromofluorobenzene (Surr)

Trifluorotoluene (Surr)

Trifluorotoluene (Surr)

			Spike	LCS	LCS				%Rec.	
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits	
Gasoline			1.00	0.860		mg/L		86	79 - 110	
	LCS	LCS								
Surrogate	%Recovery	Qualifier	Limits							
4-Bromofluorobenzene (Surr)	97		58 - 133							

77 - 128

Lab Sample ID: LCSD 580-255887/8 Matrix: Water

Analysis Batch: 255887											
-			Spike	LCSD	LCSD				%Rec.		RPD
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Gasoline			1.00	0.857		mg/L		86	79 - 110	0	10
	LCSD	LCSD									
Surrogate	%Recovery	Qualifier	Limits								
4-Bromofluorobenzene (Surr)	96		58 - 133								
Trifluorotoluene (Surr)	97		77 - 128								

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-25 Matrix: Water Analysis Batch: 255937	55886/1-B							Clie	ent Samp	ole ID: Method Prep Type: To Prep Batch:	d Blank otal/NA 255886
Amelyde	MB	MB	ы			11	_			Amelymed	
Analyte	Result	Quaimer	RL		WDL	Unit	U	- P	repared	Analyzeu	DIIFac
#2 Diesel (C10-C24)	0.0241	J	0.10	0	.019	mg/L		09/1	2/17 08:05	09/12/17 15:16	1
Motor Oil (>C24-C36)	ND		0.25	0	.077	mg/L		09/1	2/17 08:05	09/12/17 15:16	1
	MB	МВ									
Surrogate	%Recovery	Qualifier	Limits					P	Prepared	Analyzed	Dil Fac
o-Terphenyl	83		43 - 119					09/1	12/17 08:05	09/12/17 15:16	1
Lab Sample ID: LCS 580-2 Matrix: Water Analysis Batch: 255937	255886/2-B						Clien	t Sa	mple ID:	Lab Control S Prep Type: To Prep Batch:	Sample otal/NA 255886
·			Spike	LCS	LCS	;				%Rec.	
Analyte			Added	Result	Qua	lifier	Unit	D	%Rec	Limits	
#2 Diesel (C10-C24)			2.00	1.48			mg/L		74	59 - 112	

QC Sample Results

Client Sample ID: Lab Control Sample Dup

6

Method: NWTPH-Dx - Northwest - Sen	ni-Volatile Pe	etroleun	n <mark>Prod</mark> u	icts (G	C) (C	Contin	ued)
Lab Sample ID: LCS 580-255886/2-B				Clie	nt Sa	mple ID	: Lab Control Sample
Matrix: Water							Prep Type: Total/NA
Analysis Batch: 255937							Prep Batch: 255886
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Motor Oil (>C24-C36)	2.00	1.84		mg/L		92	64 - 120

Analyte			714404
Motor Oil (>C24-C36)			2.00
	LCS	LCS	
Surrogate	%Recovery	Qualifier	Limits
o-Terphenvl	80		43 - 119

Matrix: water Analysis Batch: 255937									Prep Ty	be: 100 atch: 2{	al/NA 55886
-			Spike	LCSD	LCSD				%Rec.		RPD
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
#2 Diesel (C10-C24)			2.00	1.66		mg/L		83	59 - 112	12	16
Motor Oil (>C24-C36)			2.00	2.04		mg/L		102	64 - 120	10	17
	LCSD	LCSD									
Surrogate	%Recoverv	Qualifier	l imits								

Surrogate	%Recovery	Quaimer	Limits
o-Terphenyl	83		43 - 119

Lab Sample ID: 580-71163-1

5 6 7

Client Sample ID: OUTFALL#002-091117 Date Collected: 09/11/17 11:30

ate Collected: 09/11/17 11:30 ate Received: 09/11/17 14:27									
-	Batch	Batch	Dura	Dilution	Batch	Prepared	A	Lab	
Total/NA	Analysis	- 624		$-\frac{\text{Factor}}{1}$	255871	09/12/17 04:30	JSM	TAL SEA	
Total/NA	Prep	CWA_Prep			255859	09/11/17 16:21	DSO	TAL SEA	
Total/NA	Analysis	625		1	255876	09/11/17 21:01	ERB	TAL SEA	
Total/NA	Analysis	NWTPH-Gx		1	255887	09/12/17 11:55	RSB	TAL SEA	
Total/NA	Prep	3510C			255886	09/12/17 08:05	NDB	TAL SEA	
Total/NA	Cleanup	3630C			255909	09/12/17 10:43	REY	TAL SEA	
Total/NA	Analysis	NWTPH-Dx		1	255937	09/12/17 16:24	ADB	TAL SEA	

Client Sample ID: TB-09112017 Date Collected: 09/11/17 00:00 Date Received: 09/11/17 14:27

Lab Sample ID: 580-71163-2

Matrix: Water

Pren Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624			255871	09/12/17 04:05	JSM	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	255887	09/12/17 12:27	RSB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc Project/Site: Edmonds Terminal Edmonds, WA TestAmerica Job ID: 580-71163-1

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	UST-022	03-02-18
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

TestAmerica Job ID: 580-71163-1

Lab Sample ID	Client Sample ID	Matrix	Collected Received
580-71163-1	OUTFALL#002-091117	Water	09/11/17 11:30 09/11/17 14:27
580-71163-2	TB-09112017	Water	09/11/17 00:00 09/11/17 14:27

TestAmericc Loc: 580 THE LEADER IN ENVIRONMENTAL TESTING	TestAmerica Seattle 5755 8th Street E. Tacoma, WA 98424 Tel. 253-922-2310 Fax 253-922-5047 www.testamericainc.com	Rush Short H	old Cu	ain of stody Record 2
Client	Client Contact		Date	Chain of Custody Number
Address Address	Telephone Number (Area Code)/Fax N	lumber	1-11-2C1 T Lab Number	$\frac{31442}{1}$
1100 Olive Way, Suite 80	0 509-438-9828	A	253-922-2310	Page of
City 7 State $2ip$ Code See H_{12} $W/A = 9817.5$	R B 1 Elc	in a Val Par mor	alysis (Attach list if e space is needed)	
Project Name and Location (State)	Billing Contact	Ele El Alton		6
Edmonde Termina Edmonds WA Contract/Purchase Order/Quote No.		Containorn &		Special Instructions/ Conditions of Receipt
WOR. BOO 45362.0010	Matrix	Preservatives		
Sample I.D. and Location/Description (Containers for each sample may be combined on one line) Date	Air Adreous Sect. Soit	HN03 HN03 HOA Naoh NWTP EPA (8
OUTFALL#002-091117 9-11-1	7 1130 X 8	8		Email recults to: 9
TB-09112017 9-11-1	7 - X	<u>4</u> X X		ryan brauch la Carcadis, com 10
· · ·				Sunvel, miles @ arcedy, com
				eric kruzger @ aradycom 11
				ophelie. encell@arcudy com
				scott. Zorn Carcade com
				WBS Code:
		TBA2 Cooler Co	r <u>U.[</u> Unc <u>().9</u>	NWENVPM4001430803
		Wef/Packs Packing	bubble	
	-71163 Chain of Custody	Ci drop Custody Se	eal: Yes 50	
Cooler Possible Hazard Identifica	ition	Sample Disposal	Disposal By Lab	(A fee may be assessed if samples
Yes No Cooler Temp: Non-Hazard	Flammable 🗌 Skin Irritant 🗌 Poison i	B Unknown Return To Client	Archive For Months	are retained longer than 1 month)
Iurn Around Time Required (business days)	Davs 🗆 Other	uc Requirements (Specity)		
1. Belinquished By Sign/Print	La 9-11-17 1230	1. Reproved By Sign/Print	- be latham	Date 9-11-17 1736
2. Belinquished BJ Sign/Print	Date Time	Z. Received By Sign/Print	, <u>}</u>	Date Time
13. Relinquished By Sign/Print	Date Time	3. Received By Sign/Print	ing se	Date Time
Comments				1

Client: ARCADIS U.S. Inc

Login Number: 71163 List Number: 1 Creator: Ponce-McDermott, Monica

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
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").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

List Source: TestAmerica Seattle



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle 5755 8th Street East Tacoma, WA 98424 Tel: (253)922-2310

TestAmerica Job ID: 580-71291-2 Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc 1100 Olive Way Suite 800 Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by: 9/20/2017 4:40:40 PM Elaine Walker, Project Manager II (253)248-4972 elaine.walker@testamericainc.com

Have a Question?

Expert

Visit us at: www.testamericainc.com

..... Links

Review your project results through

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.

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Job ID: 580-71291-2

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE Client: ARCADIS U.S. Inc Project: Chevron Edmonds Terminal Report Number: 580-71291-2

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

The samples were received on 9/15/2017 10:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.1° C.

This report contains results for the water samples received with this delivery group. The soil sample results are reported under separate cover in job 580-71291-1.

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

VOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample Outfall#002-091417 (580-71291-3) was analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 09/18/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample Outfall#002-091417 (580-71291-3) was analyzed for semivolatile organic compounds (GC-MS) in accordance with EPA Method 625. The samples were prepared on 09/15/2017 and analyzed on 09/17/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GASOLINE RANGE ORGANICS (GRO)

Samples Outfall#002-091417 (580-71291-3) and TB-091417 (water) (580-71291-5) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 09/16/2017 and 09/17/2017.

4-Bromofluorobenzene (Surr) recovered outside acceptable drift limits for the batch opening CCV. All other surrogates and analytes passed in the CCV, and all surrogates and analytes met limits for the MB, LCS, LCSD, and samples. The data has been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

DIESEL AND MOTOR OIL RANGE ORGANICS

2 3 4 5 6 7 8 9 10

Job ID: 580-71291-2 (Continued)

Laboratory: TestAmerica Seattle (Continued)

Sample Outfall#002-091417 (580-71291-3) was analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared on 09/15/2017 and analyzed on 09/18/2017.

#2 Diesel (C10-C24) was detected in method blank MB 580-256280/1-B at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples were not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Dilution Factor

Detection Limit (DoD/DOE)

Estimated Detection Limit (Dioxin)

Limit of Detection (DoD/DOE)

Method Detection Limit

Minimum Level (Dioxin)

Practical Quantitation Limit

Relative Error Ratio (Radiochemistry)

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Not Calculated

Quality Control

Limit of Quantitation (DoD/DOE)

Decision Level Concentration (Radiochemistry)

Minimum Detectable Activity (Radiochemistry)

Minimum Detectable Concentration (Radiochemistry)

Reporting Limit or Requested Limit (Radiochemistry)

Not Detected at the reporting limit (or MDL or EDL if shown)

DL, RA, RE, IN Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample

Relative Percent Difference, a measure of the relative difference between two points

|--|

Dil Fac

DL

DLC

EDL

LOD

LOQ

MDA

MDC

MDL

ML

NC

ND

PQL

QC RER

RL

RPD

TEF

TEQ

GC/MS Sem	ii VOA	Δ
Qualifier	Qualifier Description	
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.	5
GC Semi VC	Α	U
Qualifier	Qualifier Description	
В	Compound was found in the blank and sample.	
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.	
Glossary		8
Abbreviation	These commonly used abbreviations may or may not be present in this report.	0
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis	y
%R	Percent Recovery	
CFL	Contains Free Liquid	
CNF	Contains No Free Liquid	
DER	Duplicate Error Ratio (normalized absolute difference)	

Date Collected: 09/14/17 16:30

Date Received: 09/15/17 10:25

Analyte

Surrogate

o-Terphenyl

#2 Diesel (C10-C24)

Motor Oil (>C24-C36)

Client Sample ID: Outfall#002-091417

Lab Sample ID: 580-71291-3 Matrix: Water

5

Method: 624 - Volatile Orga	anic Compoun	ds (GC/MS	5)			_			
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			09/18/17 23:05	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	101		74 - 123					09/18/17 23:05	1
Toluene-d8 (Surr)	103		79 - 122					09/18/17 23:05	1
4-Bromofluorobenzene (Surr)	101		78 - 119					09/18/17 23:05	1
Dibromofluoromethane (Surr)	100		70_120					09/18/17 23:05	1
1,2-Dichloroethane-d4 (Surr)	104		70 - 120					09/18/17 23:05	1
Method: 625 - Semivolatile	Organic Com	oounds (G	C/MS)						
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.3	0.022	ug/L		09/15/17 11:13	09/17/17 20:55	1
Chrysene	ND		0.66	0.011	ug/L		09/15/17 11:13	09/17/17 20:55	1
Benzo[a]pyrene	ND		1.1	0.022	ug/L		09/15/17 11:13	09/17/17 20:55	1
Indeno[1,2,3-cd]pyrene	ND		1.1	0.055	ug/L		09/15/17 11:13	09/17/17 20:55	1
Dibenz(a,h)anthracene	ND		0.66	0.022	ug/L		09/15/17 11:13	09/17/17 20:55	1
Benzo[k]fluoranthene	ND		1.1	0.022	ug/L		09/15/17 11:13	09/17/17 20:55	1
Benzo[b]fluoranthene	ND		1.1	0.055	ug/L		09/15/17 11:13	09/17/17 20:55	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	111		60 - 135				09/15/17 11:13	09/17/17 20:55	1
Method: NWTPH-Gx - Nort	hwest - Volatil	e Petroleu	m Products (GC)					
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			09/17/17 16:05	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		58 - 133					09/17/17 16:05	1
Trifluorotoluene (Surr)	105		77 - 128					09/17/17 16:05	1

RL

0.11

0.26

Limits

43 - 119

MDL Unit

0.020 mg/L

0.081 mg/L

D

Prepared

Prepared

Analyzed

Analyzed

09/15/17 11:15 09/18/17 10:59

09/15/17 11:15 09/18/17 10:59

09/15/17 11:15 09/18/17 10:59

Dil Fac

Dil Fac

1

1

1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Result Qualifier

0.050 JB

%Recovery Qualifier

71

ND

Client Sample ID: TB-091417 (water) Date Collected: 09/14/17 00:01 Date Received: 09/15/17 10:25

Lab Sample ID: 580-71291-5 Matrix: Water

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			09/16/17 17:38	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	78		58 - 133					09/16/17 17:38	1
Trifluorotoluene (Surr)	115		77 - 128					09/16/17 17:38	1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-256621/5 **Client Sample ID: Method Blank Matrix: Water** Prep Type: Total/NA Analysis Batch: 256621 MB MB Analyte **Result Qualifier** RL MDL Unit D Prepared Analyzed Dil Fac 2.0 Benzene ND 0.42 ug/L 09/18/17 20:59 1 MB MB Surrogate %Recovery Qualifier Limits Prepared Analyzed Dil Fac Trifluorotoluene (Surr) 101 74 - 123 09/18/17 20:59 1 Toluene-d8 (Surr) 102 79 - 122 09/18/17 20:59 1 4-Bromofluorobenzene (Surr) 98 78 - 119 09/18/17 20:59 1 99 70 - 120 Dibromofluoromethane (Surr) 09/18/17 20:59 1 1,2-Dichloroethane-d4 (Surr) 101 70 - 120 09/18/17 20:59 1 **Client Sample ID: Lab Control Sample** Lab Sample ID: LCS 580-256621/6 **Matrix: Water** Prep Type: Total/NA Analysis Batch: 256621 LCS LCS Spike %Rec. Analyte Added Result Qualifier Unit D %Rec Limits Benzene 10.0 10.2 ug/L 102 37 - 151

	LCS	LCS		
Surrogate	%Recovery	Qualifier	Limits	
Trifluorotoluene (Surr)	101		74 - 123	
Toluene-d8 (Surr)	102		79 - 122	
4-Bromofluorobenzene (Surr)	99		78 - 119	
Dibromofluoromethane (Surr)	99		70 - 120	
1,2-Dichloroethane-d4 (Surr)	99		70 - 120	

Lab Sample ID: LCSD 580-256621/7 **Matrix: Water** Analysis Batch: 256621

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

-			Spike	LCSD	LCSD				%Rec.		RPD
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Benzene			10.0	10.2		ug/L		102	37 - 151	0	30
	LCSD	LCSD									
Surrogate	%Recovery	Qualifier	Limits								
Trifluorotoluene (Surr)	100		74 - 123								
Toluene-d8 (Surr)	102		79 - 122								
4-Bromofluorobenzene (Surr)	100		78_119								
Dibromofluoromethane (Surr)	100		70 - 120								
1,2-Dichloroethane-d4 (Surr)	100		70 - 120								

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-256279/1-A Matrix: Water Analysis Batch: 256416							Client Samp	le ID: Methoc Prep Type: To Prep Batch: ∷	I Blank otal/NA 256279
-	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		09/15/17 11:13	09/17/17 19:40	1
Chrysene	ND		0.60	0.010	ug/L		09/15/17 11:13	09/17/17 19:40	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		09/15/17 11:13	09/17/17 19:40	1

TestAmerica Seattle

6
Method: 625 - Semivolatile Organic Compounds (GC/MS) (Continued)

MB MB Result Qualifier

ND

ND

ND

ND

98

%Recovery

MB MB

Qualifier

Lab Sample ID: MB 580-256279/1-A

Matrix: Water

Indeno[1,2,3-cd]pyrene

Dibenz(a,h)anthracene

Benzo[k]fluoranthene

Benzo[b]fluoranthene

Analyte

Surrogate

Terphenyl-d14

Analysis Batch: 256416

Client Sample ID: Method Blank

09/15/17 11:13 09/17/17 19:40

09/15/17 11:13 09/17/17 19:40

Prep Type: Total/NA

Prep Batch: 256279

Prep Type: Total/NA

Dil Fac

1

1

6

09/15/17 11:13	09/17/17 19:40	1
09/15/17 11:13	09/17/17 19:40	1
Prepared	Analyzed	Dil Fac
09/15/17 11:13	09/17/17 19:40	1

Analyzed

Lab Sample ID: LCS 580-256279/2-A Matrix: Water Analysis Ratch 256/16

Analysis Batch: 256416							Prep Batch: 256279
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Benzo[a]anthracene	2.00	1.53	J	ug/L		76	33 - 143
Chrysene	2.00	1.53		ug/L		76	17 - 168
Benzo[a]pyrene	2.00	1.66		ug/L		83	17 - 163
Indeno[1,2,3-cd]pyrene	2.00	1.53		ug/L		77	1 - 171
Dibenz(a,h)anthracene	2.00	1.64		ug/L		82	1 - 227
Benzo[k]fluoranthene	2.00	1.69		ug/L		85	11 - 162
Benzo[b]fluoranthene	2.00	1.88		ug/L		94	24 - 159

RL

1.0

0.60

1.0

1.0

Limits

60 - 135

MDL Unit

0.050 ug/L

0.020 ug/L

0.020 ug/L

0.050 ug/L

D

Prepared

	LCS	LCS	
Surrogate	%Recovery	Qualifier	Limits
Terphenyl-d14	91		60 - 135

Lab Sample ID: LCSD 580-256279/3-A Matrix: Water

Analysis Batch: 256416 Prep Batch: 256279 Spike LCSD LCSD RPD %Rec. **Result Qualifier** Analyte Added Unit D %Rec Limits RPD Limit Benzo[a]anthracene 2.00 1.63 J ug/L 82 33 - 143 7 50 Chrysene 2.00 1.54 77 17 - 168 50 ug/L 0 Benzo[a]pyrene 2.00 1.65 ug/L 82 17 - 163 50 1 ug/L 83 50 Indeno[1,2,3-cd]pyrene 2.00 1.66 8 1 - 171 2.00 1.74 87 1 - 227 50 Dibenz(a,h)anthracene ug/L 6 Benzo[k]fluoranthene 2.00 1.70 ug/L 85 11 - 162 0 50 Benzo[b]fluoranthene 2.00 1.91 ug/L 96 24 - 159 2 50 - - -

	LCSD I	LCSD	
Surrogate	%Recovery	Qualifier	Limits
Terphenyl-d14	90		60 - 135

Client Sample ID: Lab Control Sample

Client Sample ID: Lab Control Sample Dup

Drom	Tumou	Totol/NIA
Prep	Type:	i Olal/INA
D	D - C - L	0 - 0 - 0 - 0

TestAmerica	Seattle
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-						uuc	13 (0	,0,						
Lab Sample ID: MB 580-2 Matrix: Water	56386/5								Cli	ier	nt Sam	ple ID: Meth	od Tot	Blan tal/N/
Analysis Batch: 256386												пер турс.	101	
analysis Daten. 200000		ΜВ	МВ											
Analvte	Re	sult	Qualifier	R	L	MDL	Unit		D	Pre	epared	Analvzed		Dil Fa
Gasoline		ND		0.2	5	0.050	mg/L					09/16/17 16:3	7 -	-
							•							
Surragata	% Bases	MB	MB Qualifiar	Limito						Dre	norod	Analyzad		
J_Bromofluorobenzene (Surr)	/%Reco	70	Quaimer		_					F /e	epareu	$-\frac{Allalyzeu}{00/16/17,16.3}$	7 -	<i>DII Га</i>
Trifluorotoluene (Surr)		99		77 128								09/16/17 16:3	7	
		00		11-120								00/10/11 10:0	,	
Lab Sample ID: LCS 580-	256386/6							Clie	nt Sa	am	ple ID	: Lab Contro	I Sa	ample
Matrix: Water												Prep Type:	Tot	tal/N/
Analysis Batch: 256386														
				Spike	LCS	S LCS	3					%Rec.		
Analyte				Added	Resul	t Qua	alifier	Unit	D) '	%Rec	Limits		
Gasoline				1.00	0.906	6		mg/L			91	79_110		
	LCS	LCS	5											
Surrogate	%Recovery	Qua	alifier	Limits										
4-Bromofluorobenzene (Surr)	80			58 - 133										
Trifluorotoluene (Surr)	112			77 - 128										
Analyto	Po	MB	MB Qualifier	P	1	мпі	Unit		л 1	Dro	narod	Analyzod		Dil Ea
Gasoline			Quaimer	02	5	0.050	ma/l			FIE	epareu		9 -	DIFA
		ne		0.2	•	0.000	ing/L					00,11,11,11,12	0	
•	6 / 5	MB	MB	••••						_				
Surrogate	%Reco	very	Qualifier		_					Pre	epared	Analyzed		Dil Fa
4-Bromonuorobenzene (Surr)		88		58 - 133 77 100								09/17/17 14:2	9	
		93		11 - 120								09/11/11 14.2	9	
Lab Sample ID: LCS 580-	256407/7							Clie	nt Sa	am	DI ela	: Lab Contro	I Sa	ample
Matrix: Water												Prep Type:	Tot	tal/NA
Analysis Batch: 256407														
-				Spike	LCS	S LCS	5					%Rec.		
Analyte				Added	Resul	t Qua	alifier	Unit	D) '	%Rec	Limits		
Gasoline				1.00	0.864	1		mg/L			86	79_110		
	LCS	LCS	5											
Surrogate	%Recovery	Qua	alifier	Limits										
4-Bromofluorobenzene (Surr)	95			58 - 133										
Trifluorotoluene (Surr)	92			77 - 128										
ab Sample ID: LCSD 580)-256407/8						C	lient S	ample	e II	D: Lab	Control San	nol	e Dur
Matrix: Water										- •	_	Prep Type:	Tot	tal/N4
Analysis Batch: 256407														
				0	1.005		20					0/		RPI
				Spike	LUSL	LCS	עפ					%Rec.		
Analyte				Spike Added	Resul	t Qua	alifier	Unit	D)	%Rec	%Rec. Limits R	PD	Limi

Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 256407	0-256407/8						C	lient Sa	ample	e II	D: Lab	Control S Prep Typ	Sampl be: To	le Dup tal/NA
	LCSD	LCS	SD											
Surrogate	%Recovery	Qua	lifier	Limits										
4-Bromofluorobenzene (Surr)	96			58 - 133										
Trifluorotoluene (Surr)	96			77 - 128										
lethod: NWTPH-Dx -	Northwest	: - S	emi-Vo	latile Petr	oleun	n Pr	rodu	cts (G	C)					
Lab Sample ID: MB 580-2	56280/1-B								Cli	ien	nt Samp	ole ID: M	ethod	Blank
Matrix: Water												Prep Typ	be: To	tal/NA
Analysis Batch: 256424												Prep Ba	tch: 2	256280
	_	MB	MB							_				
Analyte		esult	Qualifier			MDL	Unit			Pre	epared	Analyz	ed	Dil Fac
#2 Diesel (C10-C24)	0.0	0479	J	0.10		.019	mg/L		09/	/15/	17 11:15	09/18/17	09:52	
Viotor OII (>C24-C36)		ND		0.25	C	.077	mg/L		09/	/15/	17 11:15	09/18/17	09:52	
		MB	MB											
Surrogate	%Reco	very	Qualifier	Limits						Pre	epared	Analyz	ed	Dil Fac
o-Terphenyl		76		43 - 119					09/	/15/	/17 11:15	09/18/17	09:52	·
Lab Sample ID: LCS 580- Matrix: Water Analysis Batch: 256424	256280/2-B			Spike	LCS	LCS	;	Clie	nt Sa	am	ple ID:	Lab Con Prep Typ Prep Ba %Rec.	itrol S be: To itch: 2	ample tal/NA 256280
Analyte				Added	Result	Qua	lifier	Unit	D) 9	%Rec	Limits		
#2 Diesel (C10-C24)				2.00	1.50			mg/L			75	59 - 112		
Motor Oil (>C24-C36)				2.00	1.73			mg/L			86	64 - 120		
	LCS	LCS	;											
Surrogate	%Recoverv	Qua	lifier	Limits										
o-Terphenvl	76			43 - 119										
Lab Sample ID: LCSD 580)-256280/3-B	3					C	lient Sa	ample	e II	D: Lab	Control S	Samp	le Dup
Matrix: Water												Prep Typ	be: To	tal/NA
Analysis Batch: 256424												Prep Ba	tch: 2	256280
				Spike	LCSD	LCS	D					%Rec.		RPD
Analyte				Added	Result	Qua	lifier	Unit	D) 9	%Rec	Limits	RPD	Limi
#2 Diesel (C10-C24)				2.00	1.42			mg/L			71	59 - 112	6	16
Motor Oil (>C24-C36)				2.00	1.67			mg/L			83	64 - 120	4	17
	1.000		` D											
Survey and a	LCSD	LCS		Limita										
Surrogate	%Recovery	Qua	uitier											
- · ·														

Dilution

Factor

1

1

1

1

Run

Batch

Number

Prepared

or Analyzed

256621 09/18/17 23:05 IWH

256279 09/15/17 11:13 MRG

256416 09/17/17 20:55 W1T

256407 09/17/17 16:05 RSB

256280 09/15/17 11:15 MRG

256373 09/16/17 08:24 JWL

256424 09/18/17 10:59 ADB

Analyst

Lab

TAL SEA

Lab Sample ID: 580-71291-5

Date Collected: 09/14/17 16:30

Date Received: 09/15/17 10:25

Prep Type

Total/NA

Total/NA

Total/NA

Total/NA

Total/NA

Total/NA

Total/NA

Client Sample ID: Outfall#002-091417

Batch

624

625

3510C

3630C

Method

CWA_Prep

NWTPH-Gx

NWTPH-Dx

Batch

Туре

Prep

Analysis

Analysis

Analysis

Cleanup

Analysis

Prep

Lab Sample ID: 580-71291-3

Matrix: Water

Matrix: Water

1 2 3 4 5 6 7 8 8 9

Client Sample ID: TB-091417 (water)

Date Collected: 09/14/17 00:01 Date Received: 09/15/17 10:25

_								
	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	NWTPH-Gx		1	256386	09/16/17 17:38	JCV	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Client: ARCADIS U.S. Inc Project/Site: Chevron Edmonds Terminal TestAmerica Job ID: 580-71291-2

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	UST-022	03-02-18
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Sample Summary

TestAmerica Job ID: 580-71291-2

Client: ARCADIS U.S. Inc Project/Site: Chevron Edmonds Terminal

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-71291-3	Outfall#002-091417	Water	09/14/17 16:30	09/15/17 10:25
580-71291-5	TB-091417 (water)	Water	09/14/17 00:01	09/15/17 10:25



THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Seattle 5755 8th Street E. Tacoma, WA 98424 Tel. 253-922-2310 Fax 253-922-5047 www.testamericainc.com



Short Hold

Chain of Custody Record

Client		Client R.c.	Contac	ct	, hla										Date 9-14-1*	7	Chair	n of Custody Nu	umber 29436
Address		Telephi	one Nu	imber (i	Area Coo	de)/Fax	Numb	er	····						Lab Number	/		š,	
1100 Olive Way Suite 80) n Cada	509-	-43	8-9	828		h Contr								$1 + 1 \times 7$	1	Page	<u>e</u>	of
Seattle WA	98101	Rycan I	= Brave	chla	(RB)	E)	sine	Wa	Jk	er				A M	ore space is needed	, */			
Project Name and Location (State)		Billing	Contac	t								61	3	$\mathbf{\hat{s}}$	N.S.				
Edmonds Terminal			1									3	Sente	РАН	(Ber			Special I Condition	Instructions/
WOO45362,0010				Matr	ix		1	Containi Preservi	ers ð ative	s S		м М-Р	C C C	76	224			conanior	ιο υι πευειμι
Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous Sed.	Soil	Unpres.	H2S04	HN03 HCI	NaOH	ZnAc/ NaOH	NL TP	NWTP	8260	82.70.	EPA (1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -
EX-DB2-A2-5-SW	91417			_	X	2			<u> </u>	+	? X	X	X	ж			E	mail resu	.lts to
EX-DB2-B2-10	9-14-12	0840			X	2					2 X	X	X	*				ryen.brau	rehlyCuruchs.com
EX-DB2-B2-10-MS	9-14-17	0840			X	2					2 X	X	X	¥				ophelie. ene	celle Carradis. com
EX-DBZ-BZ-10-MSD	9-14-17	0840			X	2					2 X	ĺΧ	X	¥				servel, m	165 Carendis com
EX-DB2-C2-10	9-14-17	1155			X	2				Ż	2 X	X	X	*				Nott zo	m Carcudic.com
OUTFALL#002-091417	9-14-17	1630		X		8		8			X	X			XX			ericler	Veger Cando.con
RB-091417-	9-14-17	1030	2					2									W	IBS Codes	<u></u>
TB-091417 (water)	9-14-17			\langle	X		ļ	2			$ \lambda$	[X		X			NWENVPM	6001430003- Wester
TB-091417 (solid)										ļ								NNENVPNE	001430804-5011
																	*	Analice :	sample IF
									ļ								D	RO/HO	detected
												L						····	11 yuuuuu uu
Cooler Possible h	lazard Identification	amable]_Skin	Irritan	t 🗆	Poiso	n R		nkna	Si WA	ample Retu	Dispo m To .	sal Client		Disposal By Lab	Montt	(A 15 ar	fee may be as	sessed if samples
Turn Around Time Required (business days)							QC RI	equirem	nents	(Specif	v)			L.				- Totalinou long	
24 Hours 48 Hours 5 Days 10 Da	iys 🗌 15 Days	Dete	97				1 0 .	aniu od I	b . (····/n	•								Time
The LI Bill Ryan Brauchle		0ale 9-1	5-1	7	 190	0	I. Hel		57 	Signitr	/1	Ξr.	y n	c_{1}	10 Luna	Jr.		15/17	0400
2. Relinquished By Sign/Print	1. J.	Date 9/10	/1-	7	me In Ui	()	2. Rei	ceived E	By S	Sign/Pr	int /	1	< /		Blaukin	ship	Dat	te 2/15/17	Time 1040
3. Relinquished By Sign/Print	uny	Date		Th	<u>пе</u>	<u> </u>	3. Rei	ceived E	3y s	lign/Pri	nt	· · · ·	Ð		2		Dal	te	Time
Comments	R Cooler	Car	. A f	Un	. A 9											·····			<u></u>
	oler Dsc	Blue	@La	_om ab	- <u>V//</u>														
DISTRIBUTION: WHITE - Stays with the Samples; CA	et/Packs Pa	acking	bub	N.P	P	age	15 o	f 16	 	580-71	291 C	hain	of CL	ustod	VIIIIIIIIIIIIIIIIIIIIII			TAL	8274- 5 920/2017
A	hCor !	Custody Sea	al: Ye	s	No <u>X</u>		-	-								-			

10

Client: ARCADIS U.S. Inc

Login Number: 71291 List Number: 1 Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
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	additional labels on pretared vial.
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").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	True	

Job Number: 580-71291-2

List Source: TestAmerica Seattle



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle 5755 8th Street East Tacoma, WA 98424 Tel: (253)922-2310

TestAmerica Job ID: 580-71420-1 Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc 1100 Olive Way Suite 800 Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by: 9/21/2017 4:23:14 PM Elaine Walker, Project Manager II (253)248-4972 elaine.walker@testamericainc.com

Review your project results through TOTOLACCESS Have a Question?

..... Links

Visit us at:

Ask-

www.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.

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QC Sample Results	8
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Sample Summary	14
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Receipt Checklists	16

Job ID: 580-71420-1

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE Client: ARCADIS U.S. Inc Project: Chevron Edmonds Terminal Report Number: 580-71420-1

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

Two samples were received on 9/20/2017 11:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.6° C.

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

VOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample OUTFALL#002-091917 (580-71420-1) was analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 09/20/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample OUTFALL#002-091917 (580-71420-1) was analyzed for semivolatile organic compounds (GC-MS) in accordance with EPA Method 625. The samples were prepared on 09/20/2017 and analyzed on 09/21/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GASOLINE RANGE ORGANICS (GRO)

Samples OUTFALL#002-091917 (580-71420-1) and TB-091917 (580-71420-2) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 09/20/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

DIESEL AND MOTOR OIL RANGE ORGANICS

Sample OUTFALL#002-091917 (580-71420-1) was analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared on 09/20/2017 and analyzed on 09/21/2017.

Please note - the laboratory is unable to process the reverse surrogate used in the Silica Gel Cleanup for NWTPH-Dx as it contains a 1-point calibration and the associated samples are run with a 5-point calibration. This surrogate will not be present in the forms for the Level IV report; however this surrogate is reported in the raw data section for this analysis.

Job ID: 580-71420-1 (Continued)

Laboratory: TestAmerica Seattle (Continued)

#2 Diesel (C10-C24) was detected in method blank MB 580-256726/1-B at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. This target analyte concentration was less than half the reporting limit (1/2RL); therefore, re-extraction and re-analysis of samples was not performed.

CCV recoveries were below %D control limits for o-Terphenyl surrogate, but within %R limits. Therefore, the data were reported. (CCV 580-256786/15), (CCV 580-256786/17), (CCVRT 580-256786/4) and (MB 580-256726/1-B).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Qualifiers

GC/MS Sem	ni VOA	1	
Qualifier	Qualifier Description	-	
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.	5	
GC Semi VC	Α	J	
Qualifier	Qualifier Description		
В	Compound was found in the blank and sample.		
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.		
Glossary		8	
Abbreviation	These commonly used abbreviations may or may not be present in this report.	0	
¤	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)

Not Calculated NC

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 ID: OUTFALL#002-091917

Lab Sample ID: 580-71420-1 Matrix: Water

5

Date Collected: 09/19/17 14:50 Date Received: 09/20/17 11:05

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			09/20/17 16:21	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	112		74 - 123					09/20/17 16:21	1
Toluene-d8 (Surr)	91		79 - 122					09/20/17 16:21	1
4-Bromofluorobenzene (Surr)	102		78 - 119					09/20/17 16:21	1
Dibromofluoromethane (Surr)	105		70 - 120					09/20/17 16:21	1
1,2-Dichloroethane-d4 (Surr)	93		70 - 120					09/20/17 16:21	1
Method: 625 - Semivolatile	Organic Com	oounds (G	C/MS)						
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.1	0.021	ug/L		09/20/17 12:35	09/21/17 12:16	1
Chrysene	ND		0.63	0.010	ug/L		09/20/17 12:35	09/21/17 12:16	1
Benzo[a]pyrene	ND		1.0	0.021	ug/L		09/20/17 12:35	09/21/17 12:16	1
Indeno[1,2,3-cd]pyrene	ND		1.0	0.052	ug/L		09/20/17 12:35	09/21/17 12:16	1
Dibenz(a,h)anthracene	ND		0.63	0.021	ug/L		09/20/17 12:35	09/21/17 12:16	1
Benzo[k]fluoranthene	ND		1.0	0.021	ug/L		09/20/17 12:35	09/21/17 12:16	1
Benzo[b]fluoranthene	ND		1.0	0.052	ug/L		09/20/17 12:35	09/21/17 12:16	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
- all ogalo			60 125				00/20/17 12:25	00/21/17 12:16	

Analyte	Result	Qualifier	RL	MDL Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050 mg/L			09/20/17 18:16	1
Surrogate	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		58 - 133				09/20/17 18:16	1
Trifluorotoluene (Surr)	105		77 - 128				09/20/17 18:16	1

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)											
Analyte	Result	Qualifier	RL	MDL	Únit	D	Prepared	Analyzed	Dil Fac		
#2 Diesel (C10-C24)	0.040	JB	0.11	0.020	mg/L		09/20/17 12:41	09/21/17 00:55	1		
Motor Oil (>C24-C36)	ND		0.27	0.083	mg/L		09/20/17 12:41	09/21/17 00:55	1		
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac		
o-Terphenyl	71		43 - 119				09/20/17 12:41	09/21/17 00:55	1		
n-Decanoic Acid (Surr)	0.0005		0 - 1				09/20/17 12:41	09/21/17 00:55	1		

RL

0.25

Limits

58 - 133

77 - 128

MDL Unit

0.050 mg/L

D

Prepared

Prepared

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Result Qualifier

ND

%Recovery Qualifier

90

106

Client Sample ID: TB-091917

Date Collected: 09/19/17 00:01 Date Received: 09/20/17 11:05

4-Bromofluorobenzene (Surr)

Trifluorotoluene (Surr)

Analyte

Gasoline

Surrogate

Lab Sample ID: 580-71420-2 Matrix: Water

Analyzed

09/20/17 17:44

Analyzed

09/20/17 17:44

09/20/17 17:44

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-29 Matrix: Water					C	lie	ent Sam	ple ID: Method	Blank		
Analysis Batch: 256753										гтер туре. П	
Analysis Baten. 200700	м	в мв									
Analyte	Resu	It Qualifier	RL		MDL Ur	nit	D	Р	repared	Analyzed	Dil Fac
Benzene	N	D	2.0		0.42 ug	I/L				09/20/17 12:57	1
	14	R MR									
Surrogate	%Recover	v Qualifier	Limits					P	repared	Analvzed	Dil Fac
Trifluorotoluene (Surr)		1	74 - 123				_			09/20/17 12:57	1
Toluene-d8 (Surr)	g	3	79 - 122							09/20/17 12:57	1
4-Bromofluorobenzene (Surr)	10)1	78 - 119							09/20/17 12:57	1
Dibromofluoromethane (Surr)	10)4	70 - 120							09/20/17 12:57	1
1,2-Dichloroethane-d4 (Surr)	ç	2	70 - 120							09/20/17 12:57	1
_ Lab Sample ID: LCS 580-2	256753/6						Client S	Sar	mple ID	: Lab Control S	Sample
Matrix: Water										Prep Type: To	otal/NA
Analysis Batch: 256753											
			Spike	LCS	LCS					%Rec.	
Analyte			Added	Result	Qualifie	er U	nit	D	%Rec	Limits	
Benzene			10.0	9.53		u	g/L	_	95	37 - 151	
	LCS L	cs									
Surrogate	%Recovery Q	ualifier	Limits								

Surrogate	%Recovery	Qualifier	Limits
Trifluorotoluene (Surr)	112		74 - 123
Toluene-d8 (Surr)	93		79 - 122
4-Bromofluorobenzene (Surr)	99		78_119
Dibromofluoromethane (Surr)	104		70 - 120
1,2-Dichloroethane-d4 (Surr)	90		70 - 120

Lab Sample ID: LCSD 580-256753/7 Matrix: Water Analysis Batch: 256753

5 6

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

-			Spike	LCSD	LCSD				%Rec.		RPD
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Benzene			10.0	9.84		ug/L		98	37 - 151	3	30
	LCSD	LCSD									
Surrogate	%Recovery	Qualifier	Limits								
Trifluorotoluene (Surr)	111		74 - 123								
Toluene-d8 (Surr)	92		79 - 122								
4-Bromofluorobenzene (Surr)	101		78_119								
Dibromofluoromethane (Surr)	106		70 - 120								
1,2-Dichloroethane-d4 (Surr)	91		70 - 120								

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-25672 Matrix: Water Analysis Batch: 256810	4/1-A						Client Samp	le ID: Methoo Prep Type: To Prep Batch: :	l Blank otal/NA 256724
	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		09/20/17 12:35	09/21/17 11:01	1
Chrysene	ND		0.60	0.010	ug/L		09/20/17 12:35	09/21/17 11:01	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		09/20/17 12:35	09/21/17 11:01	1

Lab Sample ID: MB 580-256724/1-A

Matrix: Water

2 3 4 5 6

Dil Fac

Dil Fac

1

1

1

1

1

	Client Sample ID: Method Blank
	Prep Type: Total/NA
E	Prep Batch: 256724

09/20/17 12:35 09/21/17 11:01

09/20/17 12:35 09/21/17 11:01

09/20/17 12:35 09/21/17 11:01

09/20/17 12:35 09/21/17 11:01

09/20/17 12:35 09/21/17 11:01

Client Sample ID: Lab Control Sample

Client Sample ID: Lab Control Sample Dup

Analyzed

Analyzed

Prep Type: Total/NA

Prep Type: Total/NA

Prepared

Prepared

D

	MB	MB			
Analyte	Result	Qualifier	RL	MDL	Unit
Indeno[1,2,3-cd]pyrene	ND		1.0	0.050	ug/L
Dibenz(a,h)anthracene	ND		0.60	0.020	ug/L
Benzo[k]fluoranthene	ND		1.0	0.020	ug/L
Benzo[b]fluoranthene	ND		1.0	0.050	ug/L
	МВ	МВ			
Surrogate	%Recovery	Qualifier	Limits		
Terphenyl-d14	98		60 - 135		

Method: 625 - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 580-256724/2-A Matrix: Water Analysis Batch: 256810

Analysis batch: 200010							Prep Batch: 256/24
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Benzo[a]anthracene	2.00	2.14	J	ug/L		107	33 - 143
Chrysene	2.00	2.02		ug/L		101	17 - 168
Benzo[a]pyrene	2.00	2.15		ug/L		108	17 - 163
Indeno[1,2,3-cd]pyrene	2.00	2.07		ug/L		104	1 - 171
Dibenz(a,h)anthracene	2.00	2.38		ug/L		119	1 - 227
Benzo[k]fluoranthene	2.00	2.22		ug/L		111	11 - 162
Benzo[b]fluoranthene	2.00	2.18		ug/L		109	24 - 159

	LCS	LCS	
Surrogate	%Recovery	Qualifier	Limits
Terphenyl-d14	100		60 - 135

Lab Sample ID: LCSD 580-256724/3-A Matrix: Water Analysis Batch: 256810

Analysis Batch: 256810 Prep Batch: 256724 Spike LCSD LCSD %Rec. RPD Analyte Added **Result Qualifier** Unit D %Rec Limits RPD Limit Benzo[a]anthracene 2.00 2.28 J ug/L 114 33 - 143 6 50 Chrysene 2.00 2.11 ug/L 105 17 - 168 4 50 Benzo[a]pyrene 2.00 2.25 ug/L 113 17 - 163 50 4 50 Indeno[1,2,3-cd]pyrene 2.00 2.14 ug/L 107 3 1_171 Dibenz(a,h)anthracene 2.00 2.41 121 1 - 227 50 ug/L 1 Benzo[k]fluoranthene 2.00 2.29 ug/L 114 11 - 162 3 50 Benzo[b]fluoranthene 2.00 2.14 ug/L 107 24 - 159 2 50

	LCSD	LCSD	
Surrogate	%Recovery	Qualifier	Limits
Terphenyl-d14	112		60 - 135

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

MB MB

ND MB MB

%Recovery Qualifier

90

105

Result Qualifier

Lab Sample ID: MB 580-256728/6

Lab Sample ID: LCS 580-256728/7

Matrix: Water

Analyte

Gasoline

Surrogate

Analysis Batch: 256728

4-Bromofluorobenzene (Surr)

Analysis Batch: 256728

Trifluorotoluene (Surr)

Matrix: Water

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Type: Total/NA

RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	6
0.25	0.050	mg/L			09/20/17 15:36	1	U
Limits				Prepared	Analyzed	Dil Fac	
58 - 133					09/20/17 15:36	1	8
77 - 128					09/20/17 15:36	1	
							0
			Client	t Sample ID:	Lab Control S	Sample	3
					Prep Type: To	otal/NA	

Client Sample ID: Lab Control Sample Dup

		Spike	LCS	LCS				%Rec.	
Analyte		Added	Result	Qualifier	Unit	D	%Rec	Limits	
Gasoline		1.00	0.871		mg/L		87	79_110	
	LCS LCS								

	200	200	
Surrogate	%Recovery	Qualifier	Limits
4-Bromofluorobenzene (Surr)	95		58 - 133
Trifluorotoluene (Surr)	96		77 - 128
-			

Lab Sample ID: LCSD 580-256728/8 **Matrix: Water**

Analysis Batch: 256728											
-			Spike	LCSD	LCSD				%Rec.		RPD
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Gasoline			1.00	0.865		mg/L		86	79 - 110	1	10
	LCSD	LCSD									
Surrogate	%Recovery	Qualifier	Limits								
4-Bromofluorobenzene (Surr)	96		58 - 133								
Trifluorotoluene (Surr)	93		77 - 128								

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-256 Matrix: Water Analysis Batch: 256786	726/1-B						Client Samp	le ID: Methoo Prep Type: To Prep Batch: :	l Blank otal/NA 256726
	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	0.0242	J	0.10	0.019	mg/L		09/20/17 12:41	09/20/17 23:27	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		09/20/17 12:41	09/20/17 23:27	1
	МВ	MB							
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	69		43 - 119				09/20/17 12:41	09/20/17 23:27	1
n-Decanoic Acid (Surr)	0.000009		0 - 1				09/20/17 12:41	09/20/17 23:27	1

