Ethan Berkowitz, Mayor

2016 Pesticide Screening Report
APDES Permit No. AKS-052558

Final Report - 2016

MUNICIPALITY OF ANCHORAGE

WATERSHED MANAGEMENT SERVICES

Prepared for: Municipality of Anchorage
Project Management and Engineering Department
Watershed Management Services

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2525 C Street, Suite
Anchorage, AK 99503

January 2017

WATERSHED MANAGEMENT

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1.0 Introduction

The Alaska Department of Environmental Conservation reissued the joint Municipal Separate Storm Sewer System (MS4) permit in August, 2015 to the Municipality of Anchorage and the Alaska State Department of Transportation and Public Facilities. (Permit number AK052558). Section 4.1.6 of the permit requires pesticide screening requires continued sampling of Lake Otis, Hideaway Lake, and Little Campbell Lake as a continuation of the previous permit's pesticide screening program.

1.1 Pesticide Definition

The term pesticide is defined by the State of Alaska Department of Environmental Conservation (ADEC) to be "a chemical or biological agent intended to prevent, destroy, repel, or mitigate plant or animal life, and any substance intended for use as a plant regulatory, defoliant, or desiccant, including insecticides, fungicides, rodenticides, herbicides, nematocides, and biocides." For the purposes of the MOA water quality program, the term pesticide includes herbicides, insecticides, and fungicides (MOA, 2000).

1.2 Background

Pesticides have received widespread attention because of their potential adverse affects on humans and aquatic life. Adverse impacts from exposure can include acute and chronic toxicity, carcinogenicity, reproductive and nervous system disorders, and endocrine disruption. For these reasons, pesticides have been studied in the Anchorage basin for a number of years by the MOA and the U.S. Geological Survey (USGS).

The Municipality of Anchorage (MOA) has conducted a number of pesticide screening studies as required by their (MS4) National Pollutant Discharge Elimination System (NPDES) permit, originally issued in 1999. The permit, now administered by the Alaska Department of Environmental Conservation (ADEC), was re-issued in 2009 and again in 2015. The 2009 permit required that the MOA continue the pesticide screening that was conducted on three lakes in 2000 and 2002. Pesticide sampling occurred for that permit cycle in 2011 and 2013. The 2015 permit requires continued pesticide screening in years two and four (2016 and 2018) of the current permit. This report provides the results of the 2016 pesticide screening.

The MOA does not contain a large amount of agricultural land; pesticide use is predominantly home application for lawn and garden care, golf course maintenance, industrial application within utility corridors, and municipal maintenance (landscape, right-of-way, and parks). The pesticides used in the Anchorage area include broadcast pesticides applied by homeowners and localized pesticides (those pesticides applied along roads and trails most often by agencies)–all areas that tend to be closer to local waterways.

Factors influencing the vulnerability of surface water to contamination by pesticides include the quantity and timing of pesticide application, type of soil, topography, and buffer area between the site of application and the water body. Pesticide application typically occurs in the spring and summer months. This coincides with the heaviest rainfall period and the greatest likelihood of chemicals being washed into local streams and lakes. Unless direct application to a water

body is made, stormwater runoff serves as the conveyance mechanism. Water bodies that are located closer to a pesticide application site are more likely to receive direct runoff from a post-application rain event than a more distant water body. Pesticides that are not washed off may be transported into groundwater through infiltration, and these may be subsequently discharged as base flow to streams. This transport mechanism likely results in lower concentrations of pesticides in the receiving water since pesticides are retained within the soil matrix (MOA, 1999).

The MOA conducted a pesticide use survey (MOA, Watershed Management Services 1999) and found seven pesticides were used most prevalently, two of which were selected for screening (MOA, 2000). These two pesticides were Sevin FL (Carbaryl), which is used in the summer for aphid and spruce beetle control, and 2,4-D, a broadcast herbicide used by homeowners for lawn care and aquatic vegetation control.

The pesticide screening program was originally designed to collect screening data within areas that are most likely to accumulate pesticides. The U.S. Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation (ADEC) suggested that sampling the water column of closed-basin lakes (lakes without defined surface water outlets) would meet the criteria. Three closed-basin lakes, Lake Otis, Hideaway Lake, and Little Campbell Lake, were sampled in 2011 and 2013. Grab samples were collected from the water column at least 10 meters offshore of each lake. Samples were analyzed for 2,4-D and Carbaryl. The monitoring revealed detectable levels of 2,4-D in Hideaway Lake and Lake Otis in the 2013 water samples. These samples were the first in the history of the sampling program to find detectable levels of pesticides, though much lower than ADEC drinking water standard. Since detection of 2,4-D had never occurred in either lake before, a second sampling event was completed in August 2013. The repeated sampling confirmed that 2,4-D was present in concentrations over the method detection limit and reporting limit in both lakes.