6

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-2 Matrix: Water Analysis Batch: 256786	256726/2-B		Spike	LCS	LCS	Clie	nt Sai	nple ID	: Lab Cor Prep Tyj Prep Ba %Rec.	ntrol Sa pe: Tot atch: 28	imple al/NA 56726
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits		
#2 Diesel (C10-C24)			2.00	1.24		mg/L		62	59 - 112		
Motor Oil (>C24-C36)			2.00	1.38		mg/L		69	64 - 120		
	LCS	LCS									
Surrogate	%Recovery	Qualifier	Limits								
o-Terphenyl	63		43 - 119								
n-Decanoic Acid (Surr)	0.03		0 - 1								
_											
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 256786	-256726/3-B				C	Client Sa	mple	ID: Lat	Control S Prep Tyj Prep Ba	Sample pe: Tot atch: 25	e Dup al/NA 56726
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 256786	-256726/3-B		Spike	LCSD	LCSD	Client Sa	mple	ID: Lat	Control S Prep Typ Prep Ba %Rec.	Sample pe: Tot atch: 25	e Dup al/NA 56726 RPD
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 256786 Analyte	-256726/3-B		Spike Added	LCSD Result	LCSD Qualifier	Unit	mple	ID: Lak	Control Prep Typ Prep Ba %Rec. Limits	Sample pe: Tot atch: 25 RPD	e Dup al/NA 56726 RPD Limit
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 256786 Analyte #2 Diesel (C10-C24)	-256726/3-B		Spike Added 2.00	LCSD Result 1.39	LCSD Qualifier	Unit mg/L	mple	ID: Lak	Control S Prep Typ Prep Ba %Rec. Limits 59 - 112	Sample pe: Tot atch: 28 <u>RPD</u> 11	e Dup al/NA 56726 RPD Limit 16
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 256786 Analyte #2 Diesel (C10-C24) Motor Oil (>C24-C36)	-256726/3-B 		Spike Added 2.00 2.00	LCSD Result 1.39 1.46	LCSD Qualifier	Unit mg/L mg/L	mple	1D: Lak %Rec <u>69</u> 73	Control S Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample oe: Tota atch: 28 <u>RPD</u> 11 6	e Dup al/NA 56726 RPD Limit 16 17
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 256786 Analyte #2 Diesel (C10-C24) Motor Oil (>C24-C36)	-256726/3-B	LCSD	Spike Added 2.00 2.00	LCSD Result 1.39 1.46	C LCSD Qualifier	Unit mg/L mg/L	mple	%Rec 69 73	Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample oe: Tota atch: 28 <u>RPD</u> 11 6	e Dup al/NA 56726 RPD Limit 16 17
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 256786 Analyte #2 Diesel (C10-C24) Motor Oil (>C24-C36) Surrogate	-256726/3-B LCSD %Recovery	LCSD Qualifier	Spike Added 2.00 2.00 Limits	LCSD Result 1.39 1.46	C LCSD Qualifier	Unit mg/L mg/L	mple	%Rec 69 73	Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample pe: Tota atch: 28 <u>RPD</u> 11 6	A Dup al/NA 56726 RPD Limit 16 17
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 256786 #2 Diesel (C10-C24) Motor Oil (>C24-C36) Surrogate o-Terpheny/	-256726/3-B 	LCSD Qualifier	Spike Added 2.00 2.00 Limits 43 - 119	LCSD Result 1.39 1.46	LCSD Qualifier	Unit mg/L mg/L	mple	1D: Lat %Rec 69 73	Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample oe: Tota atch: 25 <u>RPD</u> 11 6	e Dup al/NA 56726 RPD Limit 16 17

Lab Sample ID: 580-71420-2

Matrix: Water

Lab Sample ID: 580-71420-1 Matrix: Water

Client Sample ID: OUTFALL#002-091917 Date Collected: 09/19/17 14:50 Date Received: 09/20/17 11:05

Prep Type Total/NA	Batch Type Analysis	Batch Method 624	Run	Dilution Factor 1	Batch Number 256753	Prepared or Analyzed 09/20/17 16:21	Analyst T1W	Lab TAL SEA
Total/NA	Prep	CWA_Prep		1	256724	09/20/17 12:35	MRG	TAL SEA
Total/NA	Analysis	025 NWTPH-Gx		1	256728	09/20/17 12:16	RSB	TAL SEA
Total/NA Total/NA	Prep	3510C 3630C			256726 256771	09/20/17 12:41	MRG APR	TAL SEA TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	256786	09/21/17 00:55	ERZ	TAL SEA

Client Sample ID: TB-091917

Date Collected: 09/19/17 00:01 Date Received: 09/20/17 11:05

-									
	Batch	Batch		Dilution	Batch	Prepared			
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab	
Total/NA	Analysis	NWTPH-Gx		1	256728	09/20/17 17:44	RSB	TAL SEA	

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Client: ARCADIS U.S. Inc Project/Site: Chevron Edmonds Terminal TestAmerica Job ID: 580-71420-1

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	UST-022	03-02-18
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

Client: ARCADIS U.S. Inc Project/Site: Chevron Edmonds Terminal

Lab Sample ID	Client Sample ID	Matrix	Collected Received
580-71420-1	OUTFALL#002-091917	Water	09/19/17 14:50 09/20/17 11:05
580-71420-2	TB-091917	Water	09/19/17 00:01 09/20/17 11:05

TestAmerica	TestAme 5755 8tł Tacoma Tel. 253 Fax 253	rica Seattle h Street E. I, WA 98424 -922-2310 -922-5047		Rush Short) C Hold C	hain of Sustody Record	1 2
Client	www.tes Clien R.	stamericainc.com			Date 9-19-2017	Chain of Custody Number	
Address 1100 Olive Way, Svite (KOO Telép. 504	hone Number (Area Code)/I 1-438-9828	ax Number	A	Lab Number 253-922-2310	Page of	4
Seattle WA 9 Project Name and Location (State)	810) Rich	Brauchly (PB)	Elvine Walla	Xer Creek	anysis (Attach list in bre space is needed)	T 71420	5 6
Edmonds lerminal Edm Contract/Purchase Order/Quote No. BOO45362.0010	nonds, WA	Matrix	Containers & Preservatives	4-6x 14-0x w/ 12-9 (8w)		Special Instructions/ Conditions of Receipt	
Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date Time	Air Aqueous Sed. Soil	Unpres. H2S04 HNO3 HCI NaOH	NW/TP NW/TP EPA 6			8
OUTFALL#002-091917	9-19-17 1450	<u> X</u>	8 8			Email results to	9
1B-091917	9-19-17 -	X	2	X		ryan. brauchla Carcedis.com	10
						samuel, miles @ arcedis.com	~
						ophelie encelle Pareadis com	11
						scott.zorn@arcadis.com	
						WBS Codes:	
						NWENVPMG001430804-Soil	
				TB <u>42</u> Cooler	CorUnc4	NWENVPMG01430803- wete	۶
	580-7142	20 Chain of Custody		Wet/Packs Pack	tody Seal: Yes Nok		
Cooler Possible Hai	rard Identification ard	Skin Irritant Po	ison B 🗌 Unknown	Sample Disposal	Disposal By Lab Archive For Mon	(A fee may be assessed if samples ths are retained longer than 1 month)	
Turn Around Time Required (business days)	15 Davs 0 Ot	her	QC Requirements (S	pecify)			
1. Relinquished By Sign/Print Aman () () () () () () () () () () () () ()	Bravelle 9-	20-17 0950	1. Received By Sig	n/Print / Francisco	Lunh, Jr	Date 9/20/17 0950	
1. Beinquished By Sign/Print 235/Francisco Lang Tr	Date 4/21	c/17 1105	2. Received By Sig	n/Print TomBlank	Blankinship	Date Time 9/20/17 1105	
3. Helinquished By Sign/Print '		lime	3. Heceived by Sig	n/Print'			

Client: ARCADIS U.S. Inc

Login Number: 71420 List Number: 1 Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
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").	False	Refer to Job Narrative for details.
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Job Number: 580-71420-1

List Source: TestAmerica Seattle



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle 5755 8th Street East Tacoma, WA 98424 Tel: (253)922-2310

TestAmerica Job ID: 580-71583-1 Client Project/Site: Edmonds Terminal

For: ARCADIS U.S. Inc 1100 Olive Way Suite 800 Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by: 9/27/2017 3:59:34 PM Elaine Walker, Project Manager II (253)248-4972 elaine.walker@testamericainc.com

LINKS Review your project results through TOTOLACCESS Have a Question?



Visit us at: www.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.

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Job ID: 580-71583-1

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE Client: ARCADIS U.S. Inc Project: Edmonds Terminal Report Number: 580-71583-1

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

Two samples were received on 9/26/2017 12:00 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.5° C.

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

VOLATILE ORGANIC COMPOUNDS (GC-MS)

Samples OUTFALL#002-092617 (580-71583-1) and TB-092617 (water) (580-71583-2) were analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 09/26/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample OUTFALL#002-092617 (580-71583-1) was analyzed for semivolatile organic compounds (GC-MS) in accordance with EPA Method 625. The samples were prepared and analyzed on 09/26/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GASOLINE RANGE ORGANICS (GRO)

Samples OUTFALL#002-092617 (580-71583-1) and TB-092617 (water) (580-71583-2) were analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 09/26/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

DIESEL AND MOTOR OIL RANGE ORGANICS

Sample OUTFALL#002-092617 (580-71583-1) was analyzed for diesel and motor oil range organics in accordance with Method NWTPH-Dx. The samples were prepared and analyzed on 09/26/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description		
J	Result is less than the		

Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

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)

RL

2.0

Limits

74 - 123

79 - 122

78 - 119

70 - 120

70 - 120

RL

2.9

0.58

0.97

0.97

0.58

0.97

0.97

Limits

60 - 135

MDL Unit

0.42 ug/L

MDL Unit

0.019 ug/L

0.0097 ug/L

0.019 ug/L

0.048 ug/L

0.019 ug/L

0.019 ug/L

0.048 ug/L

D

D

Prepared

Prepared

Prepared

09/26/17 13:09

Prepared

09/26/17 13:09 09/26/17 19:03

09/26/17 13:09 09/26/17 19:03

09/26/17 13:09 09/26/17 19:03

09/26/17 13:09 09/26/17 19:03

09/26/17 13:09 09/26/17 19:03

09/26/17 13:09 09/26/17 19:03

09/26/17 13:09 09/26/17 19:03

Client Sample ID: OUTFALL#002-092617 Date Collected: 09/26/17 08:45

Method: 624 - Volatile Organic Compounds (GC/MS)

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Result Qualifier

ND

%Recovery Qualifier

114

91

104

106

95

ND

ND

ND

ND

ND

ND

ND

%Recovery Qualifier

88

Result Qualifier

Analyte

Benzene

Surrogate

Analyte

Chrysene

Surrogate

Terphenyl-d14

Trifluorotoluene (Surr)

4-Bromofluorobenzene (Surr)

Dibromofluoromethane (Surr)

1,2-Dichloroethane-d4 (Surr)

Toluene-d8 (Surr)

Benzo[a]anthracene

Indeno[1,2,3-cd]pyrene

Dibenz(a,h)anthracene

Benzo[k]fluoranthene

Benzo[b]fluoranthene

Benzo[a]pyrene

Lab Sample ID: 580-71583-1 Matrix: Water

Analyzed

09/26/17 19:49

Analyzed

09/26/17 19:49

09/26/17 19:49

09/26/17 19:49

09/26/17 19:49

09/26/17 19:49

Analyzed

09/26/17 19:03

Analyzed

5

Dil Fac

Dil Fac

1

1

1

1

1

9

Dil Fac	
1	

1

1

1

1

Dil Fac

-				
Mothod: NWTPH_Gy - Northwost	- Volatilo	Potroloum	Producte	(GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L		•	09/26/17 14:51	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	95		58 - 133					09/26/17 14:51	1
Trifluorotoluene (Surr)	95		77 - 128					09/26/17 14:51	1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.10	0.019	mg/L		09/26/17 13:13	09/26/17 20:10	1
Motor Oil (>C24-C36)	ND		0.26	0.079	mg/L		09/26/17 13:13	09/26/17 20:10	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	79		43 - 119				09/26/17 13:13	09/26/17 20:10	1

Date Collected: 09/26/17 00:01

Client Sample ID: TB-092617 (water)

580-71583-2 Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		2.0	0.42	ug/L			09/26/17 19:25	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	114		74 - 123					09/26/17 19:25	1
Toluene-d8 (Surr)	91		79 - 122					09/26/17 19:25	1
4-Bromofluorobenzene (Surr)	102		78 - 119					09/26/17 19:25	1
Dibromofluoromethane (Surr)	107		70 - 120					09/26/17 19:25	1
1.2-Dichloroethane-d4 (Surr)	94		70 - 120					09/26/17 19:25	1

Analyte	Result	Quaimer			Unit		Fiepareu	Analyzeu	Dirrac	
Gasoline	ND		0.25	0.050	mg/L			09/26/17 15:23	1	
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac	
4-Bromofluorobenzene (Surr)	93		58 - 133			-		09/26/17 15:23	1	
Trifluorotoluene (Surr)	98		77 - 128					09/26/17 15:23	1	

Lab Sample ID: 580-71583-2

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-257337/5 **Client Sample ID: Method Blank Matrix: Water** Prep Type: Total/NA Analysis Batch: 257337 MB MB Analyte **Result Qualifier** RL MDL Unit D Prepared Analyzed Dil Fac 2.0 Benzene ND 0.42 ug/L 09/26/17 12:12 1 MB MB Surrogate %Recovery Qualifier Limits Prepared Analyzed Dil Fac Trifluorotoluene (Surr) 113 74 - 123 09/26/17 12:12 1 Toluene-d8 (Surr) 91 79 - 122 09/26/17 12:12 1 4-Bromofluorobenzene (Surr) 104 78 - 119 09/26/17 12:12 1 Dibromofluoromethane (Surr) 105 70 - 120 09/26/17 12:12 1 1,2-Dichloroethane-d4 (Surr) 70 - 120 09/26/17 12:12 93 1

Lab Sample ID: LCS 580-257337/6 Matrix: Water Analysis Batch: 257337

			Spike	LCS	LCS				%Rec.	
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits	
Benzene			10.0	9.98		ug/L		100	37 - 151	
	LCS	LCS								
Surrogate	%Recovery	Qualifier	Limits							
Trifluorotoluene (Surr)	114		74 - 123							
Toluene-d8 (Surr)	91		79 - 122							
4-Bromofluorobenzene (Surr)	104		78_119							
Dibromofluoromethane (Surr)	104		70 - 120							
1,2-Dichloroethane-d4 (Surr)	92		70 - 120							

Lab Sample ID: LCSD 580-257337/7 Matrix: Water Analysis Batch: 257337

Client Sample ID: Lab Control Sample Prep Type: Total/NA

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

-			Spike	LCSD	LCSD				%Rec.		RPD
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Benzene			10.0	10.3		ug/L		103	37 - 151	3	30
	LCSD	LCSD									
Surrogate	%Recovery	Qualifier	Limits								
Trifluorotoluene (Surr)	113		74 - 123								
Toluene-d8 (Surr)	90		79 - 122								
4-Bromofluorobenzene (Surr)	102		78 - 119								
Dibromofluoromethane (Surr)	105		70 - 120								
1,2-Dichloroethane-d4 (Surr)	91		70 - 120								

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-257305/1-A Matrix: Water Analysis Batch: 257377							Client Samp	le ID: Methoo Prep Type: To Prep Batch: ∷	l Blank otal/NA 257305
	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		09/26/17 13:09	09/26/17 17:49	1
Chrysene	ND		0.60	0.010	ug/L		09/26/17 13:09	09/26/17 17:49	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		09/26/17 13:09	09/26/17 17:49	1

RL

1.0

0.60

1.0

1.0

Limits

60 - 135

MDL Unit

0.050 ug/L

0.020 ug/L

0.020 ug/L

0.050 ug/L

D

Prepared

Method: 625 - Semivolatile Organic Compounds (GC/MS) (Continued)

MB MB Result Qualifier

ND

ND

ND

ND

91

%Recovery

MB MB

Qualifier

Analysis Batch: 257377

Matrix: Water

Indeno[1,2,3-cd]pyrene

Dibenz(a,h)anthracene

Benzo[k]fluoranthene

Benzo[b]fluoranthene

Analyte

Surrogate

Terphenyl-d14

Lab Sample ID: MB 580-257305/1-A

Client Sample ID: Method Blank

09/26/17 13:09 09/26/17 17:49

09/26/17 13:09 09/26/17 17:49

Prep Type: Total/NA Prep Batch: 257305

Dil Fac

1

1

6

Prepared	Analyzed	Dil Fac
09/26/17 13:09	09/26/17 17:49	1
09/26/17 13:09	09/26/17 17:49	1

Prep Type: Total/NA

Analyzed

Prepared	Analyzed	Di
09/26/17 13:09	09/26/17 17:49	

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 580-257305/2-A **Matrix: Water** Analysis Batch: 257377

Analysis Batch: 257377							Prep Batch: 257305
	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Benzo[a]anthracene	2.00	2.08	J	ug/L		104	33 - 143
Chrysene	2.00	1.96		ug/L		98	17 - 168
Benzo[a]pyrene	2.00	2.15		ug/L		107	17 - 163
Indeno[1,2,3-cd]pyrene	2.00	2.01		ug/L		101	1 - 171
Dibenz(a,h)anthracene	2.00	2.30		ug/L		115	1 - 227
Benzo[k]fluoranthene	2.00	2.12		ug/L		106	11 - 162
Benzo[b]fluoranthene	2.00	2.10		ug/L		105	24 - 159

	LCS	LCS	
Surrogate	%Recovery	Qualifier	Limits
Terphenyl-d14	86		60 - 135

Lab Sample ID: LCSD 580-257305/3-A Matrix: Water

Analysis Batch: 257377 Prep Batch: 257305 Spike LCSD LCSD %Rec. RPD **Result Qualifier** Analyte Added Unit D %Rec Limits RPD Limit Benzo[a]anthracene 2.00 2.11 J ug/L 105 33 - 143 50 1 97 17 _ 168 **Б**О Chrysene 2.00 1.93 ug/L Benzo[a]pyrene 2.00 1.87 ug/L 2.00 ug/L Indeno[1,2,3-cd]pyrene 1.81 2.00 2.00 Dibenz(a,h)anthracene ug/L Benzo[k]fluoranthene 2.00 1.89 ug/L Benzo[b]fluoranthene 2.00 1.96 ug/L 98 24 - 159 7 50

	LCSD	LCSD	
Surrogate	%Recovery	Qualifier	Limits
Terphenyl-d14	82		60 - 135

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

97	17 - 100	I	50
93	17 - 163	14	50
91	1_171	10	50
100	1 _ 227	14	50
95	11 - 162	11	50

RL

0.25

MDL Unit

0.050 mg/L

D

Analysis Batch: 257293

Matrix: Water

Analyte

Gasoline

Lab Sample ID: MB 580-257293/6

Client Sample ID: Method Blank

Client Sample ID: Lab Control Sample

Client Sample ID: Lab Control Sample Dup

2 3 4 5 6

Prepared	Analyzed	Dil Fac	
	09/26/17 11:02	1	

Prep Type: Total/NA

Prep Type: Total/NA

Dil Fac

1

1

Prep Type: Total/NA

	MB	MB				
Surrogate	%Recovery	Qualifier	Limits		Prepared	Analyzed
4-Bromofluorobenzene (Surr)	93		58 - 133	-		09/26/17 11:02
Trifluorotoluene (Surr)	104		77 - 128			09/26/17 11:02

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

MB MB

ND

Result Qualifier

Lab Sample ID: LCS 580-257293/7 Matrix: Water

Analysis Batch: 257293									
-		Spike	LCS	LCS				%Rec.	
Analyte		Added	Result	Qualifier	Unit	D	%Rec	Limits	
Gasoline		1.00	0.901		mg/L		90	79 - 110	
	LCS LCS								
0	0/ D	1							

Surrogate	%Recovery	Qualifier	Limits
4-Bromofluorobenzene (Surr)	99		58 - 133
Trifluorotoluene (Surr)	99		77 - 128

Lab Sample ID: LCSD 580-257293/8 Matrix: Water

Analysis Batch: 257293 LCSD LCSD RPD Spike %Rec. Analyte Added Result Qualifier Unit D %Rec Limits RPD Limit Gasoline 1.00 0.895 mg/L 90 79 - 110 10 1 LCSD LCSD %Recovery Qualifier Surrogate Limits 4-Bromofluorobenzene (Surr) 99 58 - 133 Trifluorotoluene (Surr) 98 77 - 128

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-257 Matrix: Water Analysis Batch: 257364	′307/1-B						Client Samp	le ID: Methoc Prep Type: To Prep Batch: :	ethod Blank be: Total/NA tch: 257307			
	MB	MB										
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac			
#2 Diesel (C10-C24)	ND		0.10	0.019	mg/L		09/26/17 13:13	09/26/17 19:10	1			
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		09/26/17 13:13	09/26/17 19:10	1			
	MB	МВ										
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac			
o-Terphenyl	81		43 - 119				09/26/17 13:13	09/26/17 19:10	1			
n-Decanoic Acid (Surr)	0.00006		0 - 1				09/26/17 13:13	09/26/17 19:10	1			

6

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-2 Matrix: Water Analysis Batch: 257364	257307/2-B		Spike	LCS	LCS	Clie	nt Sai	nple ID	: Lab Cor Prep Tyj Prep Ba %Rec.	itrol Sa be: Tot itch: 28	imple al/NA 57307
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits		
#2 Diesel (C10-C24)			2.00	1.43		mg/L		72	59 - 112		
Motor Oil (>C24-C36)			2.00	1.74		mg/L		87	64 - 120		
	LCS	LCS									
Surrogate	%Recovery	Qualifier	Limits								
o-Terphenyl	77		43 - 119								
n-Decanoic Acid (Surr)	0.07		0 - 1								
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257364	-257307/3-B				C	Client Sa	mple	ID: Lat	Control Prep Tyj Prep Ba	Sample be: Tot itch: 25	e Dup al/NA 57307
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257364	-257307/3-B		Spike	LCSD	LCSD	Client Sa	mple	ID: Lat	Prep Typ Prep Ba %Rec.	Sample be: Tot itch: 28	e Dup al/NA 57307 RPD
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257364 Analyte	-257307/3-В		Spike Added	LCSD Result	C LCSD Qualifier	Client Sa Unit	i mple D	ID: Lak %Rec	Control S Prep Typ Prep Ba %Rec. Limits	Sample be: Tota itch: 28 RPD	e Dup al/NA 57307 RPD Limit
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257364 Analyte #2 Diesel (C10-C24)	-257307/3-B		Spike Added 2.00	LCSD Result 1.27	LCSD Qualifier	Unit mg/L	mple	ID: Lat %Rec 64	Control Prep Typ Prep Ba %Rec. Limits 59 - 112	Sample be: Tot itch: 28 <u>RPD</u> 12	e Dup al/NA 57307 RPD Limit 16
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257364 Analyte #2 Diesel (C10-C24) Motor Oil (>C24-C36)	-257307/3-B		Spike Added 2.00 2.00	LCSD Result 1.27 1.54	LCSD Qualifier	Unit mg/L mg/L	mple	NRec 64 77	Control S Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample be: Tot itch: 28 <u>RPD</u> 12 12	e Dup al/NA 57307 RPD Limit 16 17
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257364 Analyte #2 Diesel (C10-C24) Motor Oil (>C24-C36)	-257307/3-B	LCSD	Spike Added 2.00 2.00	LCSD Result 1.27 1.54	LCSD Qualifier	Unit mg/L mg/L	mple	ID: Lat <u>%Rec</u> <u>64</u> 77	Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample be: Tot itch: 28 <u>RPD</u> 12 12	Pup al/NA 57307 RPD Limit 16 17
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257364 Analyte #2 Diesel (C10-C24) Motor Oil (>C24-C36) Surrogate	-257307/3-B LCSD %Recovery	LCSD Qualifier	Spike Added 2.00 2.00 Limits	LCSD Result 1.27 1.54	LCSD Qualifier	Unit mg/L mg/L	mple	MRec 64 77	Control Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample be: Tota tch: 28 <u>RPD</u> 12 12	e Dup al/NA 57307 RPD Limit 16 17
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257364 #2 Diesel (C10-C24) Motor Oil (>C24-C36) Surrogate o-Terpheny/	-257307/3-B 	LCSD Qualifier	Spike Added 2.00 2.00 43 - 119	LCSD Result 1.27 1.54	LCSD Qualifier	Unit mg/L mg/L	<u> </u>	WRec 64 77	Control Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample be: Tota itch: 28 <u>RPD</u> 12 12	Dup al/NA 57307 RPD Limit 16 17

Client Sample ID: OUTFALL#002-092617 Date Collected: 09/26/17 08:45

Date Received: 09/26/17 12:00

Lab Sample ID: 580-71583-1 Matrix: Water

	Batch	Batch		Dilution	Batch	Prepared		
Prep Туре	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	257337	09/26/17 19:49	TL1	TAL SEA
Total/NA	Prep	CWA_Prep			257305	09/26/17 13:09	NDB	TAL SEA
Total/NA	Analysis	625		1	257377	09/26/17 19:03	CJ	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	257293	09/26/17 14:51	TL1	TAL SEA
Total/NA	Prep	3510C			257307	09/26/17 13:13	NDB	TAL SEA
Total/NA	Cleanup	3630C			257357	09/26/17 16:17	APR	TAL SEA
Fotal/NA	Analysis	NWTPH-Dx		1	257364	09/26/17 20:10	ADB	TAL SEA

Client Sample ID: TB-092617 (water)

Date Collected: 09/26/17 00:01 Date Received: 09/26/17 12:00

Lab Sample ID: 580-71583-2 Matrix: Water

-	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	257337	09/26/17 19:25	TL1	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	257293	09/26/17 15:23	TL1	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Client: ARCADIS U.S. Inc Project/Site: Edmonds Terminal TestAmerica Job ID: 580-71583-1

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	UST-022	03-02-18
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18
Sample Summary

Matrix

Water

Water

Lab Sample ID

580-71583-1

580-71583-2

Client Sample ID

TB-092617 (water)

OUTFALL#002-092617

09/26/17 08:45 09/26/17 12:00

09/26/17 00:01 09/26/17 12:00

Collected

5
8
9

Received

TestAmerica Seattle

TestAmerica The leader in environmental testing	TestAmerica Seattle 5755 8th Street E. Tacoma, WA 98424 Tel. 253-922-2310 Fax 253-922-5047 www.testamericainc.com	KRush Short Ho	old Chain of Custody	1Record
Client	Client Contact	I1.583	hate Chain of Cu. 7-7/2017	29431
Address	Telephone Number (Area Code)/Fax	Number	ab Number	4
City State Zip Code	Sampler - 128-9828	b Contact Analy	253-922-250 Page	<u>07</u> 5
Seattle WA 98101	Ryan Brauchti (RB) E	Elaine Walker 300	pace is needed)	6
Edmonds Terminal Edmonds	WA binning contact	LAH &	Sp	ecial Instructions/
Contract/Purchase Order/Quote No. BOO45362.0010	Matrix	Containers & THU	Co	nditions of Receipt
Sample I.D. and Location/Description (Containers for each sample may be combined on one line) Date	Little Advectors Sed. Soli Unpres.	H2S04 HCI Nach NW NW FPA 6		8
OUTFALL#002-092617 9-26-17	0845 X 2	8 XXXX	Email	results to 9
TB-092617 (wester) 9-26-17	- X	Z X X	rya.	y. brauchk@aradis.con
			sam	vel. miles@aradis.com
				H. zorn@aradu.com
			oph	elie.encelle@arcolis.com
			WBS	(ade i surface water
			NWEN	NPMG001430803
		TBA2_CoolerCo	r <u>0.5</u> Unc 1,2	
		Cooler Dsc Blue	@Lab	
		Wet/Packs Packing		
580-71	583 Chain of Custody		Veneral Put ob	
Cooler Possible Hazaro continuum X Yes □ No Cooler Temp: X Non-Hazaro □ Fil	ammable 🔲 Skin Irritant 🔲 Poisc	n B Unknown Return To Client A	rchive For Months are retai	ay be assessed if samples ned longer than 1 month)
Turn Around Time Required (business days)		QC Requirements (Specify)		
Cet Hours 48 Hours 5 Days 10 Days 15 Da Refeatures 18 Sign/Profile	/s Date Time	1. Received By Sign/Print	, Date	, Time
Apr W Jall Ryan Brauch	a 9-26-17 1030	ZZA/ Francisco	Lunc, Jr 9/20,	117 1030
2 Relifyuished By Sign/Print	Date Time 9/76/17 1715	2. Received By Sign/Print	Blankinship 19/21	6/17 1215
3. Relinquished By Sign/Print	Date	3. Received By Sign/Print	Date	Time
Comments		<u> </u>		l

Client: ARCADIS U.S. Inc

Login Number: 71583 List Number: 1 Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
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").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Job Number: 580-71583-1

List Source: TestAmerica Seattle



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Seattle 5755 8th Street East Tacoma, WA 98424 Tel: (253)922-2310

TestAmerica Job ID: 580-71756-1 Client Project/Site: Chevron Edmonds Terminal

For:

ARCADIS U.S. Inc 1100 Olive Way Suite 800 Seattle, Washington 98101

Attn: Samuel Miles

M. Elaine Walker

Authorized for release by: 10/4/2017 4:12:12 PM Elaine Walker, Project Manager II (253)248-4972 elaine.walker@testamericainc.com

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The

Expert

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.

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Job ID: 580-71756-1

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE Client: ARCADIS U.S. Inc Project: Chevron Edmonds Terminal Report Number: 580-71756-1

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

One sample was received on 10/3/2017 8:45 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was -0.5° C.

The Chain-of-Custody (COC) was incomplete as received and/or improperly completed. The Trip Blank was listed on the COC but no containers were received. The sample was not logged in.

Containers A-D for sample 1 did not have labels: Outfall #002-100217 (580-71756-1) Samples logged in per the COC.

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

VOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample Outfall #002-100217 (580-71756-1) was analyzed for volatile organic compounds (GC-MS) in accordance with EPA Method 624. The samples were analyzed on 10/04/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Sample Outfall #002-100217 (580-71756-1) was analyzed for semivolatile organic compounds (GC-MS) in accordance with EPA Method 625. The samples were prepared and analyzed on 10/03/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GASOLINE RANGE ORGANICS (GRO)

Sample Outfall #002-100217 (580-71756-1) was analyzed for gasoline range organics (GRO) in accordance with Method NWTPH-Gx. The samples were analyzed on 10/03/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

DIESEL AND MOTOR OIL RANGE ORGANICS

Sample Outfall #002-100217 (580-71756-1) was analyzed for diesel and motor oil range organics in accordance with Method

1 2 3 4 5 6 7 8 9 10

Job ID: 580-71756-1 (Continued)

Laboratory: TestAmerica Seattle (Continued)

NWTPH-Dx. The samples were prepared and analyzed on 10/03/2017.

Continuing calibration verification (CCV) recovered below %D control limits for o-Terphenyl surrogate. However, the CCV and all associated samples recovered within %R control limits; therefore, the data are qualified and reported.

A deviation from the Standard Operating Procedure (SOP) occurred. Details are as follows: The time between CCVs exceeded the 12 hour limit required by the SOP. However, this CCV window and the number of injections between CCVs (10) meet the NWTPH-DX method requirements.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

1 2 3 4 5 6 7

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
.1	Result is less than the l

Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

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)

RL

MDL Unit

D

Prepared

Date Collected: 10/02/17 12:15

Date Received: 10/03/17 08:45

Analyte

Client Sample ID: Outfall #002-100217

Method: 624 - Volatile Organic Compounds (GC/MS)

Result Qualifier

Lab Sample ID: 580-71756-1 Matrix: Water

Analyzed

5

Dil Fac

	8
	9

_	
C	
-	
1	

Benzene	ND		2.0	0.42	ug/L			10/04/17 13:59	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	107		74 - 123					10/04/17 13:59	1
Toluene-d8 (Surr)	99		79 - 122					10/04/17 13:59	1
4-Bromofluorobenzene (Surr)	101		78 - 119					10/04/17 13:59	1
Dibromofluoromethane (Surr)	106		70 - 120					10/04/17 13:59	1
1,2-Dichloroethane-d4 (Surr)	103		70 - 120					10/04/17 13:59	1
Method: 625 - Semivolatile	Organic Com	oounds (G	C/MS)						
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		10/03/17 10:10	10/03/17 18:27	1
Chrysene	ND		0.59	0.0099	ug/L		10/03/17 10:10	10/03/17 18:27	1
Benzo[a]pyrene	ND		0.99	0.020	ug/L		10/03/17 10:10	10/03/17 18:27	1
Indeno[1,2,3-cd]pyrene	ND		0.99	0.049	ug/L		10/03/17 10:10	10/03/17 18:27	1
Dibenz(a,h)anthracene	ND		0.59	0.020	ug/L		10/03/17 10:10	10/03/17 18:27	1
Benzo[k]fluoranthene	ND		0.99	0.020	ug/L		10/03/17 10:10	10/03/17 18:27	1
Benzo[b]fluoranthene	ND		0.99	0.049	ug/L		10/03/17 10:10	10/03/17 18:27	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Terphenyl-d14	84		60 - 135				10/03/17 10:10	10/03/17 18:27	1
Method: NWTPH-Gx - Nort	hwest - Volatil	e Petroleu	m Products	(GC)					
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.25	0.050	mg/L			10/03/17 12:19	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		58 - 133					10/03/17 12:19	1
Trifluorotoluene (Surr)	113		77 - 128					10/03/17 12:19	1

D Prepared Analyzed D	Jil Fac
<u> </u>	1
10/03/17 10:15 10/03/17 20:26	1
Prepared Analyzed D	Dil Fac
Prepared Analyzed D 10/03/17 10:15 10/03/17 20:26	Dil Fac
	<u> D Prepared Analyzed L 10/03/17 10:15 10/03/17 20:26 10/03/17 10:15 10/03/17 20:26 10/03/17 10:15 10/03/17 20:26 </u>

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-2	Client Sample ID: Me							l Blank		
Matrix: Water									Prep Type: To	otal/NA
Analysis Batch: 258049										
	М	в мв								
Analyte	Resu	It Qualifier	· RL		MDL Uni	t	DF	Prepared	Analyzed	Dil Fac
Benzene	N	D	2.0		0.42 ug/	<u> </u>			10/04/17 12:37	1
	М	B MB								
Surrogate	%Recover	y Qualifier	r Limits				F	Prepared	Analyzed	Dil Fac
Trifluorotoluene (Surr)	10	6	74 - 123						10/04/17 12:37	1
Toluene-d8 (Surr)	10	1	79 - 122						10/04/17 12:37	1
4-Bromofluorobenzene (Surr)	10	3	78 - 119						10/04/17 12:37	1
Dibromofluoromethane (Surr)	10	6	70 - 120						10/04/17 12:37	1
1,2-Dichloroethane-d4 (Surr)	10	1	70 - 120						10/04/17 12:37	1
Lab Sample ID: LCS 580-2	258049/6					CI	ient Sa	mple ID	: Lab Control S	Sample
Matrix: Water									Prep Type: To	otal/NA
Analysis Batch: 258049										
			Spike	LCS	LCS				%Rec.	
Analyte			Added	Result	Qualifie	r Unit	D	%Rec	Limits	
Benzene			10.0	10.4		ug/L		104	37 - 151	
	LCS L	cs								
Surrogate	%Recovery Q	ualifier	Limits							
Triffic and the last a (Occurr)	407		74 400							

Trifluorotoluene (Surr)	107	74 - 123
Toluene-d8 (Surr)	98	79 - 122
4-Bromofluorobenzene (Surr)	105	78_119
Dibromofluoromethane (Surr)	112	70 - 120
1,2-Dichloroethane-d4 (Surr)	102	70 - 120
—		

Lab Sample ID: LCSD 580-258049/7 Matrix: Water Analysis Batch: 258049

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

-			Spike	LCSD	LCSD				%Rec.		RPD
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Benzene			10.0	10.1		ug/L		101	37 - 151	2	30
	LCSD	LCSD									
Surrogate	%Recovery	Qualifier	Limits								
Trifluorotoluene (Surr)	108		74 - 123								
Toluene-d8 (Surr)	99		79 - 122								
4-Bromofluorobenzene (Surr)	99		78_119								
Dibromofluoromethane (Surr)	106		70 - 120								
1,2-Dichloroethane-d4 (Surr)	102		70 - 120								

Method: 625 - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-257888/1-A Matrix: Water Analysis Batch: 257956 MB MB							Client Samp	le ID: Method Prep Type: To Prep Batch: :	I Blank otal/NA 257888
	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzo[a]anthracene	ND		3.0	0.020	ug/L		10/03/17 10:10	10/03/17 16:23	1
Chrysene	ND		0.60	0.010	ug/L		10/03/17 10:10	10/03/17 16:23	1
Benzo[a]pyrene	ND		1.0	0.020	ug/L		10/03/17 10:10	10/03/17 16:23	1

TestAmerica Seattle

Method: 625 - Semivolatile Organic Compounds (GC/MS) (Continued)

MB MB

ND

ND

ND

ND

92

%Recovery

MB MB

Qualifier

Result Qualifier

Lab Sample ID: MB 580-257888/1-A

Matrix: Water

Indeno[1,2,3-cd]pyrene

Dibenz(a,h)anthracene

Benzo[k]fluoranthene

Benzo[b]fluoranthene

Analyte

Surrogate

Surrogate

Terphenyl-d14

Terphenyl-d14

Analysis Batch: 257956

Client Sample ID: Method Blank

Analyzed

Prep Type: Total/NA

Prep Batch: 257888

Prep Type: Total/NA

Dil Fac

1

1

6

10/03/17 10:10	10/03/17 16:23	1
10/03/17 10:10	10/03/17 16:23	1
Prepared	Analyzed	Dil Fac
10/02/17 10.10	10/00/17 10 00	

10/03/17 10:10 10/03/17 16:23

10/03/17 10:10 10/03/17 16:23

Client Sample ID: Lab Control Sample

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCS 580-257888/2-A Matrix: Water Analysis Batch 257956

Analysis Batch: 257956							Prep Batch: 257888
-	Spike	LCS	LCS				%Rec.
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits
Benzo[a]anthracene	2.00	1.77	J	ug/L		88	33 - 143
Chrysene	2.00	1.72		ug/L		86	17 - 168
Benzo[a]pyrene	2.00	1.90		ug/L		95	17 - 163
Indeno[1,2,3-cd]pyrene	2.00	1.75		ug/L		87	1 - 171
Dibenz(a,h)anthracene	2.00	1.96		ug/L		98	1 - 227
Benzo[k]fluoranthene	2.00	1.81		ug/L		90	11 - 162
Benzo[b]fluoranthene	2.00	1.87		ug/L		93	24 - 159

RL

1.0

0.60

1.0

1.0

Limits

60 - 135

MDL Unit

0.050 ug/L

0.020 ug/L

0.020 ug/L

0.050 ug/L

D

Prepared

	LCS	LCS	
Surrogate	%Recovery	Qualifier	Limits
Terphenyl-d14	83		60 - 135

%Recovery Qualifier

86

Lab Sample ID: LCSD 580-257888/3-A Matrix: Water

Prep Type: Total/NA Analysis Batch: 257956 **Prep Batch: 257888** Spike LCSD LCSD %Rec. RPD Analyte Added **Result Qualifier** Unit D %Rec Limits RPD Limit Benzo[a]anthracene 2.00 1.82 J ug/L 91 33 - 143 3 50 Chrysene 2.00 1.78 17 - 168 ug/L 89 4 50 ug/L Benzo[a]pyrene 2.00 1.94 97 17 - 163 2 50 ug/L 93 50 2.00 1.86 6 Indeno[1,2,3-cd]pyrene 1 - 171 2.00 2.03 102 1 - 227 50 Dibenz(a,h)anthracene ug/L 4 Benzo[k]fluoranthene 2.00 1.77 ug/L 89 11 - 162 2 50 Benzo[b]fluoranthene 2.00 2.02 ug/L 101 24 - 159 8 50 LCSD LCSD

Limits 60 - 135

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-257895/6

Matrix: Water

Analyte

Gasoline

Surrogate

Analyte

Gasoline

Surrogate

Trifluorotoluene (Surr)

Trifluorotoluene (Surr)

Matrix: Water

Analysis Batch: 257895

Client Sample ID: Method Blank

Prep Type: Total/NA

MB MB **Result Qualifier** RL MDL Unit D Prepared Analyzed Dil Fac 6 0.25 ND 0.050 mg/L 10/03/17 10:12 1 MB MB %Recovery Qualifier Limits Prepared Analyzed Dil Fac 4-Bromofluorobenzene (Surr) 93 58 - 133 10/03/17 10:12 1 104 77 - 128 10/03/17 10:12 1 Lab Sample ID: LCS 580-257895/7 **Client Sample ID: Lab Control Sample** Prep Type: Total/NA Analysis Batch: 257895 LCS LCS Spike %Rec. Added Result Qualifier Limits Unit D %Rec 1.00 0.892 89 79 - 110 mg/L LCS LCS %Recovery Qualifier Limits 4-Bromofluorobenzene (Surr) 58 - 133 99 101 77 - 128 Lab Sample ID: LCSD 580-257895/8 **Client Sample ID: Lab Control Sample Dup**

Prep Type: Total/NA

RPD

Limit

10

Matrix: Water Analysis Batch: 257895 LCSD LCSD Spike %Rec. Analyte Added **Result Qualifier** Unit D %Rec Limits RPD Gasoline 1.00 0.879 mg/L 88 79 - 110 2 LCSD LCSD Surrogate %Recovery Qualifier I imits 4-Bromofluorobenzene (Surr) 99 58 - 133 Trifluorotoluene (Surr) 98 77 - 128

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-257 Matrix: Water Analysis Batch: 257985	890/1-B						Client Samp	ele ID: Method Prep Type: To Prep Batch: 3	l Blank otal/NA 257890
	MB	МВ							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.10	0.019	mg/L		10/03/17 10:15	10/03/17 19:24	1
Motor Oil (>C24-C36)	ND		0.25	0.077	mg/L		10/03/17 10:15	10/03/17 19:24	1
	MB	MB							
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	76		43 - 119				10/03/17 10:15	10/03/17 19:24	1
n-Decanoic Acid (Surr)	0.00004		0 - 1				10/03/17 10:15	10/03/17 19:24	1

5

6

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCS 580-2 Matrix: Water Analysis Batch: 257985	257890/2-B		Spike	LCS	LCS	Clie	nt Sar	nple ID	: Lab Cor Prep Tyj Prep Ba %Rec.	ntrol Sa be: Tot ntch: 28	mple al/NA 57890
Analyte			Added	Result	Qualifier	Unit	D	%Rec	Limits		
#2 Diesel (C10-C24)			2.00	1.36		mg/L		68	59 - 112		
Motor Oil (>C24-C36)			2.00	1.63		mg/L		81	64 - 120		
	LCS	LCS									
Surrogate	%Recovery	Qualifier	Limits								
o-Terphenyl	70		43 - 119								
n-Decanoic Acid (Surr)	0		0 - 1								
Lab Sample ID: LCSD 580-257890/3-B Matrix: Water Analysis Batch: 257985											
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257985	-257890/3-B				C	lient Sa	mple	ID: Lat	Control Prep Tyj Prep Ba	Sample be: Tot atch: 25	e Dup al/NA 57890
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257985	-257890/3-B		Spike	LCSD	LCSD	lient Sa	mple	ID: Lat	Control Prep Typ Prep Ba %Rec.	Sample be: Tot itch: 28	e Dup al/NA 57890 RPD
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257985 Analyte	-257890/3-B		Spike Added	LCSD Result	C LCSD Qualifier	Unit	mple	ID: Lak	Prep Typ Prep Ba %Rec. Limits	Sample be: Tot itch: 28 	e Dup al/NA 57890 RPD Limit
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257985 Analyte #2 Diesel (C10-C24)	-257890/3-B		Spike Added 2.00	LCSD Result 1.34	LCSD Qualifier	Unit mg/L	mple	1D: Lak <u>%Rec</u> 67	Control S Prep Typ Prep Ba %Rec. Limits 59 - 112	Sample be: Tot ttch: 28 <u>RPD</u> 2	P Dup al/NA 57890 RPD Limit 16
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257985 Analyte #2 Diesel (C10-C24) Motor Oil (>C24-C36)	-257890/3-B		Spike Added 2.00 2.00	LCSD Result 1.34 1.61	C LCSD Qualifier	Unit mg/L mg/L	mple	1D: Lak %Rec 67 81	Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample be: Tota tch: 25 <u>RPD</u> 2 1	P Dup al/NA 57890 RPD Limit 16 17
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257985 Analyte #2 Diesel (C10-C24) Motor Oil (>C24-C36)	-257890/3-B	LCSD	Spike Added 2.00 2.00	LCSD Result 1.34 1.61	C LCSD Qualifier	Unit mg/L mg/L	mple	%Rec 67 81	Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample be: Tota ttch: 25 <u>RPD</u> 2 1	e Dup al/NA 57890 RPD Limit 16 17
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257985 Analyte #2 Diesel (C10-C24) Motor Oil (>C24-C36) Surrogate	-257890/3-B LCSD %Recovery	LCSD Qualifier	Spike Added 2.00 2.00 Limits	LCSD Result 1.34 1.61	C LCSD Qualifier	Unit mg/L mg/L	mple	%Rec 67 81	Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample be: Tot itch: 28 <u>RPD</u> 2 1	e Dup al/NA 57890 RPD Limit 16 17
Lab Sample ID: LCSD 580 Matrix: Water Analysis Batch: 257985 Analyte #2 Diesel (C10-C24) Motor Oil (>C24-C36) Surrogate o-Terphenyl	-257890/3-B 	LCSD Qualifier	Spike Added 2.00 2.00 <u>Limits</u> 43 - 119	LCSD Result 1.34 1.61	C LCSD Qualifier	Unit mg/L mg/L	mple	%Rec 67 81	Control Prep Typ Prep Ba %Rec. Limits 59 - 112 64 - 120	Sample be: Tot ttch: 25 <u>RPD</u> 2 1	e Dup al/NA 57890 RPD Limit 16 17

Lab Sample ID: 580-71756-1 Matrix: Water

Client Sample ID: Outfall #002-100217 Date Collected: 10/02/17 12:15 Date Received: 10/03/17 08:45