1.3 Screening Program

The goal of the pesticide screening program is to determine whether two pesticides commonly used in the Anchorage area persist in three closed-basin lakes selected for screening: Lake Otis, Hideaway Lake, and Little Campbell Lake, shown in Figure 1. The location in each lake where the sampling was conducted is shown on the individual lake maps (Figures 2 through 4). Photos of the sampling effort in each lake are shown in Appendix A. Lake Otis and Hideaway Lake are surrounded by residential development while the area around Little Campbell Lake remains undeveloped. Little Campbell Lake is used as a control for this study. To meet this goal, MOA sampled for 2,4-D and Carbaryl in each of the three lakes as representative pesticides.

The previous APDES permit specified that pesticides are to be screened using a field immunoassay kit and any positive readings will be verified by a laboratory sample. However, immunoassay kits are no longer available for Carbaryl. Therefore, the sampling design was modified (QAP 2016) to include laboratory sampling; ALS provided sampling containers, and preformed the analysis (EPA Method 8231B; see Section 2.6, Deviations from the QAP).

2.0 Methods

2.1 Sampling Locations

Pesticide sampling was conducted at three closed-basin lakes: Lake Otis, Hideaway Lake, and Little Campbell Lake on October 13, 2016. There was no detection of 2,4-D or Carbaryl in any of the lakes during the sampling event.

Table 1 shows the precipitation data for Anchorage during the 16 days prior to the sampling event.

Table 1. Precipitation Data for Anchorage for 16 Days Prior to Sampling

Date (2011)	Precipitation (inches)	Date	Precipitation (inches)
Sept 28	0	Oct 6	0
Sept 29	0	Oct 7	0
Sept 30	0	Oct 8	0
Oct 1	0	Oct 9	0
Oct 2	0.08	Oct 10	0.01
Oct 3	0.02	Oct 11	0
Oct 4	0.01	Oct 12	0
Oct 5	0	Oct 13	0.