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	258049	10/04/17 13:59	IWH	TAL SEA
Total/NA	Prep	CWA_Prep			257888	10/03/17 10:10	MRG	TAL SEA
Total/NA	Analysis	625		1	257956	10/03/17 18:27	W1T	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	257895	10/03/17 12:19	RSB	TAL SEA
Total/NA	Prep	3510C			257890	10/03/17 10:15	MRG	TAL SEA
Total/NA	Cleanup	3630C			257963	10/03/17 15:41	JWL	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	257985	10/03/17 20:26	ADB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

TestAmerica Seattle

Client: ARCADIS U.S. Inc Project/Site: Chevron Edmonds Terminal TestAmerica Job ID: 580-71756-1

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	UST-022	03-02-18
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
US Fish & Wildlife	Federal		LE058448-0	10-31-18
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-18

TestAmerica Seattle

Sample Summary

Client: ARCADIS U.S. Inc Project/Site: Chevron Edmonds Terminal

TestAmerica Job ID: 580-71756-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-71756-1	Outfall #002-100217	Water	10/02/17 12:15	10/03/17 08:45

TestAmerica The leader in environmental testing	TestAmerica Seattle 5755 8th Street E. Tacoma, WA 98424 Tel. 253-922-2310 Fax 253-922-5047 www.testamericain	ic.com	Loc: 580 71756	Rush	lold C	hain of ustody Record	1
Address	Client Contact Ryan Tel <u>e</u> phóne Number (A	Area Code)/Fax	Number		Date 10/2/17 Lab Number	Chain of Custody Number 29429	
1100 Olive Way Shire 800	519-438-	-9828			153-922-2310	Page of	
City Code	JAMA Little	Lac E	Elaine Walker	Ana mor	e space is needed)	T	5
Project Name and Location (State) Edmod Terminal (WA)	Billing Contact		L	S S C C S		Special Instructions/	Ampliant G
Contract/Purchase Order/Quote No. BDO 45362, Op 10	Matri	ix	Containers & Preservatives	1911-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-			7
Sample I.D. and Location/Description (Containers for each sample may be combined on one line) Date	ed Time Hit Section 1	Soil Unpres.	H2S04 HNO3 HCI NaOH NaOH	N SAL			Alexandre Constanting
Outfall #202-100217 10/2/	17 1215 X	2	8	$\lambda \times \times \times$		Enal Results to:	ni-judenska
1B-01,2017 10/2/1	т X		4	× ×		ry An. broughly Dariadis in	N
						Somul Miles Barcolision	10
						oric Kruger Constiguion	1496 VALLA
						ophelle prelle Corrollium	Landay Adversaria
							Sarahan .
						MBS carle	ni m địn tược là
						NWEWP16001430803	and the participants of
			Cooler D	oolerCor sc <u>lg blue uMd</u> s Packing b	0.5 Unc <u>0.2</u> @Lab		lind, Mathalana and an an an Art of
580	-71756 Chain of Custody		Clidr	OP Custody Seal			o fond an Alman fond an
·							a yandi yaka yaka da ku
Cooler Possible Hazard Identi	ification] Flammable Skin Irritan:	t 🗀 Poisor	San NB□Unknown□	nple Disposal 🛛 🗔 Return To Client 🛛	Disposal By Lab Archive For Mon	(A fee may be assessed if samples ths are retained longer than 1 month)	a la contra
Turn fround Time Required (business days)		· 	QC Requirements (Specify)				or Alle (Learning
24 Hours □ 48 Hours □ 5 Days □ 10 Days □ Belionuideed Bus Sign/Print	15 Days Other	me	1. Received By—Sign/Prin.			Date , , Time	jaqueta nafyan
War/Jain Little			Mobice	Milton	mott	10/3/17 0845	ush eterreteden
2. Relfiguished By Sign/Print	Date	ime	2. Received By Sign/Prin.	t		Uate ' lime	ing to game mits to
3. Relinquished By Sign/Print	Date Ti	ime	3. Received By Sign/Prim			Date Time	showed of them and worst o

Comments

Client: ARCADIS U.S. Inc

Login Number: 71756 List Number: 1 Creator: Ponce-McDermott, Monica

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
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.	False	Refer to Job Narrative for details.
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	False	Refer to Job Narrative for details.
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").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Job Number: 580-71756-1

List Source: TestAmerica Seattle

APPENDIX M

Discharge Monitoring Reports





Discharge Monitoring Report (DMR)

Permittee: Former Unocal Edmonds Bulk Terminal

Permit Number: WA0991007 Facility County: Snohomish

Monitoring Period: 09/01/2017 - 09/30/2017

Receiving Waterbody: Shelleberger Creek Outfall: 002 - Willow Creek

Version: 1

	Monitoring	Flow Gallons/minute (gpm) Once per defined event Metered/Recorded	pH Standard Units Weekly Grab	Benzene Micrograms/L (ug/L) Weekly Grab	NWTPHGx Gasoline (NWTPH Gx)(volatile) Micrograms/L (ug/L) Weekly Grab	NWTPHDx Diesel (NWTPH Dx) (semi-volatile) Micrograms/L (ug/L) Weekly Grab	Polynuclear Aromatic Hydrocarbons (PAH) Carcinogenic PAHs Micrograms/L (ug/L) Weekly Calculated	Benzo(a)anthracene Micrograms/L (ug/L) Weekly Grab	Benzo(b)fluoranthene (3,4-Benzofluoranthene) Micrograms/L (ug/L) Weekly Grab	Benzo(k /luoranthene (11,12-benzofluoranthene) Micrograms/L (ug/L) Weekiy Grab	Chrysene Micrograms/L (ug/L) Weekly Grab	Benzo(a pyrene Micrograms/L (ug/L) Weekly Grab
1 E	Point											
1-F	9/1/17						U U	U U	U U			
2-Su	9/3/17	С	С	С	С	С	С	С	С	С	С	С
2-M	9/4/17					<u> </u>	<u> </u>	<u> </u>	<u> </u>			
2-T	9/5/17											
2-W	9/6/17											
2-Th	9/7/17											
2-F	9/8/17											
2-Sa	9/9/17											
3-Su	9/10/17					С						
3-M	9/11/17		8.17	< 0.42	< 0.050	< 0.019	0.0185	< 0.020	< 0.051	< 0.020	< 0.010	< 0.020
3-T	9/12/17	3.94										
3-W	9/13/17	10.93										
3-Th	9/14/17	13.64	7.40	< 0.42	< 0.050	J 0.050	0.0199	< 0.022	< 0.055	< 0.022	< 0.011	< 0.022
3-F	9/15/17	10.44										
3-Sa	9/16/17											
4-Su	9/17/17	12.04										
4-1VI 4 T	9/18/17	12.94	6.00	10.042	< 0.050	110.040	0.0190	< 0.021	< 0.052	+ 0.021	< 0.010	+ 0.021
4-1 4-\\\/	9/19/17	7.72	0.99	< 0.042	< 0.050	310.040	0.0169	< 0.021	< 0.052	< 0.021	< 0.010	< 0.021
- ••• 4-Th	9/21/17	6.68										
4-F	9/22/17	4,25										
4-Sa	9/23/17											
5-Su	9/24/17											
5-M	9/25/17	13.89										
5-T	9/26/17	7.34	8.02	< 0.042	< 0.050	< 0.019	0.0179	< 0.019	< 0.048	< 0.019	< 0.097	< 0.019
5-W	9/27/17	8.78										
5-Th	9/28/17	3.65										
5-F	9/29/17	8.60										
5-Sa	9/30/17											
Dails	/ Minimum											
Dany	, ann ann		>= 6.0 (RO)									
Daily	Maximum	13.89	8.17	0.42	0.05	0.05	0.0189	0.022 Report Only	0.055 Report Only	0.022 Report Only	0.097 Report Only	0.022 Report Only
		<= 15 (KU)	<= 9.0 (RO)	<= 10 (KU)	<= 000 (KU)	<= 500 (KO)	<= 0.05 (KO)	Report Only	Report Only	Report Only	Report Only	Report Only

Reporting Codes Used: B - Below Detection Limit/No Detection, C - No Discharge, J - Estimated Value/Below Quantitation Limit

Overall DMR Notes/Comment

Discharge of the dewatering system began on 9/12/17. The minimum detection limit is reported for all non-detects.

	Monitoring	Dibenzo(a,h)anthracene Micrograms/L (ug/L) Weekiy Grab	Indeno(1,2,3-cd)pyrene Micrograms/L (ug/L) Weekiy Grab	Chitosan Acetate Yes/No Weekiy Grab	Flow Gallons/minute (gpm) Wetered/Recorded	pH Standard Units Weekly Grab	Benzene Micrograms/L (ug/L) Weekly Grab	NWTPHGx Gasoline (NWTPH Gx) (volatile) Micrograms/L (ug/L) Weekly Grab	NWTPHDx Diesel (NWTPH Dx)(semi-volatile) Micrograms/L (ug/L) Weekly Grab	Polynuclear Aromatic Hydrocarbons (PAH) Carcinogenic PAHs Micrograms/L (ug/L) Weekly Calculated	Benzo (a)anthracene Micrograms/L (ug/L) Weekiy Grab	Benzo(b)fluoranthene (3,4-Benzofluoranthene) Micrograms/L (ug/L) Weekiy Grab
Week	Point	DE1	DE1	DE1	DPE	DPE	DPE	DPE	DPE	DPE	DPE	DPE
1-F	9/1/17	С	С	С								
1-Sa	9/2/17											
2-Su	9/3/17	С	С	С								
2-IVI	9/4/17											
2-1	9/0/17											
2-VV 2 Th	9/0/17											
2-111 2-F	9/8/17											
2-5a	9/9/17											
3-Su	9/10/17											
3-M	9/11/17	< 0.020	< 0.051	No								
3-T	9/12/17											
3-W	9/13/17											
3-Th	9/14/17	< 0.022	< 0.055	No								
3-F	9/15/17											
3-Sa	9/16/17											
4-Su	9/17/17											
4-M	9/18/17											
4-T	9/19/17	< 0.021	< 0.052	NO								
4-W	9/20/17											
4-Th	9/21/17											
4-F	9/22/17											
4-Sa	9/23/17											
5-Su	9/24/17											
5-M	9/25/17											
5-T	9/26/17	< 0.019	< 0.048	No								
5-W	9/27/17											
5-Th	9/28/17											
5-F	9/29/17											
5-Sa	9/30/17											
Dail	Minimum											
Daily	y wiminum					>= 6.0 (RO)						
Dail	/ Maximum	0.022	0.055	No							С	С
Daily		Report Only	Report Only	<= 0 (RO)	<= 100 (RO)	<= 9.0 (RO)	<= 16 (RO)	<= 800 (RO)	<= 500 (RO)	<= 0.05 (RO)	Report Only	Report Only

Week	Monitoring Point	Benzo(k //luoranthene (11,12-benzofluoranthene Micrograms/L (ug/L) Grab	Chrysene Micrograms/L (ug/L) Grab	Benzo(a)pyrene Micrograms/L (ug/L) Grab	Dibenzo(a,h)anthracene Micrograms/L (ug/L) Meekly Grab	Indeno(1,2,3-cd/pyrene Micrograms/L (ug/L) Meekly Grab	Chitosan Acetate Yes/No Grab
1-F	9/1/17						
1-Sa	9/2/17			1	1	1	
2-Su	9/3/17						
2-M	9/4/17						
2-T	9/5/17						
2-W	9/6/17						
2-Th	9/7/17						
2-F	9/8/17						
2-Sa	9/9/17						
3-Su	9/10/17						
3-M	9/11/17						
3-T	9/12/17						
3-W	9/13/17						
3-Th	9/14/17						
3-F	9/15/17						
3-Sa	9/16/17						
4-Su	9/17/17						
4-M	9/18/17						
4-T	9/19/17						
4-W	9/20/17						
4-Th	9/21/17						
4-F	9/22/17			ļ	ļ	ļ	
4-Sa	9/23/17				ļ		
5-Su	9/24/17						
5-M	9/25/17						
5-1	9/26/17			ļ			
5-W	9/27/17			ļ			
5-1h	9/28/17						
5-F	9/29/17						
o-Sa	9/30/17						
Daily	y Minimum						

Daily Maximum

С

С

С

Report Only Report Only Report Only Report Only

С

С

С

<= 0 (RO)

Т

т

Т



Washington State Department of Ecology Discharge Monitoring Report (DMR)

Page: 4 of 4

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Garrick Jauregui

10/26/2017 9:10:03 AM

Signature

Date



Discharge Monitoring Report (DMR)

Permittee: Former Unocal Edmonds Bulk Terminal

Permit Number: WA0991007 Facility County: Snohomish

Monitoring Period: 10/01/2017 - 10/31/2017

Receiving Waterbody: Shelleberger Creek Outfall: 002 - Willow Creek

Version: 1

	Monitoring	Flow Gallons/minute (gpm) Once per defined event Metered/Recorded	pH Standard Units Weekly Grab	Benzene Micrograms/L (ug/L) Weekly Grab	NWTPHGx Gasoline (NWTPH Gx)(volatile) Micrograms/L (ug/L) Weekly Grab	NWTPHDx Diesel (NWTPH Dx) (semi-volatile) Micrograms/L (ug/L) Weekly Grab	Polynuclear Aromatic Hydrocarbons (PAH) Carcinogenic PAHs Micrograms/L (ug/L) Weekly Calculated	Benzo(a)anthracene Micrograms/L (ug/L) Weekly Grab	Benzo(b)fluorarthene (3,4-Benzofluorarthene) Micrograms/L (ug/L) Weekly Grab	Benzo(k /luoranthene (11,12-benzofluoranthene) Micrograms/L (ug/L) Weekly Grab	Chrysene Micrograms/L (ug/L) Weekly Grab	Benzo(a pyrene Micrograms/L (ug/L) Veekiy Grab
week	Point											
1-Su	10/1/17	0.00	7.0				0.00755					
1-M	10/2/17	8.62	7.3	B 0.42*	BI0.050*	B 0.019*	0.00755	B 0.020*	В 0.049	B 0.020*	BI0:0098	B 0.020*
1-1	10/3/17											
1-VV	10/4/17											
1-111 1-E	10/5/17											
1-Sa	10/7/17											
2-Su	10/8/17											
2-M	10/9/17											
2-T	10/10/17	С	С	С	С	С	С	С	С	С	С	С
2-W	10/11/17								-			
2-Th	10/12/17											
2-F	10/13/17											
2-Sa	10/14/17											
3-Su	10/15/17	С	С	С	С	С	С	С	С	С	С	С
3-M	10/16/17											
3-T	10/17/17											
3-W	10/18/17											
3-Th	10/19/17											
3-F	10/20/17											
3-Sa	10/21/17											
4-Su	10/22/17	С	С	С	С	С	С	С	С	С	С	С
4-M	10/23/17											
4-T	10/24/17											
4-W	10/25/17											
4-Th	10/26/17											
4-F	10/27/17											
4-Sa	10/28/17											
5-Su	10/29/17	С	С	С	С	С	С	С	С	С	С	С
5-M	10/30/17											
5-T	10/31/17											
Daily	Minimum		7.3									
Daily	,		>= 6.0 (RO)									
Daily	/ Maximum	8.62	7.3	B 0.42	B 0.050	B 0.019	0.00755	B 0.020	B 0.049	B 0.020	B 0.0099	B 0.020
		<= 15 (RO)	<= 9.0 (RO)	<= 16 (RO)	<= 800 (RO)	<= 500 (RO)	<= 0.05 (RO)	Report Only	Report Only	Report Only	Report Only	Report Only

Reporting Codes Used: B $\,$ - Below Detection Limit/No Detection, C $\,$ - No Discharge

Overall DMR Notes/Comment

No discharge weeks 2 through 5.

					Discria	vischarge monitoring Report (DMR)				
	16	8				(volatile)	emi-volatile)	Hydrocarbons (PA H)	(3.4-Benzofluoranthene)	

	Monitoring	Dibenzo(a,h)anthracene Micrograms/L (ug/L) Weekly Grab	Indeno(1,2,3-cd/pyrene Micrograms/L (ug/L) Weekly Grab	Chitosan Acetate Yes/No Weekly Grab	Flow Gallons/minute (gpm) Wetered/Recorded	pH Standard Units Weekly Grab	Benzene Micrograms/L (ug/L) Weekly Grab	NWTPHGx Gasoline (NWTPH Gx) (volatil Micrograms/L (ug/L) Weekly Grab	NWTPHDx Diesel (NWTPH Dx)(semi-vola Micrograms/L (ug/L) Weekly Grab	Polynuclear Aromatic Hydroc: Carcinogenic PA Hs Wicrograms/L (ug/L) Weekly Calculated	Benzo[a]anthracene Micrograms/L (ug/L) Weekly Grab	Benzo(b)fluoranthene (3,4-Be; Micrograms/L (ug/L) Weekly Grab
Week	Point	DE1	DE1	DE1	DPE	DPE	DPE	DPE	DPE	DPE	DPE	DPE
1-Su	10/1/17											
1-M	10/2/17	B 0.020	B 0.049*	no								
1-T	10/3/17											
1-W	10/4/17											
1-Th	10/5/17											
1-F	10/6/17											
1-Sa	10/7/17											
2-Su	10/8/17											
2-M	10/9/17											
2-T	10/10/17	С	С	С								
2-W	10/11/17											
2-Th	10/12/17											
2-F	10/13/17											
2-Sa	10/14/17											
3-Su	10/15/17	С	С	С								
3-M	10/16/17											
3-T	10/17/17											
3-W	10/18/17											
3-Th	10/19/17											
3-F	10/20/17											
3-Sa	10/21/17											
4-Su	10/22/17	С	С	С								
4-M	10/23/17											
4-T	10/24/17											
4-W	10/25/17											
4-Th	10/26/17											
4-F	10/27/17											
4-Sa	10/28/17											
5-Su	10/29/17	C	C	C								
5-M	10/30/17											
5-T	10/31/17											
Daily	Minimum					>= 6.0 (RO)						
		BI0 020	BI0 040	Blac								
Daily	Maximum	Report Only	Report Only		<- 100 (PO)		<- 16 (PO)	<- 800 (PO)	<- 500 (PO)		Report Only	Report Only
		Teport Only	Teport Only	$\zeta = 0 (RO)$	<= 100 (KO)	<= 9.0 (KU)	<= 10 (KU)	<= 000 (KU)	<= 300 (KU)	<= 0.05 (KO)	Report Only	Teport Only

	Monitoring	Benzo(k)fluoranthene (11,12-benzofluora Micrograms/L (ug/L) Weekly Grab	Chrysene Micrograms/L (ug/L) Weekly Grab	Benzo(a)pyrene Micrograms/L (ug/L) Weekly Grab	Dibenzo(a,h)anthracene Micrograms/L (ug/L) Weekly Grab	Indeno(1,2,3-cd/pyrene Micrograms/L (ug/L) Weekly Grab	Chitosan Acetate Yes/No Weekly Grab
Week	Point	DPE	DPE	DPE	DPE	DPE	DPE
1-Su	10/1/17						
1-M	10/2/17						
1-1	10/3/17						
1-VV	10/4/17						
1-111	10/5/17						
1-52	10/7/17						
2-Su	10/8/17						
2-00 2-M	10/9/17						
2-T	10/10/17						
2-W	10/11/17						
2-Th	10/12/17						
2-F	10/13/17						
2-Sa	10/14/17						
3-Su	10/15/17						
3-M	10/16/17						
3-T	10/17/17						
3-W	10/18/17						
3-Th	10/19/17						
3-F	10/20/17						
3-Sa	10/21/17						
4-Su	10/22/17						
4-M	10/23/17						
4-T	10/24/17						
4-W	10/25/17						
4-Th	10/26/17						
4-F	10/27/17						
4-Sa	10/28/17						
5-Su	10/29/17						
о-іvі 5 т	10/30/17						
5-1	10/31/17						
Daily	/ Minimum						
Daily	Maximum						
		Report Only	Report Only	Report Only	Report Only	Report Only	<= 0 (RO)



Outfall: 002 - Willow Creek

Monitoring Point	Parameter	Sample Date/ Statistical Base	Value	Notes/Comment
DE1	Benzene Not Applicable Micrograms/L (ug/L)	10/2/2017	B 0.42	MDL
DE1	Petroleum Hydrocarbons Gasoline (NWTPH Gx) (volatile) Micrograms/L (ug/L)	10/2/2017	B 0.050	MDL
DE1	Petroleum Hydrocarbons Diesel (NWTPH Dx) (semi- volatile) Micrograms/L (ug/L)	10/2/2017	B 0.019	MDL
DE1	Benzo[a]anthracene Not Applicable Micrograms/L (ug/L)	10/2/2017	B 0.020	MDL
DE1	Benzo(k)fluoranthene (11,12- benzofluoranthene) Not Applicable Micrograms/L (ug/L)	10/2/2017	B 0.020	MDL
DE1	Benzo(a)pyrene Not Applicable Micrograms/L (ug/L)	10/2/2017	B 0.020	MDL
DE1	Indeno(1,2,3-cd)pyrene Not Applicable Micrograms/L (ug/L)	10/2/2017	B 0.049	MDL
DPE	All Parameters		С	

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Garrick Jauregui

11/17/2017 2:40:44 PM

Signature

Date

APPENDIX N

Compaction Testing Forms



Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Client:	Entact	Date:	September 28, 2017
Address:	2873 W Hardies Road Suite 300	Project:	DB-2 Excavation
	Gibsonia, PA 15044	Project #:	17B196
Attn:	James Curl		B17-1008
Revised on:		Sample date:	September 26, 2017

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results	Test(s) Performed:	Test Results
Χ	Sieve Analysis	See Report	Sulfate Soundness	
X	Proctor	124.0 pcf at 7.2%	Bulk Density & Voids	
	Sand Equivalent		WSDOT Degradation	
	Fracture Count			
	Moisture Content			
	Specific Gravity, Coarse			
	Specific Gravity, Fine			
	Hydrometer Analysis			
	Atterberg Limits			

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted, Cheryl Meredith WABO Supervising Laboratory Technician

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980 Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974 Visit our website: www.mtc-inc.net Visit our website: Www.mtc-inc.net

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting



Sieve Report

Project: Project #: Client: Source: Sample#:	DB-2 Excavatio 17B196 Entact OSSP - "Vadase B17-1008	on en"		Date Received Sampled By Date Tested Tested By	ASTM D-24 SW-SM, Wel Sample Colo gray	87 Unified Soils Classification Sys Il-graded Sand with Silt or:	tem	
				ASTM D-2216,	ASTM D-2419	9, ASTM D-4318, AST	TM D-5821	
Specifications No Specs Sample Meets Specs ? N/A			' N/A		Du	$\begin{array}{llllllllllllllllllllllllllllllllllll$	% Gravel = 7.1% % Sand = 87.1% % Silt & Clay = 5.8% Liquid Limit = n/a Plasticity Index = n/a Sand Equivalent = n/a Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a	Coeff. of Curvature, $C_C = 1.22$ Coeff. of Uniformity, $C_U = 8.50$ Fineness Modulus = 3.57 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
			I		ASTM C-136	, ASTM D-6913		
		Actual	Interpolated				Grain Size Distribution	
Storro	Sizo	Cumulative	Cumulative	Speed	Space			
JIS	Metric	Percent	Percent	Specs	Specs	8 10	6 4 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	##100 ##1100 2001
12.00"	300.00	1 assing	100%	100.0%	0.0%	100% 🍬 🔶	*-*	100.0%
10.00"	250.00		100%	100.0%	0.0%	-		
8.00"	200.00		100%	100.0%	0.0%	90%		90.0%
6.00"	150.00		100%	100.0%	0.0%	-		
4.00"	100.00		100%	100.0%	0.0%	-		
3.00"	75.00		100%	100.0%	0.0%	80%		80.0%
2.50"	63.00		100%	100.0%	0.0%	-		
2.00"	50.00		100%	100.0%	0.0%	70%		70.0%
1.75"	45.00		100%	100.0%	0.0%	-		
1.50"	37.50		100%	100.0%	0.0%	-		
1.25"	31.50		100%	100.0%	0.0%	60%		60.0%
1.00"	25.00		100%	100.0%	0.0%	buiss.		build
3/4"	19.00		100%	100.0%	0.0%	8 50%		50.0% ×
5/8"	16.00		100%	100.0%	0.0%			
1/2"	12.50	100%	100%	100.0%	0.0%			
3/8"	9.50	100%	100%	100.0%	0.0%	40%		40.0%
1/4"	6.30	020/	95%	100.0%	0.0%	-		
#4	4.75	93%	93%	100.0%	0.0%	30%	IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	30.0%
#ð #10	2.30	60%	04% 60%	100.0%	0.0%			
#10 #16	2.00	00%	00% /1%	100.0%	0.0%			
#10 #20	0.850	33%	41 %	100.0%	0.0%	20%	── <u> </u>	20.0%
#30	0.600	5570	24%	100.0%	0.0%		N	
#40	0.425	18%	18%	100.0%	0.0%	10%		10.0%
#50	0.300	10/0	13%	100.0%	0.0%			
#60	0.250	10%	10%	100.0%	0.0%			
#80	0.180		8%	100.0%	0.0%	0% 🗪	<u>e el⊎e be el le bil e</u> el le de ele el le de ele ele de	0.100 0.010 0.001
#100	0.150	8%	8%	100.0%	0.0%		· · · · · · · · · · · · · · · · · · ·	
#140	0.106		7%	100.0%	0.0%		Particle Size (mm)	
#170	0.090		6%	100.0%	0.0%			
#200	0.075	5.8%	5.8%	100.0%	0.0%	+ Sieve Sizes	Min Specs	Specs Sieve Results
Copyright	Spears Engineering & Tec	hnical Services PS, 1996-	98					

Comments:

Reviewed by:

Cheryl Meredith

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Proctor Report

Р	roject: D	DB-2 Excavati	on	Date Received	: 26-Sep-17	Unified	Soils Classi	ification System	, ASTM D-2487		А	STM C-1	36	
Pro	ject #: 1	7B196		Sampled By	: J. Butorac	SW-SM	, Well-grade	ed Sand with Silt		Sieve	Size	Percent	Specifi	cations
	Client: E	Entact		Date Tested	: 27-Sep-17	Sample	Color			US	mm	Passing	Max	Min
S	ource: C	OSSP - "Vadas	sen"	Tested By	: M. Carrillo	gray				12.00"	300.00		100.0 %	0.0 %
Sar	nple#: B	817-1008	~							10.00"	250.00		100.0 %	0.0 %
			Sample Prepared	: Moist	:: X		Manu	ial:		8.00"	200.00		100.0 %	0.0 %
			T		/ :				\mathbf{M}_{1}	6.00	150.00		100.0 %	0.0 %
			Test Standard	ASTM D 1557): V. V	F A	ASHIU I Y	99: •^.	Method	4.00"	100.00		100.0 %	0.0 %
	A	ISp. Cr	Doint	ASIM D 1557		A	ASHIUII	80: noonnootod Droo	A ton Volue	3.00	/5.00 62.00		100.0 %	
1		60 GF.	r onn Number	Moisture	Dry Density		May	Dry Density	Ontimum Moist	2.30	50.00		100.0 %	0.0 %
			1	16%	117.6		121 8	lbs/ft ⁵	77%	1.75"	45.00		100.0 %	0.0 %
			1	4.0 %	121.5		121.0	105/10	7.7 /0	1.75	37.50		100.0 %	0.0 %
	XЛ		2 3	85%	121.5		Value v	v/ Oversize Cori	ection Annlied	1.50	31.50		100.0 %	0.0 %
			4	10.6 %	118.2		Max	Dry Density	Ontimum Moist	1.25	25.00		100.0 %	0.0 %
	CRED	ITED		10.0 /0	110.2		124.0	lbs/ft ³	7.2%	3/4"	19.00		100.0 %	0.0 %
Certifica	ite #: 1366.01, 1	366.02								5/8"	16.00		100.0 %	0.0 %
										1/2"	12.50	100 %	100.0 %	0.0 %
(Moisture l	Density Relatio	nship				3/8"	9.50	100 %	100.0 %	0.0 %
:	^{130.0} T									1/4"	6.30		100.0 %	0.0 %
	128.0									#4	4.75	93 %	100.0 %	0.0 %
	128.0									#8	2.36		100.0 %	0.0 %
i	126.0									#10	2.00	60 %	100.0 %	0.0 %
ity										#16	1.18		100.0~%	0.0 %
ens	124.0									#20	0.850	33 %	100.0~%	0.0 %
L I I	122.0 -			~						#30	0.600		100.0 %	0.0 %
Ā				•						#40	0.425	18 %	100.0 %	0.0 %
	120.0									#50	0.300		100.0 %	0.0 %
:	118.0									#60	0.250	10 %	100.0 %	0.0 %
		~								#80	0.180	0.04	100.0 %	0.0 %
1	116.0 + 2 • • • 4%	5% 6	% 7% 8%	6 9% 10	% 11%	12%	13% 14%	6 15% 1	6% 17% 18%	#100	0.150	8 %	100.0 %	0.0 %
				Per	cent Moisture					#140 #170	0.106		100.0 %	0.0 %
					٠	Data Points	:	Zero Air Voids Curve	Curve Fit	#170	0.090	5804	100.0 %	0.0 %
						I	Sno	os. No Space		#200	0.075	J.8 /0	100.0 /0	0.0 /0
		ASTM D-4	718, Misc. Oversi	ze Correction Va	lues		spe	cs. No specs				MIEE	s specs.	IN/A
			9	6 Oversize Mat'l	: 7%			% Gra	vel: 7.1%	C _c :	1.22		D(10):	0.235
% Ove	ersize	Corrected	Optimum					% S	and: 87.1%	C _U :	8.50		$D_{(30)}$:	0.755
Reta	ined	Density	Moisture					% Silt&C	lay: 5.8%	FM:	3.57		$D_{(60)}$:	1.993
59	6	123.4	7.3%						, i construction of the second s				(00)	
10	%	125.0	7.0%						LL: n/a	PL:	n/a		PI:	n/a
15	%	126.6	6.6%											
20	%	128.2	6.3%					Sand Equival	ent: n/a	Req'	d Sand E	quivalent:		
25	%	129.9	5.9%							1				
30	%	131.7	5.5%					Fracture %, 1 F	ace: n/a	Req'd H	Fracture %	6, 1 Face:		
	Copyright Sp	pears Engineering & Te	echnical Services PS, 1996-98				F	racture %, 2+ Fa	ces: n/a	Req'd Fra	cture %,	2+ Faces:		
All results ap written appr	oply only to ac	ctual locations and mat	erials tested. As a mutual prote	ection to clients, the public an	d ourselves, all reports are	e submitted as t	he confidential prop	erty of clients, and authoriz	ation for publication of statements,	conclusions or e	extracts from or	regarding our re	eports is reserved	d pending our

Comments:

Reviewed by:

Cheryl Meredith

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DB-2 Excavation - 17	3196 - IPD-Soil Compaction: Repor	t #D39883	-
CLIENT PROJECT LOCATION	Entact 11720 Unaco Road Edmonds WA 98020	DATE PERMIT #	10/10/2017
Inspection Informatio	on:		
Inspection Date: 10/10/2017	Time Onsite: 10:30 AM Weather Conditions:	Cloudy, 60*F, Dry	
Inspection Performed:	IPD-Soil Compaction		
Field Data:			
Work / Location:	Western Pad	Gauge Standard MS	: 763

	Sample #: Description:	Proctor Value(pcf):	Optimum Moisture and Oversize Rock Correction:
1.	B17-1008 SW-SM, Well graded SAND with SILT	124.0	7.2% OM. 7.0% ORC

TEST	METHOD
------	--------

ASTM D-1557 /AASHTO T-180

In Place Density Test Results (ASTM D-6938):

Test #	Mode / Depth	Location of Test	Elev.	Wet Dens.	Dry Dens.	Moist %	Sample #	% Comp.	% Reqd.
1	12"	North End	-3.5' BFG	129.4	123.6	4.7	1	99.7	90
2	12"	Central	-3.5' BFG	132.7	123.8	7.2	1	99.8	90
3	12"	South End	-3.5' BFG	130.7	123.9	5.5	1	99.9	90
Nativ	ve Soils	Soils consistent with Procto	or			• Ye	s O No		
☑ Imported Fills Soils found to be firm an		Soils found to be firm and s	stable; and	to the best o	of our	• Ye	s O No		
		knowledge, meet compaction Contractor notified of result	on ts			• Ye	s O No		

Remarks:

MTC onsite at the contractors request for in place density testing of imported fill. Compaction efforts were concluded prior to the arrival of MTC.

All areas tested met or exceeded 90% compaction as required by plan specifications.

Images:

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Image is oriented north

REPORTED BY: Kevin Parine REVIEWED BY: Kevin Walters, Project Manager

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Ma	teria	ls [C C		ultir mental Const	ıg,]	[nc.		
			Engineered Assur	ance Since I	981				Materials Tending &	Canal and a start
DB-2 E	Excavation	- 17E	3196 - IPD-Soil Co	mpacti	on: Rej	port #D3	39903			•
CLIEN	T		Entact]	DATE		10/11/20)17
PROJE	ECT LOCAT	ΓΙΟΝ	11720 U Edmon]	PERMIT #					
Inspec	ction Infor	matio	n:							
Inspectio	on Date: 10/11/2	2017	Time Onsite: 02:00 PM	Weathe	r Conditio	ns: Sunny	, 70*F, Dry	7		
Inspectio	on Performed:		IPD-Soil Compaction							
Field I	Data:									
Work / L	ocation:		West Pad				Gauge Standard MS:			589
Equipme	ent ID & Serial	#:	CPN MC-1, Ser. #MD50302505				Gauge Standard DS: 7558			
Test S	amples:									
Sample	e #: Description	1:]	Proctor Va	lue(pcf): O	ptimum M	oisture and	d Oversize R	ock Corre	ction:
1. B17-10	008 SW-SM, W	ell grade	ed SAND with SILT	124	.0 7	.2% OM, 7.	0% ORC			
TEST MI	ETHOD		ASTM D-1	557 / A A	SHTO Т.	.180				
In Plac	ce Density	Test	Results (ASTM D	-6938):	51110 1	100				
Test #	Mode / Depth		Location of Test	Elev.	Wet Dens.	Dry Dens.	Moist %	Sample #	% Comp.	% Reqd.
1	12" S	South		-3' BFG	129.5	123	5.3	1	99.2	90
2	12" N	North		-3' BFG	127.5	121.9	4.6	1	98.3	90

	lative Soils	Soils consistent with Proctor	۲	Yes	0	No	
🛛 Ii	nported Fills	Soils found to be firm and stable; and to the best of our	۲	Yes	0	No	
		knowledge, meet compaction					
		Contractor notified of results	۲	Yes	0	No	

Remarks:

MTC onsite at the contractors request for in place density testing of imported fill. Compaction efforts were concluded prior to the arrival of MTC.

All areas tested met or exceeded 90% compaction as required by plan specifications.

Images:

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Oriented North

REPORTED BY: Kevin Parine REVIEWED BY: Kevin Walters, Project Manager

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Ma	teria ical Engineering	ls '	Testing of Special Inspection • N	& Co		ultin mental Conse	ıg,]	[nc.		
			Engineered As	surance Since I	981				Relative Testing	A Counting in
DB-2 E	Excavatio	n - 17l	B196 - IPD-Soil C	compacti	on: Re	port #D	39918			
CLIEN	T		Entac	t			DATE		10/12/2	.017
PROJECT LOCATION			11720 Edmo) Unaco Ro nds WA 98	oad 8020		PERMIT	Γ#		
Inspe	ction Info	rmatio	on:							
Inspectio	on Date: 10/12	2/2017	Time Onsite: 2:30 PM	Weather	Condition	s: Rainy,	50s, wet			
Inspectio	on Performed:	:	IPD-Soil Compaction							
Field I	Data:									
Work / L	location:		West Pad	West Pad					: 7	65
Equipme	ent ID & Seria	ւl #:	Instrotek 3500, Ser. #12	Instrotek 3500, Ser. #1241					: 2	249
Test S Sample	amples: e #: Descriptio	on:		Proctor Va	lue(pcf): C)ptimum M	oisture and	d Oversize F	Rock Corr	ection:
1. B17-10	008 SW-SM, V	Well grad	d SAND with SILT 124.0 7.2% OM,				7.0% ORC			
test Mi In Plac	етно д ce Densit	y Test	⊠ ASTM D• Results (ASTM	-1557 /AA D-6938):	SHTO T	-180				
Test #	Mode / Depth		Location of Test	Elev.	Wet Dens	. Dry Dens.	Moist %	Sample #	% Comp	. % Reqd
1	12"	South		-1' BFG	125.1	119.7	4.5	1	96.5	90
2	12"	North		-1' BFG	124.7	118.1	5.6	1	95.2	90
3	12	Middle		-1' BFG	123.3	118	4.5	1	95.2	90
□ Native ⊠ Impor	e Soils rted Fills		Soils consistent with Pro Soils found to be firm an knowledge, meet compac Contractor notified of res	ctor d stable; and ction sults	to the best	of our	 Ye Ye Ye Ye 	es O No es O No		

Remarks:

MTC was on site to test the compaction of soils placed on the western pad. The project manager Mike instructed MTC where to take the density/moisture readings, and were surveyed after testing.

Soils were placed in approximately 1ft lifts and compacted using a CAT CS44B single drum vibratory roller.

Soils were found to be sufficiently compacted, meeting the 90% compaction required by site plans.

Images:

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Western pad tested. Looking north.

REPORTED BY: Kevin Quillan REVIEWED BY: Kevin Walters, Project Manager

salis apply only to actual le site. As a mutual protection to clients, the public and ourselves, all reports are solvained as the confidential property of clients, and authorization for publication of statements, conclusions or estructs from or regarding our reports is neared pending our within approval. 0 2008 - 2012 Materials Testing & Consulting, Inc. All rights reserved.

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CLIENT PROJECT LOCATION	Entact 11720 Unaco Road Edmonds WA 98020	DATE PERMIT #	10/17/2017					

Inspection Information:

Inspection Date: 10/17/2017	Time Onsite: 4:15 pm	Weather Conditions	Rainy, 50s, wet	
Inspection Performed:	IPD-Soil Compaction			
Field Data:				
Work / Location:	Willow Creek Berm		Gauge Standard MS:	771
Equipment ID & Serial #:	Instrotek 3500, Ser. #12	241	Gauge Standard DS:	2241
Test Samples:				
Sample #: Description:		Proctor Value(pcf): Oj	ptimum Moisture and Oversize Rock	Correction:
1. B17-1008 SW-SM, Well grad	led SAND with SILT	124.0 7.2	2% OM, 7.0% ORC	

TEST METHOD

ASTM D-1557 /AASHTO T-180

In Place Density Test Results (ASTM D-6938):

Т	est #	Mode / Depth		Location of Test	Elev.	Wet Dens.	Dry Dens.	Moist %	Sample #	% Comp.	% Reqd.
	1	12"	South		12ft ASL	127.6	123.2	3.6	1	99.4	90
	2	12"	Middle		12ft ASL	123.4	118	4.6	1	95.2	90
	3	12	North		12ft ASL	129.2	124	4.2	1	100	90
□ Native Soils Soils consistent with Proctor							• Ye	s O No			
Imported Fills Soils found to be firm and stable; and to the best of our knowledge, meet compaction						of our	• Ye	s O No			
				Contractor notified of result	ts			• Ye	s O No		

Remarks:

MTC was on site to test the compaction of soils placed to build the berm adjacent to Willow Creek to 12ft above sea level. The project manager Mike instructed MTC where to take the density/moisture readings, and were surveyed after testing.

Soils were placed in approximately 1ft lifts and compacted using a CAT CS44B single drum vibratory roller prior to MTC's arrival.

Soils were found to be sufficiently compacted, meeting the 90% compaction required by site plans.

Images:

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DB-2 Excavation - 17B196, 10/17/2017, #D39957, Page 1 of 2





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Willow Creek Berm. Looking northwest

REPORTED BY: Kevin Quillan REVIEWED BY: Kevin Walters, Project Manager

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DB-2 Excavation - 17B196, 10/17/2017, #D39957, Page 2 of 2



Data Validation Package



Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	580-71085-1
FROM:	Dilip Kumar	SITE	Former Unocal Edmonds Bulk Fuel
DATE:	November 9, 2017	511E.	Terminal Edmonds, Washington

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71085-1 for 6 soil samples, 1 trip blank and 2 rinsate blanks collected on September 6 to September 7, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC) besides cPAHs by USEPA method 8270D Selective Ion Method (SIM) and the full suite of Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) by USEPA method 8260C. The laboratory reported benzene, GRO, DRO and HO analyses and the deliverable data reports were complete for those analysis.

In the COC, BTEX analysis was mentioned but only benzene was reported in the laboratory report because only benzene analysis is mentioned in the SAP analytical program. No action required.

In the COC, cPAHs analysis was mentioned but not reported in the laboratory report because samples did not present detectable DRO and/or HO concentrations. No action required.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Holding time exceedances are presented in the following table:

Note: NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

GRO, reported as gasoline in the SDG 580-71085-1, was detected at concentration greater than the MDL in method blank MB 580-25574/1. The associated samples result were more than five times the blank value and/or non-detect therefore the samples do not qualified for blank contamination and results are meeting QA requirements.

Field sample IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blanks

No detections were observed in the rinsate blanks therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71085-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71085-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples were summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation qualifier
NE	NE	NE	NE	NE	NE

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The method/field blank samples were free
 of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-A3-10	580-71085-1	09/06/2017	16:45	Regular
EX-DB2-A4-10	580-71085-2	09/07/2017	11:25	Regular
EX-DB2-A5-10	580-71085-3	09/07/2017	11:00	Regular
EX-DB2-A6-10	580-71085-4	09/07/2017	10:50	Regular
EX-DB2-A7-10	580-71085-5	09/07/2017	10:55	Regular
EX-DB2-A8-10	580-71085-6	09/07/2017	11:10	Regular
RB-09062017	580-71085-7	09/07/2017	17:00	Rinsate Blank
RB-09072017	580-71085-8	09/06/2017	10:00	Rinsate Blank
TB-09062017	580-71085-9	09/07/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical method	Parameter	Laboratory result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered

SDG: sample delivery group

Data Validation Memorandum

то:	Ophélie Encelle	SDG:	580-71120-1
FROM:	Dilip Kumar	SITE	Former Unocal Edmonds Bulk Fuel
DATE:	November 14, 2017	SITE.	Terminal Edmonds, Washington

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71120-1 for 6 soil samples, 1 field duplicate, 1 trip blank and 1 rinsate blank collected on September 7 to September 8, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in COC but performed only for samples presenting detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

GRO, reported as gasoline in the SDG 580-71120-1, was detected at concentration greater than the MDL in method blanks MB 580-255758/1-A & MB 580-255785/5. The associated samples results were non-detect therefore the samples do not qualified for blank contamination and results are meeting QA requirements.

Benzo[a]anthracene, one of the seven cPAHs analyzed, was detected at concentration greater than the MDL in method blank MB 580-255689/1-A. The associated samples results were less than five times the blank value therefore associated sample results were qualified as non-detects (U).

Field Sample ID	Blank type	Method	Method Parameter		Sample Result	Validation Qualifier
EX-DB2-A5-5-SW	MB	8270D SIM	Benzo[a]anthracene	0.9	1	U
EX-DB2-A6-5-SW	MB	8270D SIM	Benzo[a]anthracene	0.9	1	U
EX-DB2-A7-5-SW	MB	8270D SIM	Benzo[a]anthracene	0.9	1.2	U
DUP01-SO-09082017	MB	8270D SIM	Benzo[a]anthracene	0.9	0.84	U

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blanks

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	
NE	NE	NE	

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

APPENDIX P							
Field Sample ID Parameter		LCS Recovery	LCSD Recovery	RPD	Validation Qualifier		
NE	NE	NE	NE	NE	NE		

Matrix Spike/Matrix Spike Duplicates

Matrix spikes were prepared in duplicate and analyzed. MS and MSD analysis must exhibit a percent recoveries and relative percent differences within the laboratory's acceptance criteria.

The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where compound concentration detected in the parent sample exceeds the MS/MSD concentration by factor four.

Samples associated with MS/MSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	Method	MS Recovery	MSD Recovery	RPD	Validation Qualifier	Laboratory Limit
NE	NE	NE	NE	NE	NE	NE	NE

Field Duplicates

A field duplicate was collected for SDG 580-71120-1 and all precision criteria were met.

Duplicate sample ID and Parent field sample ID were updated in the following table:

Duplicate Sample ID	Field Sample ID
DUP01-SO-09082017	EX-DB2-A5-5-SW

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples were summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Duplicate Result Result		RPD	Validation qualifier
NE	NE	NE	NE	NE	NE

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, MS/MSD, laboratory duplicate and field duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. Accuracy
 was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. Benzo[a]anthracene was detected in the
 associated laboratory method blank; This laboratory method blank detects resulted in associated
 samples detected data qualified as non-detect. The field blank samples (trip blank and rinsate blank)
 were free of contamination with no qualification required and met QA requirements.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-A3-5-SW	580-71120-1	09/08/2017	10:50	Regular
EX-DB2-A4-5-SW	580-71120-2	09/08/2017	10:00	Regular
EX-DB2-A5-5-SW	580-71120-3	09/08/2017	08:30	Regular
EX-DB2-A6-5-SW	580-71120-4	09/07/2017	16:10	Regular
EX-DB2-A7-5-SW	580-71120-5	09/07/2017	15:45	Regular
EX-DB2-A8-5-SW	580-71120-6	09/07/2017	15:35	Regular
DUP01-SO-09082017	580-71120-7	09/08/2017	NA	Field Duplicate
RB-09082017	580-71120-8	09/08/2017	09:00	Rinsate Blank
TB-09082017	580-71120-9	09/08/2017	NA	Trip Blank

Note:

NA: not applicable

Rinsate blank results for 09/07/2017 are presented in the sample delivery group 580-71085-1.

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical method	Parameter	Laboratory result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71120-3	EX-DB2-A5-5- SW	REG	580-71120-1	8270D SIM	Benzo[a]anthracene	1.0	JB	U	BL1	Ν
580-71120-4	EX-DB2-A6-5- SW	REG	580-71120-1	8270D SIM	Benzo[a]anthracene	1.0	JB	U	BL1	N
580-71120-5	EX-DB2-A7-5- SW	REG	580-71120-1	8270D SIM	Benzo[a]anthracene	1.2	JB	U	BL1	N
580-71120-7	DUP01-SO- 09082017	FD	580-71120-1	8270D SIM	Benzo[a]anthracene	0.84	JB	U	BL1	N

Notes:

REG: regular

SDG: sample delivery group

FD: field duplicate

J: Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

N: analyte not detected

Data Validation Memorandum

то:	Ophélie Encelle	SDG:	580-71216-1
FROM:	Dilip Kumar	SITE	Former Unocal Edmonds Bulk Fuel
DATE:	November 20, 2017	SITE:	Terminal Edmonds, Washington

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71216-1 for 6 soil samples, 1 trip blank and 1 rinsate blank collected on September 12, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because samples did not present detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate gualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	
NE	NE	NE	

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71216-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71216-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Results for laboratory duplicate samples are summarized in the following table:

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The laboratory method blank and field
 blank samples were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

	Table	1:	Sam	ple	Summar	y
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Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-B3-10	580-71216-1	9/12/2017	14:15	Regular
EX-DB2-B4-10	580-71216-2	9/12/2017	14:05	Regular
EX-DB2-B5-10	580-71216-3	9/12/2017	14:00	Regular
EX-DB2-B6-10	580-71216-4	9/12/2017	13:55	Regular
EX-DB2-B7-10	580-71216-5	9/12/2017	13:45	Regular
EX-DB2-B8-10	580-71216-6	9/12/2017	13:40	Regular
RB-091217	580-71216-7	9/12/2017	15:30	Rinsate Blank
TB-091217	580-71216-8	9/12/2017	NA	Tri Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered SDG: sample delivery group

TO:	Ophélie Encelle	SDG:	580-71255-1
FROM: DATE:	Dilip Kumar November 11, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71255-1 for 1 soil sample, 1 trip blank and 1 rinsate blank collected on September 13, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program.

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported benzene, GRO, DRO and HO analyses and the deliverable data reports were complete for those analysis.

As a note, cPAHs analysis was mentioned in the COC but not performed because samples did not present detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate gualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field sample IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No detections were observed in the rinsate blanks therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	
NE	NE	NE	

Laboratory Control Sample/ Laboratory Control Sample duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71255-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71255-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	rameter Sample Du Result R		RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The method/field blank samples were free
 of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-A2-10	580-71255-1	09/13/2017	12:10	Regular
RB-091317	580-71255-2	09/13/2017	15:45	Rinsate Blank
TB-091317	580-71255-3	09/13/2017	NA	Trip Blank

Note: NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical method	Parameter	Laboratory result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes: NE: not encountered SDG: sample delivery group

TO:	Ophélie Encelle	SDG:	580-71291-1
FROM: DATE:	Dilip Kumar November 14, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71291-1 for 2 soil samples, 1 trip blank and 1 rinsate blank collected on September 14, 2017. Matrix spike/matrix spike duplicates (MS/MSD) were performed for 1 soil sample. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

The SDG 580-71291-1 contains results for the soil samples recorded in the chain-of-custody documentations (COC). The water sample results recorded in the COC are reported under separate cover in the SDG 580-71291-2. Soil sample analyses were performed as requested on COC. The laboratory reported all requested soil sample analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because samples did not present detectable DRO and/or HO concentrations. No action required.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory

method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

HO, reported as motor oil (>C24-C36) in the SDG 580-71291-1, was detected at concentration greater than the MDL in method blank MB 580-256277/1-B. The associated samples result were less than five times the blank value therefore associated sample results were qualified as non-detects (U).

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
EX-DB2-B2-10	MB	Ecology NWTPH-Dx	НО	9.72	22	U
EX-DB2-C2-10	MB	Ecology NWTPH-Dx	НО	9.72	13	U

Field sample IDs qualified for blank contamination are summarized in the following table:

Notes: MB: method blank HO: reported as motor oil (>C24-C36) U: non-detect

Rinsate Blanks

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	
NE	NE	NE	

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

Matrix spikes were prepared in duplicate and analyzed. MS and MSD analysis must exhibit a percent recoveries and relative percent differences within the laboratory's acceptance criteria.

The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where compound concentration detected in the parent sample exceeds the MS/MSD concentration by factor four.

A MS/MSD was performed using sample EX-DB2-B2-10 and the results were observed within the acceptance criteria besides for DRO, reported as #2 diesel in SDG 580-71291-1. The MSD recovery results for DRO was observed with a 1% recovery low bias compared to the acceptance criteria. The associated detected sample result was qualified as "J".

Samples associated with MS/MSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	Method	MS Recovery	MSD Recovery	RPD	Validation Qualifier	Laboratory Limit
EX-DB2-B2-10	DRO	Ecology NWTPH-Dx	71	69	5	J	70-125

Notes:

DRO: reported as #2 diesel (C10-C24)

J: Result is less than the reporting limit (RL) but greater than or equal to the MDL and the concentration is an approximate value

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71291-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, MS/MSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. One matrix spike duplicate exhibited low recovery by 1% therefore result was qualified as estimated and the data is considered as valid. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. HO, reported as motor oil (>C24-C36) was
 detected in the associated laboratory method blank; This laboratory method blank detects resulted in
 associated samples detected data qualified as non-detect. The field blank samples (trip blank and rinsate
 blank) were free of contamination with no qualification required and met QA requirements.

- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample Summary

Table 2: Qualified Results Summary

	Table '	1:	Sam	ple	Summary
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Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-B2-10	580-71291-1	09/14/2017	08:40	Regular
EX-DB2-B2-10-MS	580-71291-1 MS	09/14/2017	08:40	QA
EX-DB2-B2-10-MSD	580-71291-1 MSD	09/14/2017	08:40	QA
EX-DB2-C2-10	580-71291-2	09/14/2017	11:55	Regular
RB-091417	580-71291-4	09/14/2017	10:30	Rinsate Blank
TB-091417 (solid)	580-71291-6	09/14/2017	NA	Trip Blank

Note: NA: not applicable QA: quality assurance
Table 2: Qualified Re	sults Summary
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Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71291-1	EX-DB2-B2-10	REG	580-71291-1	Ecology NWTPH-Dx	НО	22	JΒ	U	BL1	N
580-71291-2	EX-DB2-C2-10	REG	580-71291-1	Ecology NWTPH-Dx	НО	13	JΒ	U	BL1	N
580-71291-1	EX-DB2-B2-10	REG	580-71291-1	Ecology NWTPH-Dx	DRO	14	J F1	J	MSDL	Y

Notes:

REG: regular

SDG: sample delivery group

HO: heavy-oil range organics reported as motor oil (>C24-C36)

DRO: diesel range organics reported as #2 diesel (C10-C24)

Ecology: Washington State Department of Ecology

J: Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

F1: matrix spike and/or matrix spike duplicate recovery is outside acceptance limits

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

MSDL: matrix spike duplicate recovery below limit

N: analyte not detected

Y: analytes detected

Data Validation Memorandum

то:	Ophelie Encelle	SDG:	580-71327-1
FROM:	Dilip Kumar	SITE	Former Unocal Edmonds Bulk Fuel
DATE:	November 20, 2017	SITE.	Terminal Edmonds, Washington

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71327-1 for 3 soil samples, 1 trip blank and 1 rinsate blank collected on September 15, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but performed only for 1 sample presenting detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate gualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	
NE	NE	NE	

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

MS was prepared in duplicate and analyzed by laboratory using field sample EX-DB2-A2-5-SW, MS and MSD recoveries and the RPDs between the MS and MSD recoveries were within the laboratory's acceptance criteria.

Samples associated with MS/MSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	Method	MS Recovery	MSD Recovery	RPD	Validation Qualifier	Laboratory Limit
NE	NE	NE	NE	NE	NE	NE	NE

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71327-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met except for HO, reported as motor oil (>C24-C36), in sample EX-DB2-B1-8-SW. The RPD was observed above the laboratory criteria and associated sample result was qualified as "J".

Results for laboratory duplicate samples are summarized in the following table:

Sample ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier	Laboratory Limit
EX-DB2-B1-8-SW	НО	18	27.7	40	J	35

Notes:

HO: reported as motor oil (>C24-C36)

J: result is less than the reporting limit (RL) but greater than or equal to the MDL and the concentration is an approximate value

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, MS/MSD and laboratory duplicate RPDs. One sample result for HO, reported as motor oil (>C24-C36) was qualified as estimated due to RPD exceedances observed in laboratory duplicate; however, the data is considered as valid. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. Accuracy
 was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The laboratory method blank and field
 blank samples were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-A1-8-SW	580-71327-1	09/15/2017	11:50	Regular
EX-DB2-A2-5-SW	580-71327-2	09/15/2017	10:35	Regular
EX-DB2-B1-8-SW	580-71327-3	09/15/2017	14:30	Regular
RB-091517	580-71327-4	09/15/2017	11:25	Rinsate Blank
TB-091517	580-71327-5	09/15/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71327-3	EX-DB2-B1-8- SW	REG	580-71327-1	Ecology NWTPH-Dx	HO	18	J	J	LDP	Y

Notes:

REG: regular

SDG: sample delivery group

HO: heavy-oil range organics, reported as motor oil (>C10-C24) Ecology: Washington State Department of Ecology

LDP: laboratory duplicate relative percent difference acceptance limit exceeded.

J: result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value

Y: analyte detected

TO:	Ophélie Encelle	SDG:	580-71376-1
FROM: DATE:	Dilip Kumar November 14, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71376-1 for 4 soil samples, 1 trip blank and 1 rinsate blank collected on September 18, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but performed only for 1 sample presenting detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance	
NE	NE	NE	NE	NE	

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate gualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blank

No detections were observed in the rinsate blanks therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

GRO, reported as gasoline in SDG 580-71376-1, was detected at concentration greater than the MDL but lower than the reporting limit in trip blank TB-091817. The samples results were more than five times the blank value and/or non-detect therefore the samples results do not qualified for blank contamination and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery		
NE	NE	NE		

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71376-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71376-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Resul	ts f	or	lab	ora	tory	dup	olica	te sar	nple	s are	sumr	narized	l in	the	fol	llowing	ta	ble:	

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The method/field blank samples were free
 of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample SummaryTable 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-C1-8-SW	580-71376-1	09/18/2017	09:50	Regular
EX-DB2-D1-8-SW	580-71376-2	09/18/2017	14:30	Regular
EX-DB2-D2-10	580-71376-3	09/18/2017	16:00	Regular
EX-DB2-E0-1	580-71376-4	09/18/2017	16:15	Regular
RB-091817	580-71376-5	09/18/2017	10:20	Rinsate Blank
TB-091817	580-71376-6	09/18/2017	NA	Trip Blank

Note: NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical method	Parameter	Laboratory result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered SDG: sample delivery group

TO:	Ophélie Encelle	SDG:	580-71419-1
FROM: DATE:	Dilip Kumar November 15, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71419-1 for 2 soil samples, 1 trip blank and 1 rinsate blank collected on September 19, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because samples did not present detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance	
NE	NE	NE	NE	NE	

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate gualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	
NE	NE	NE	

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71419-1.

Field Duplicates

Field duplicates were collected for SDG 580-71419-1 and all precision criteria were met.

Duplicate sample ID and Parent field sample ID were updated in the following table:

		AP
Duplicate Sample ID	Field Sample ID	
DUP02-SO-09192017	EX-DB2-E1-8-SW	

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

PENDIX P

Results for laboratory duplicate samples are summarized in the following table:

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The method/field blank samples were free
 of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

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Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample SummaryTable 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-E1-8-SW	580-71419-1	09/19/2017	09:55	Regular
EX-DB2-E1-10	580-71419-2	09/19/2017	09:50	Regular
DUP02-SO-091917	580-71419-3	09/19/2017	NA	Regular
RB-091917	580-71085-4	09/19/2017	10:00	Rinsate Blank
TB-091917	580-71085-5	09/19/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered SDG: sample delivery group

Data Validation Memorandum

то:	Ophelie Encelle	SDG:	580-71458-1	
FROM:	Dilip Kumar	SITE	Former Unocal Edmonds Bulk Fuel	
DATE:	November 15, 2017	SITE.	Terminal Edmonds, Washington	

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71458-1 for 3 soil samples, 1 trip blank and 1 rinsate blank collected on September 20, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but performed only for 2 samples presenting detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Six of the seven cPAHs analyzed, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz(a,h)anthracene and indeno[1,2,3-cd]pyrene were detected at concentration greater than the MDL in method blank MB 580-256861/1-A. The associated samples results were more than five times the blank value besides dibenz(a,h)anthracene detection for EX-DB2-F0-1, therefore the samples do not qualify for blank contamination and results are meeting QA requirements. Dibenz(a,h)anthracene detection for EX-DB2-F0-1 was less than five times the blank value therefore the result was qualified as non-detects "U".

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier	
EX-DB2-F0-1	MB	8270D SIM	dibenz(a,h)anthracene	1.41	6.6	U	

Field sample IDs qualified for blank contamination are summarized in the following table:

Notes: MB: method blank U: non-detect

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample EX-DB2-F0-1, the surrogate recovery for 8270D SIM analysis was below the lower control limit (15%) and all associated detected sample results were qualified as estimated "J".

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	Laboratory Limit
EX-DB2-F0-1	Terphenyl-d14	53	68-138

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71458-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71458-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Sample ID & Duplicate ID	Parameter	Sample Result	Sample Duplicate Result Result		Validation Qualifier
NE	NE	NE	NE	NE	NE

Results for laboratory duplicate samples are summarized in the following table:

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, MS/MSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. Six samples
 results were qualified as estimated due to low bias surrogate recovery; however, the data is considered
 as valid. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. Dibenz(a,h)anthracene was detected in
 the associated laboratory method blank; This laboratory method blank detects resulted in the associated
 sample EX-DB2-F0-1 detected data qualified as non-detect. The field blank samples (trip and rinsate
 blank) were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

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USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample SummaryTable 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-A2-4-SW	580-71458-1	09/20/2017	16:15	Regular
EX-DB2-F0-1	580-71458-2	09/20/2017	13:20	Regular
EX-DB2-F1-10	580-71458-3	09/20/2017	11:15	Regular
RB-092017	580-71458-4	09/20/2017	12:40	Rinsate Blank
TB-092017	580-71458-5	09/20/2017	NA	Trip Blank

Note: NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71458-2	EX-DB2-F0-1	REG	580- 71458-1	8270D SIM	Dibenz (a, h) anthracene	6.6	JΒ	UJ	BL1, SURL	Ν
580-71458-2	EX-DB2-F0-1	REG	580- 71458-1	8270D SIM	Benzo[a]anthracene	51	В	J	SURL	Y
580-71458-2	EX-DB2-F0-1	REG	580- 71458-1	8270D SIM	Benzo[a]pyrene	49	В	J	SURL	Y
580-71458-2	EX-DB2-F0-1	REG	580- 71458-1	8270D SIM	Benzo[b]fluoranthene	110	В	J	SURL	Y
580-71458-2	EX-DB2-F0-1	REG	580- 71458-1	8270D SIM	Benzo[k]fluoranthene	30	В	J	SURL	Y
580-71458-2	EX-DB2-F0-1	REG	580- 71458-1	8270D SIM	Chrysene	100	В	J	SURL	Y
580-71458-2	EX-DB2-F0-1	REG	580- 71458-1	8270D SIM	Indeno[1,2,3-cd] pyrene	60	В	J	SURL	Y

Notes:

REG: regular

SDG: sample delivery group

SIM: selected ion monitoring

UJ: the analyte was analyzed for, but was not detected and the reported limit (RL) is approximate

J: result is less than the RL but greater than or equal to the method detection limit and the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

SURL: surrogate recovery below lower acceptance limit

N: analyte not detected

Y: analytes detected

TO:	Ophélie Encelle	SDG:	580-71539-1
FROM: DATE:	Dilip Kumar November 20, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71539-1 for 8 soil samples, 1 trip blank and 2 rinsate blanks collected on September 21 and September 22, 2017. Matrix spike/matrix spike duplicates (MS/MSD) were performed for 1 soil sample. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270D SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but performed only for 1 sample presenting detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate gualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blanks

No detections were observed in the rinsate blanks therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample EX-DB2-C4-10 in method 8260C, a surrogate recovery was above the upper control limit (by 3%), but associated sample result was non-detect therefore associated sample result was not qualified.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

Matrix spikes were prepared in duplicate and analyzed. MS and MSD analysis must exhibit a percent recoveries and relative percent differences within the laboratory's acceptance criteria.

Samples associated with MS/MSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Paramotor	Mothod	MS	MSD	DDD	Validation	Laboratory
	Farameter	Wethou	Recovery	Recovery	INF D	Qualifier	Limit
NE	NE	NE	NE	NE	NE	NE	NE

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71539-1.

Laboratory Duplicates

According to the SAP, laboratory duplicates were not performed for SDG 580-71539-1.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, MS/MSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. Accuracy
 was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The laboratory method blank and field
 blank samples were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19. USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-C3-10	580-71539-1	09/22/2017	07:55	Regular
EX-DB2-C4-10	580-71539-2	09/22/2017	08:10	Regular
EX-DB2-C5-10	580-71539-3	09/22/2017	08:30	Regular
EX-DB2-C6-10	580-71539-4	09/22/2017	08:45	Regular
EX-DB2-C7-11	580-71539-5	09/22/2017	13:10	Regular
EX-DB2-C8-10	580-71539-6	09/22/2017	10:05	Regular
EX-DB2-C8-10-MS	580-71539-6 MS	09/22/2017	10:05	QA
EX-DB2-C8-10-MSD	580-71539-6 MSD	09/22/2017	10:05	QA
EX-DB2-D3-10	580-71539-7	09/22/2017	07:45	Regular
EX-DB2-F2-12	580-71539-8	09/21/2017	11:20	Regular
RB-092117	580-71539-9	09/21/2017	12:40	Rinsate Blank
RB-092217	580-71539-10	09/22/2017	09:00	Rinsate Blank
Trip Blank	580-71539-11	09/21/2017	NA	Trip Blank

Note:

NA: not applicable

QA: quality assurance

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not applicable

SDG: sample delivery group

TO:	Ophélie Encelle	SDG:	580-71582-1
FROM: DATE:	Dilip Kumar November 16, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71582-1 for 1 soil sample, 1 trip blank and 1 rinsate blank collected on September 25, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because the sample did not present detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during
field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate gualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blank

No detections were observed in the rinsate blanks therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	
NE	NE	NE	

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71582-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71582-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Sample ID & Duplicate ID	Parameter	Sample Duplicate Result Result		RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Results for laboratory duplicate samples are summarized in the following table:

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The method/field blank samples were free
 of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample SummaryTable 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-A2-6-SW	580-71582-1	09/25/2017	1600	Regular
RB-092517	580-71582-2	09/25/2017	1630	Rinsate Blank
TB-092517 (soil)	580-71582-3	09/25/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes: NE: not encountered SDG: sample delivery group

TO:	Ophélie Encelle	SDG:	580-71607-1
FROM: DATE:	Dilip Kumar November 16, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71607-1 for 1 soil sample, 1 trip blank and 1 rinsate blank collected on September 26, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because the sample did not present detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate gualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation operation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	
NE	NE	NE	

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria besides for DRO, reported as #2 diesel (C10-C24) in SDG 580-71607-1.

LCS/LCSD were performed for DRO in analysis batch 257523 but LCSD 580-257428/3-C exhibited a 1% recovery low bias in LCSD recovery compared to the acceptance criteria. The associated non-detect sample result was qualified as "UJ". Also, the RPD for this batch was exceeding the acceptance criteria. The associated sample result was non-detect therefore associated sample result was not qualified. Identically, LCS/LCSD were performed for HO, reported as motor oil (>C10-C36) in SDG 580-71607-1, as part of the same analysis batch, and the RPD was exceeding the acceptance criteria. The associated sample result was non-detect therefore associated sample as non-detect therefore associated sample result was not qualified.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	Method	LCS Recovery	LCSD Recovery	Laboratory Limit	RPD	RPD Limit	Validation Qualifier
EX-DB2-E2- 10	DRO	Ecology NWTPH- Dx	77	63	64-127	19	16	UJ
EX-DB2-E2- 10	НО	Ecology NWTPH- Dx	88	73	70-125	19	17	-

Note:

DRO: reported as #2 diesel (C10-C24)

UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate -: the associated sample result was non-detect therefore associated sample result was not qualified

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71607-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71607-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Duplicate Result Result		RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. One sample result
 was exhibited low LCSD recovery by 1% therefore the result was qualified as estimated and data is
 considered as valid. Accuracy was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The laboratory method blank and field
 blank samples were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.

 Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample SummaryTable 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-E2-10	580-71607-1	09/26/2017	16:10	Regular
RB-092617	580-71607-2	09/26/2017	16:30	Rinsate Blank
TB-092617	580-71607-3	09/26/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71607-1	EX-DB2-E2- 10	REG	580-71607-1	Ecology Method NWTPH-Dx	DRO	ND	*	UJ	LCSDL	N

Notes:

REG: regular

SDG: sample delivery group

DRO: diesel range organics reported as #2 diesel (C10-C24)

Ecology: Washington State Department of Ecology

ND: not detected

*: laboratory control sample (LCS) or laboratory control sample duplicate (LCSD) is outside acceptance limits and relative percent difference of LCS and LCSD exceeds the control limits

UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate

LCSDL: LCSD recovery below lower acceptance limit.

N: analyte not detected

TO:	Ophélie Encelle	SDG:	580-71638-1
FROM: DATE:	Dilip Kumar November 16, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71638-1 for 5 soil samples, 1 trip blank and 1 rinsate blank collected on September 27, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in COC but not performed because samples did not present detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate gualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71638-1.

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 580-71638-1.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Results for laboratory duplicate samples are summarized in the following table:

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The laboratory method blank and field
 blank samples were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample SummaryTable 2: Qualified Results Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-D4-10	580-71638-1	09/27/2017	10:15	Regular
EX-DB2-D5-10	580-71638-2	09/27/2017	11:15	Regular
EX-DB2-D6-10	580-71638-3	09/27/2017	14:30	Regular
EX-DB2-D7-11	580-71638-4	09/27/2017	15:10	Regular
EX-DB2-D8-10	580-71638-5	09/27/2017	16:20	Regular
RB-092717	580-71638-6	09/27/2017	10:50	Rinsate Blank
TB-092717	580-71638-7	09/27/2017	NA	Trip Blank

Table 1: Sample Summary

Note: NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered SDG: sample delivery group

TO:	Ophélie Encelle	SDG:	580-71704-1
FROM: DATE:	Dilip Kumar November 17, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71704-1 for 4 soil samples, 1 field duplicate, 1 trip blank and 1 rinsate blank collected on September 29, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries, field duplicate and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but not performed because samples did not present detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during

field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate gualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample EX-DB2-E5-10 in method 8260C, a surrogate recovery was above the upper control limit by 1%, but associated sample result was non-detect therefore associated sample result was not qualified.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	
NE	NE	NE	

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71704-1.

Field Duplicates

Field duplicates were collected for SDG 580-71704-1 and all precision criteria were met.

Duplicate sample ID and Parent field sample ID were updated in the following table:

Duplicate Sample ID	Field Sample ID		
DUP03-SO-09292017	EX-DB2-E4-10		

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

Sample ID & Duplicate ID	Parameter	Sample Result	Sample Duplicate Result Result		Validation Qualifier
NE	NE	NE	NE	NE	NE

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD, laboratory duplicate and field duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The laboratory method blank and field
 blank samples were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample Summary

Table 2: Qualified Results Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-E3-11	580-71704-1	09/29/2017	11:10	Regular
EX-DB2-E4-10	580-71704-2	09/29/2017	14:20	Regular
EX-DB2-E5-10	580-71704-3	09/29/2017	15:15	Regular
EX-DB2-E6-11	580-71704-4	09/29/2017	16:25	Regular
DUP03-SO-092917	580-71704-5	09/29/2017	NA	Regular
RB-092917	580-71704-6	09/29/2017	11:50	Rinsate Blank
TB-092917	580-71704-7	09/29/2017	NA	Trip Blank

Table 1: Sample Summary

Note: NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes: NE: not encountered SDG: sample delivery group

TO:	Ophélie Encelle	SDG:	580-71754-1
FROM: DATE:	Dilip Kumar November 20, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. The confirmation soil samples were submitted to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery groups (SDG) 580-71754-1 and 580-71754-2 for 8 soil samples,1 rinsate blank and 1 trip blank collected on October 02, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

The following quality assurance samples were to be collected during implementation of the sampling program:

- One field duplicate sample per 20 field samples collected per medium
- One matrix spike/matrix spike duplicate per 20 field samples collected per medium
- One rinsate blank sample per day on decontaminated, non-dedicated sampling equipment
- One trip blank per cooler containing samples that will be analyzed for volatile compounds.

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation
- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260C), cPAHs (8270D SIM), GRO (Ecology method NWTPH-Gx) and DRO/HO (Ecology method NWTPH-Dx).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The trip blank results were reported in SDG 580-71754-2. The laboratory reported all requested analyses and the deliverable data reports were complete.

As a note, cPAHs analysis was mentioned in the COC but performed only for 1 sample presenting detectable DRO and/or HO concentrations.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedances are presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory

method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Field sample IDs qualified for blank contamination are summarized in the following table:

Rinsate Blank

No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria except for sample SP-B1-B6-1 in method 8260C, a surrogate recovery was above the upper control limit (by 1%), but associated sample result was non-detect therefore associated sample result was not qualified.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery	
NE	NE	NE	

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

According to the SAP, MS/MSD were not collected for SDGs 580-71754-1&2.

Field Duplicates

According to the SAP, field duplicates were not collected for SDGs 580-71754-1&2.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Sample ID & Duplicate ID	Parameter	Sample Result	Duplicate Result	RPD	Validation Qualifier					
NE	NE	NE	NE	NE	NE					

Results for laboratory duplicate samples are summarized in the following table:

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The laboratory method blank and field
 blank samples were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample SummaryTable 2: Qualified Results Summary

	Table	1:	Sam	ple	Summar	У
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Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
SP-B1-B6-1	580-71754-1	10/2/2017	18:00	Regular
SP-B1-B4-4	580-71754-2	10/2/2017	18:05	Regular
SP-B1-l8-1	580-71754-3	10/2/2017	18:10	Regular
SP-B1-C6-13	580-71754-4	10/2/2017	18:15	Regular
SP-B1-H4-4	580-71754-5	10/2/2017	18:20	Regular
SP-B1-B5-7	580-71754-6	10/2/2017	18:25	Regular
SP-B1-D8-2	580-71754-7	10/2/2017	18:30	Regular
TB-100217	580-71754-8	10/2/2017	NA	Trip Blank
RB-100217	580-71754-9	10/2/2017	19:10	Rinsate Blank
EX-DB2-E7-10	580-71754-10	10/2/2017	15:30	Regular

Note: NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes: NE: not encountered SDG: sample delivery group

Data Validation Memorandum

TO:	Ophélie Encelle	SDG:	1851306
FROM:	Dilip Kumar	SITE	Former Unocal Edmonds Bulk Fuel
DATE:	November 21, 2017	SITE.	Terminal Edmonds, Washington

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation soil samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report.

The confirmation soil sample for grid A2 was submitted to both Eurofins Lancaster Laboratories Environmental (Eurofins) in Lancaster, Pennsylvania and Test America Laboratories, Inc. (TA) in Tacoma, Washington, two Washington State Department of Ecology (Ecology) approved laboratory, for laboratories comparison. This report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 1851306 for the confirmation soil sample for grid A2 collected on September 15, 2017 and submitted to Eurofins. The analytical results for the confirmation soil sample for grid A2 from TA are presented in SDG 580-71327-1. The sample for analysis and qualified results is listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the SAP, samples from the excavation were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO) and heavy-oil range organics (HO)
- Samples with detectable DRO and/or HO concentrations will also be analyzed for carcinogenic polyaromatic hydrocarbons (cPAHs).

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data and to meet the SAP requirements. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation

- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Duplicate Samples (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for volatile organic compound benzene (USEPA method 8260B), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 8270C SIM).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip and rinsate blank results, LCS/LCSD results, MS/MSD results, surrogate recoveries and laboratory duplicate results.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

0				
Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Holding time exceedances are presented in the following table:

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field sample IDs qualified for blank contamination are summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

The rinsate blank for September 15, 2017 is provided under SDG 580-71327-1. No detections were observed in the rinsate blank therefore no samples contamination is suspected during field operation and results are meeting QA requirements.

Trip blank

No trip blank was performed for SDG 1851306.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the 8260C, 8270D SIM, NWTPH-Gx and NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field sample IDs associated with surrogates exhibiting outside of control limits are presented in the following table:

Field Sample ID	Surrogates	Recovery
NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit are presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix Spike/Matrix Spike Duplicates

MS was analyzed by laboratory; MS recoveries were within the laboratory's acceptance criteria.

Samples associated with MS/MSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	Method	MS Recovery	MSD Recovery	RPD	Validation Qualifier	Laboratory Limit
NE	NE	NE	NE	NE	NE	NE	NE

Field Duplicates

According to the SAP, field duplicates were not collected for SDG 1851306.

Laboratory Duplicates

Laboratory duplicates were performed as required and all precision criteria were met.

Results for laboratory duplicate samples are summarized in the following table:

	APPENDIX P								
Sample ID Parameter Sample Result Duplicate Result RPD Validation Laborato Limit Limit									
NE	NE	NE	NE	NE	NE	NE			

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD and laboratory duplicate RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate, LCS and MS recoveries. Accuracy
 was acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The laboratory method blank samples
 were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
EX-DB2-A2-5-SW	9212720	09/15/2017	10:35	Regular

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered SDG: sample delivery group
Appendix **P** Data Validation Package Laboratories Comparison Former Unocal Terminal 11720 Unoco Road Edmonds, Washington

		Test Amer	Test America (SDG 580-71327-1) EX-DB2-A2-5-SW					Eurofins (SDG 1851306) EX-DB2-A2-5-SW-S-170915			
Constituents of Concern	Units	Method	Result	RL	MDL	Dilution Factor	Method	Result	RL	MDL	Dilution Factor
Benzene	ug/kg	8260C	ND	37	16	1	8260B	ND	See MDL	31	42.74
Benzo(a)anthracene	ug/kg	8270D SIM	160	69	11	10	8270C SIM	ND	See MDL	4.7	5
Benzo(a)pyrene	ug/kg	8270D SIM	10	69	5.5	10	8270C SIM	ND	See MDL	4.7	5
Benzo(b)fluoranthene	ug/kg	8270D SIM	18	69	8.2	10	8270C SIM	ND	See MDL	4.7	5
Benzo(k)fluoranthene	ug/kg	8270D SIM	11	69	8.3	10	8270C SIM	ND	See MDL	4.7	5
Chrysene	ug/kg	8270D SIM	ND	69	21	10	8270C SIM	89	See MDL	2.4	5
Dibenz(a,h)anthracene	ug/kg	8270D SIM	20	69	10	10	8270C SIM	5.6	See MDL	4.7	5
Indeno(1,2,3-cd)pyrene	ug/kg	8270D SIM	77	69	8.3	10	8270C SIM	14	See MDL	4.7	5
cPAHs	mg/kg	1	0.039	-	-	-	1	0.006	-	-	-
GRO	mg/kg	NWTPH-Gx	ND	7.5	3.9	1	NWTPH-Gx	ND	See MDL	64	1,124.07
DRO	mg/kg	NWTPH-Dx	1,500	68	17	1	NWTPH-Dx	970	See MDL	21	5
НО	mg/kg	NWTPH-Dx	1,500	68	12	1	NWTPH-Dx	750	See MDL	71	5
TPH	mg/kg	2	3,004	-	-	-	2	1,752	-	-	-

Notes:

Test America = Test America Laboratories, Inc.

Euforins = Eurofins Lancaster Laboratories Environmental

SDG = sample delivery group

cPAHs = carcinogenic polynuclear aromatic hydrocarbons

GRO = gasoline diesel range organics

DRO = diesel range organics

HO = heavy oil range organics

TPH = total petroleum hydrocarbons

RL = reporting limit

MDL = method detection limit

NA = not available

ND = not detected

¹ = cPAHs concentration calculated by summing the concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene and adjusted for toxicity using toxic equivalency factors to represent a total benzo(a)pyrene concentration (WAC 173-340-900). If one or more cPAHs constituents were reported at concentrations less than the laboratory RL, then one-half of the RL was used to calculate cPAHs concentrations.

 2 = TPH concentration calculated by summing the concentrations of GRO, DRO and HO. If one or more TPH constituents were reported at concentrations less than the laboratory RL, then one-half of the RL was used to calculate TPH concentrations.

TO:	Ophélie Encelle	SDG:	580-71163-1
FROM: DATE:	Dilip Kumar November 21, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation water samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. Treated water from the temporary water treatment system constructed to handle and treat groundwater accumulating in the DB-2 excavation was discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71163-1 for 1 water sample and 1 trip blank collected on September 11, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs).

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation

- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for Volatile organic compound benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 625).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

DRO, reported as #2 diesel (C10-C24), was detected at concentration greater than the MDL in method blank MB 580-255886/1-B. The associated sample result was less than five times the blank value, therefore associated sample result was qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
OUTFALL#002-091117	MB	Ecology NWTPH-Dx	DRO	0.0241	0.028	U

Notes:

MB: method blank

DRO: reported as #2 diesel (C10-C24)

U: non-detect

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 625, Ecology NWTPH-Gx and Ecology NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery
NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71163-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-71163-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-71163-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. DRO, reported as #2 diesel (C10-C24)
 was detected in the associated laboratory method blank; This laboratory method blank detects resulted in
 associated samples detected data qualified as non-detect. The trip blank was free of contamination with
 no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
OUTFALL#002-091117	580-71163-1	09/11/2017	11:30	Regular
TB-09112017	580-71163-2	09/11/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71163-1	OUTFALL#002- 091117	REG	580-71163-1	Ecology NWTPH-Dx	DRO	0.028	JΒ	U	BL1	Ν

Notes:

REG: regular

SDG = sample delivery group

DRO: diesel range organics reported as #2 diesel (C10-C24)

Ecology: Washington State Department of Ecology

J: reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

N: analyte not detected

TO:	Ophélie Encelle	SDG:	580-71291-2
FROM: DATE:	Dilip Kumar November 21, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation water samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. Treated water from the temporary water treatment system constructed to handle and treat groundwater accumulating in the DB-2 excavation was discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007 Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71291-2 for 1 water sample and 1 trip blank collected on September 14, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review

According to the NPDES permit, treated water samples were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation

- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix spike/Matrix spike duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for Volatile organic compound benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 625).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

The SDG 580-71291-2 contains results for the water samples recorded in the chain-of-custody documentations (COC). The soil sample results recorded in the COC are reported under separate cover in the SDG 580-71291-1. Water sample analyses were performed as requested on the COC. The laboratory reported all requested analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

DRO, reported as #2 diesel (C10-C24), was detected at concentration greater than the MDL in method blank MB 580-256280/1-B. The associated sample result was less than five times the blank value therefore associated sample result was qualified as non-detect (U).

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
Outfall#002-091417	MB	Ecology NWTPH-Dx	DRO	0.0479	0.050	U
Notes:						

Field sample ID qualified for blank contamination summarized in the following table:

MB: method blank DRO: reported as #2 diesel (C10-C24) U: non-detect

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 625, Ecology NWTPH-Gx and Ecology NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery
NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71291-2.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-71291-2.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-71291-2.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. DRO, reported as #2 diesel (C10-C24)
 was detected in the associated laboratory method blank; This laboratory method blank detects resulted in
 associated samples detected data qualified as non-detect. The trip blank was free of contamination with
 no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
Outfall#002-091417	580-71291-3	09/14/2017	16:30	Regular
TB-091417 (water)	580-71291-5	09/14/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71291-3	Outfall#002-091417	REG	58071291-2	Ecology NWTPH-Dx	DRO	0.050	JB	U	BL1	Ν

Notes:

REG: regular

SDG: sample delivery group

DRO: diesel range organics reported as #2 diesel (C10-C24)

Ecology: Washington State Department of Ecology

J: reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

N: analyte not detected

TO:	Ophélie Encelle	SDG:	580-71420-1
FROM: DATE:	Dilip Kumar November 21, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation water samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. Treated water from the temporary water treatment system constructed to handle and treat groundwater accumulating in the DB-2 excavation was discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71420-1 for 1 water sample and 1 trip blank collected on September 19, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs).

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation

- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for Volatile organic compound benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 625).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

DRO, reported as #2 diesel (C10-C24), was detected at concentration greater than the MDL in method blank MB 580-256726/1-B. The associated sample result was less than five times the blank value, therefore associated sample result was qualified as non-detect (U).

Field sample ID qualified for blank contamination summarized in the following table.

Field Sample ID	Blank type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
OUTFALL#002-091917	MB	Ecology NWTPH-Dx	DRO	0.0242	0.040	U

Notes:

MB: method blank

DRO: reported as #2 diesel (C10-C24)

U: non-detect

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during sample transportation and results are meeting QA requirements

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 625, Ecology NWTPH-Gx and Ecology NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery
NE	NE	NE

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier	
NE	NE	NE	NE	NE	NE	

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71420-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-71420-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-71420-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

- Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.
- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. DRO, reported as #2 diesel (C10-C24)
 was detected in the associated laboratory method blank; This laboratory method blank detects resulted in
 associated samples detected data qualified as non-detect. The trip blank was free of contamination with
 no qualification required.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

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Table 1: Sample Summary

Table 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
OUTFALL#002-091917	580-71420-1	09/19/2017	14:50	Regular
TB-091917	580-71420-2	09/19/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
580-71420-1	OUTFALL#002- 091917	REG	580-71420-1	Ecology NWTPH-Dx	DRO	0.040	JB	U	BL1	Ν

Notes:

REG: regular

SDG = sample delivery group

DRO: diesel range organics reported as #2 diesel (C10-C24)

Ecology: Washington State Department of Ecology

J: reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value

B: compound was found in the laboratory method blank and sample

U: non-detect

BL1: result less than some multiple of that found in laboratory method blank

N: analyte not detected

TO:	Ophélie Encelle	SDG:	580-71583-1
FROM: DATE:	Dilip Kumar November 21, 2017	SITE:	Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation water samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. Treated water from the temporary water treatment system constructed to handle and treat groundwater accumulating in the DB-2 excavation was discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery group (SDG) 580-71583-1 for 1 water sample and 1 trip blank collected on September 26, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs).

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation

- Blanks
- Deuterated Monitoring Compounds (Surrogates)
- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for Volatile organic compound benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 625).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The laboratory reported all requested analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

Holding time exceedance presented in the following table:

Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field sample ID qualified for blank contamination summarized in the following table:

APPENDIX P										
Field Sample ID	Blank Type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier				
NE	NE	NE	NE	NE	NE	NE				

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no samples contamination is suspected during sample transportation and results are meeting QA requirements

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 625, Ecology NWTPH-Gx and Ecology NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery		
NE	NE	NE		

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71583-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-71583-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-71583-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

• Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.

- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The laboratory method blank and trip
 blank samples were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample SummaryTable 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
OUTFALL#002-092617	580-71583-1	09/26/2017	08:45	Regular
TB-09262017	580-71583-2	09/26/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered SDG: sample delivery group

TO:	Ophélie Encelle	SDG:	580-71756-1 & 580- 71754-2
FROM:	Dilip Kumar	SITE	Former Unocal Edmonds Bulk Fuel
DATE:	November 21, 2017	SITE.	Terminal Edmonds, Washington

Data Validation Memorandum

INTRODUCTION

This report was prepared by Arcadis Consulting India Pvt Ltd for Arcadis U.S., Inc. (Arcadis) to provide a data validation of the analytical results for the confirmation water samples collected during the Detention Basin 2 (DB-2) excavation activities conducted at the former Union Oil Company of California Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington (Site) during summer and fall 2017. The DB-2 excavation activities were implemented according to the Final Interim Action Work Plan (Final IAWP, Arcadis 2016b) and the Engineering Design Report (Arcadis 2016a). Quality assurance requirements are listed in the Sampling and Analysis Plan (SAP) provided as Appendix F of the Final IAWP. DB-2 excavation activities are reported in the DB-2 Excavation As-Built Report. Treated water from the temporary water treatment system constructed to handle and treat groundwater accumulating in the DB-2 excavation was discharged to Willow Creek at Outfall #002 under National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991007. This permit requires the collection of discharge water samples weekly during water treatment operation at Outfall #002 and submittal of the discharge water samples to a Washington State Department of Ecology (Ecology) approved laboratory, Test America Laboratories, Inc. (TA) in Tacoma, Washington.

Particularly, this report summarizes the level II data validation findings of the analytical results reported in the sample delivery groups (SDGs) 580-71756-1 and 580-71754-2 for 1 water sample and 1 trip blank collected on October 02, 2017. The samples for analysis and qualified results are listed in Table 1 and Table 2. The data were reviewed in accordance with United States Environmental Protection Agency (USEPA. 2017), National Functional Guidelines for Superfund Organic Methods Data Review.

According to the NPDES permit, treated water samples were to be submitted to an Ecology approved laboratory, for the following analyses:

- Benzene
- Gasoline range organics (GRO)
- Diesel range organics (DRO)
- Carcinogenic polyaromatic hydrocarbons (cPAHs).

DATA VALIDATION

The analytical data were reviewed to evaluate the usability of the data. The data validation process includes the following category:

- Data Completeness
- Holding Times and Preservation

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- Laboratory Control Samples/Laboratory Control Samples Duplicate (LCS/LCSD)
- Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- Field Duplicates (FD)
- Laboratory Duplicates/Replicates (LR).

Samples were analyzed for Volatile organic compound benzene (USEPA method 624), GRO (Ecology method NWTPH-Gx), DRO/HO (Ecology method NWTPH-Dx) and cPAHs (USEPA method 625).

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer.

The data review process performed involved evaluating the following parameters: sample receipt, case narrative, holding times, method blank results, trip blank results, LCS/LCSD results and surrogate recoveries.

Each category is further described in the following sections.

Data Completeness

All analyses were performed as requested on the chain-of-custody records (COC). The trip blank results were reported in SDG 580-71754-2. The laboratory reported all requested analyses and the deliverable data reports were complete.

Holding Times and Preservation

All analyses were performed within the method-specified holding time. In addition, all samples were collected and preserved appropriately.

			0	
Method	Holding Time	Date Sampled	Date of Analysis	Exceedance
NE	NE	NE	NE	NE

Holding time exceedance presented in the following table:

Note:

NE: not encountered

Blanks

Quality assurance (QA) blanks (i.e., method and field blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Laboratory method blanks measure laboratory contamination. Rinsate blanks measure contamination of samples during field operations by non-dedicated sampling equipment. Trip blanks measure contamination of samples during samples transportation.

Laboratory Method Blanks

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

No detections were observed in the laboratory method blanks therefore no samples contamination is suspected during laboratory analysis and results are meeting QA requirements.

Field sample ID qualified for blank contamination summarized in the following table:

Field Sample ID	Blank Type	Method	Parameter	Blank Result	Sample Result	Validation Qualifier
NE	NE	NE	NE	NE	NE	NE

Rinsate Blank

No rinsate blank is required since the equipment is dedicated to the sampling.

Trip blank

No detections were observed in the trip blank therefore no sample contamination is suspected during samples transportation and results are meeting QA requirements.

Deuterated Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the USEPA method 624, USEPA method 625, Ecology NWTPH-Gx and Ecology NWTPH-Dx analyses. All surrogate compound recoveries were within the laboratory's acceptance criteria.

Field Sample IDs associated with surrogates exhibiting outside of control limits presented in the following table:

Field Sample ID	Surrogates	Recovery		
NE	NE	NE		

Laboratory Control Sample/ Laboratory Control Sample Duplicates

LCSs were prepared in duplicate and analyzed. LCS and LCSD recoveries reported and the relative percent differences (RPDs) between the LCS and LCSD recoveries were within the laboratory's acceptance criteria.

Samples associated with LCS/LCSD exhibited recoveries outside the control limit presented in the following table:

Field Sample ID	Parameter	LCS Recovery	LCSD Recovery	RPD	Validation Qualifier
NE	NE	NE	NE	NE	NE

Matrix spike/Matrix spike duplicates

According to the SAP, MS/MSD were not collected for SDG 580-71756-1.

Field Duplicates

According to the SAP, field duplicate was not collected for SDG 580-71756-1.

Laboratory Duplicates

Laboratory duplicate was not performed for SDG 580-71756-1.

CONCLUSION

The objective of this validation memorandum is to demonstrate that sufficient number of representative samples were collected, and the resulting analytical data were acceptable according to the USEPA guidelines and the NPDES and SAP requirements.

• Precision of the data was verified through the review of field and laboratory data quality indicators that include LCS/LCSD RPDs. Precision was acceptable.

- Accuracy of the data was verified through the review of surrogate and LCS recoveries. Accuracy was
 acceptable.
- Representativeness of the data was verified through the sample collection, storage and preservation
 procedures, verification of holding time compliance and evaluation of blank data. The laboratory did not
 note any discrepancies with sample collection, storage or preservation procedures. All data were
 reported from analyses within the recommended holding time. The laboratory method blank and trip
 blank samples were free of contamination with no qualification required and met QA requirements.
- Comparability of the data was ensured through the use of standard analytical procedures and standard units for reporting. Results obtained are comparable to industry standards in that the collection and analytical techniques followed approved, documented procedures.
- Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. Completeness is expressed as the percentage of valid or usable measurements compared to planned measurements. Valid data are defined as all data that are not rejected for project use. All data were considered valid. The completeness goal was met for all analytes.

REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

ATTACHMENTS

Table 1: Sample SummaryTable 2: Qualified Results Summary

Table 1: Sample Summary

Field Sample ID	Laboratory Sample ID	Sample Date	Sample Time	Sample Purpose
OUTFALL#002-100217	580-71756-1	10/02/2017	12:15	Regular
TB-100217	580-71754-8	10/02/2017	NA	Trip Blank

Note:

NA: not applicable

Table 2: Qualified Results Summary

Laboratory Sample ID	Field Sample ID	Sample Purpose	SDG	Analytical Method	Parameter	Laboratory Result	Laboratory Qualifier	Validation Qualifier	Reason Code	Detect Flag
NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

NE: not encountered SDG: sample delivery group