Source: NWS, 2016

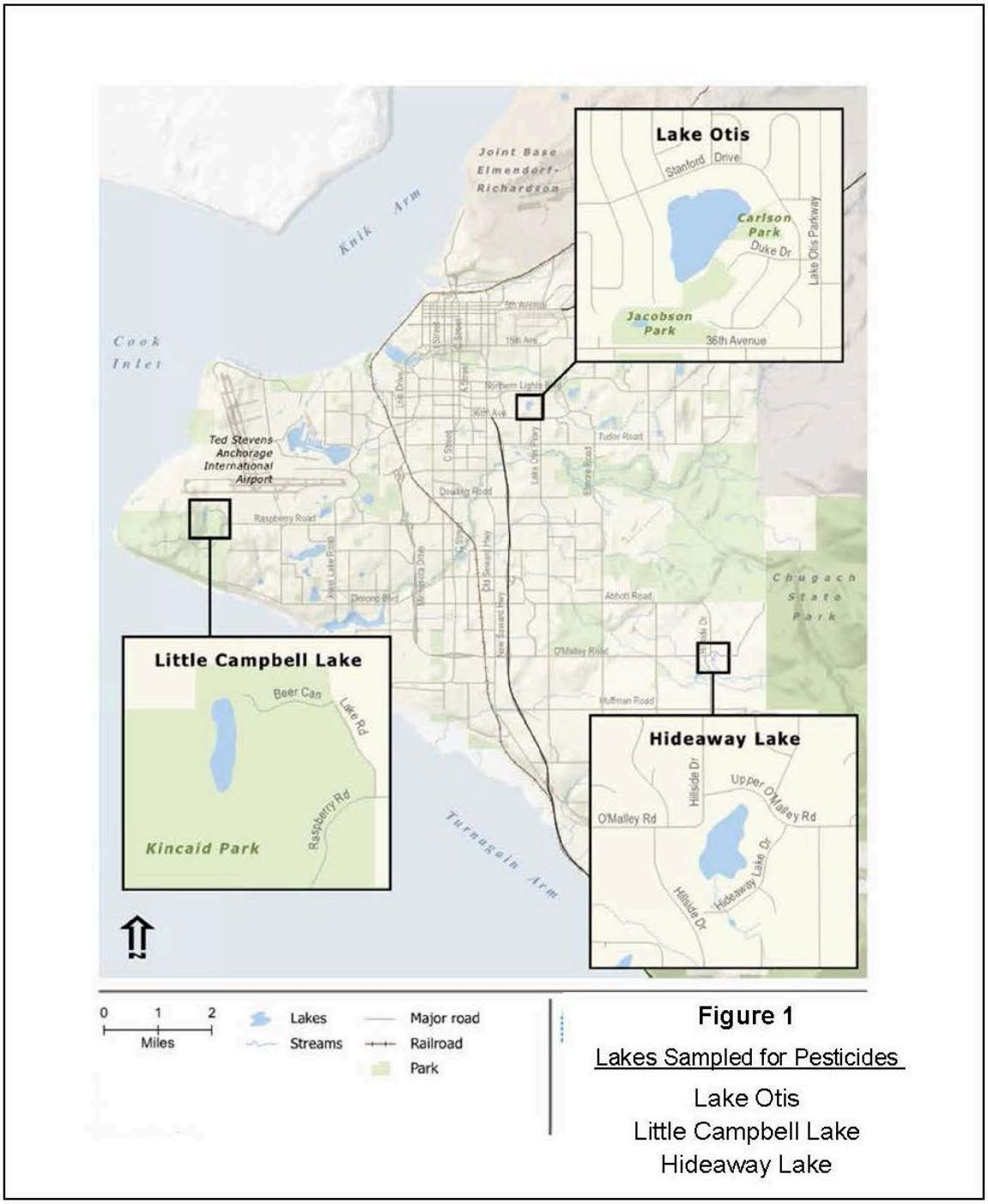


Figure 1. Area Location Map

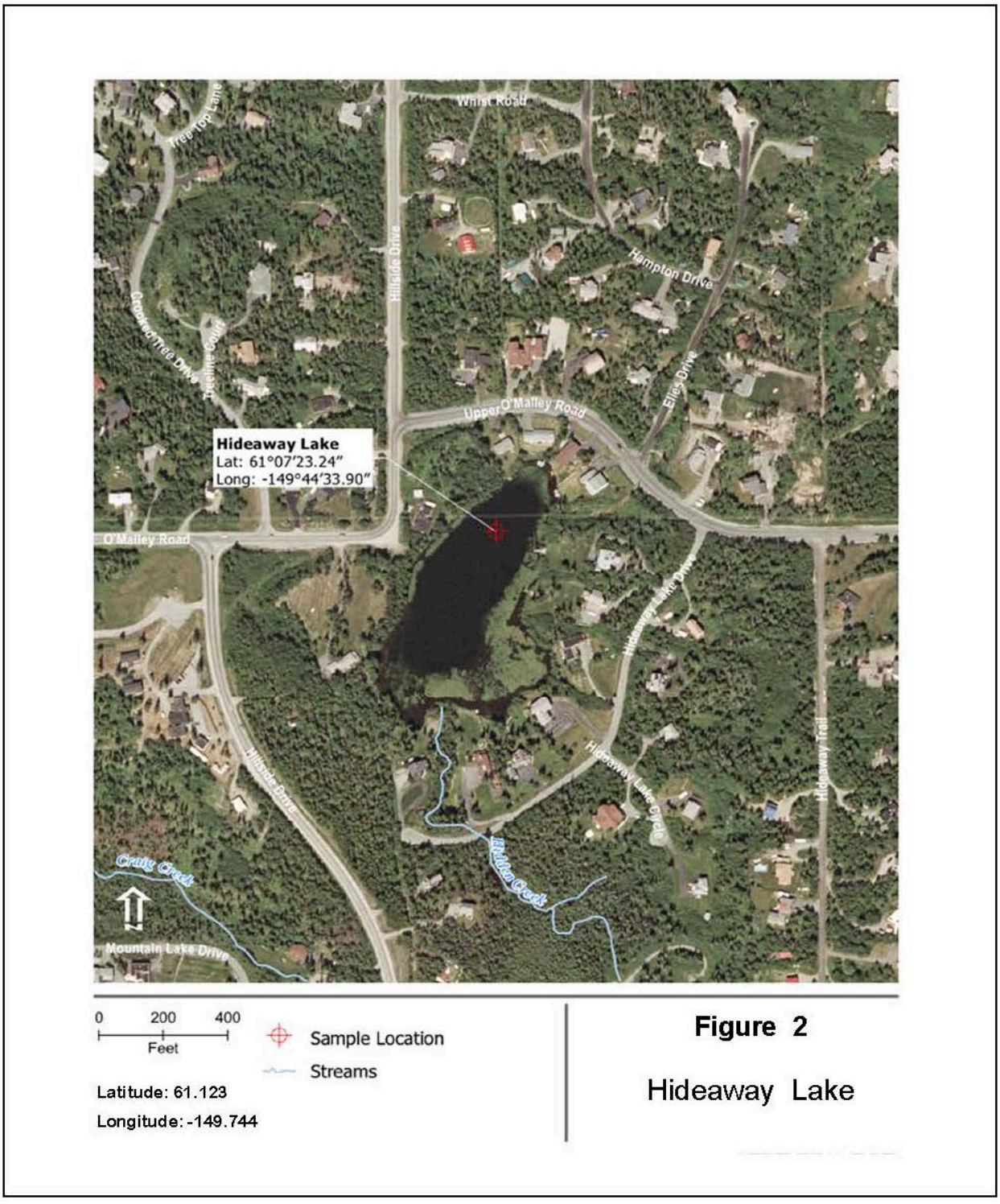


Figure 2. Hideaway Lake Pesticide Sampling Location

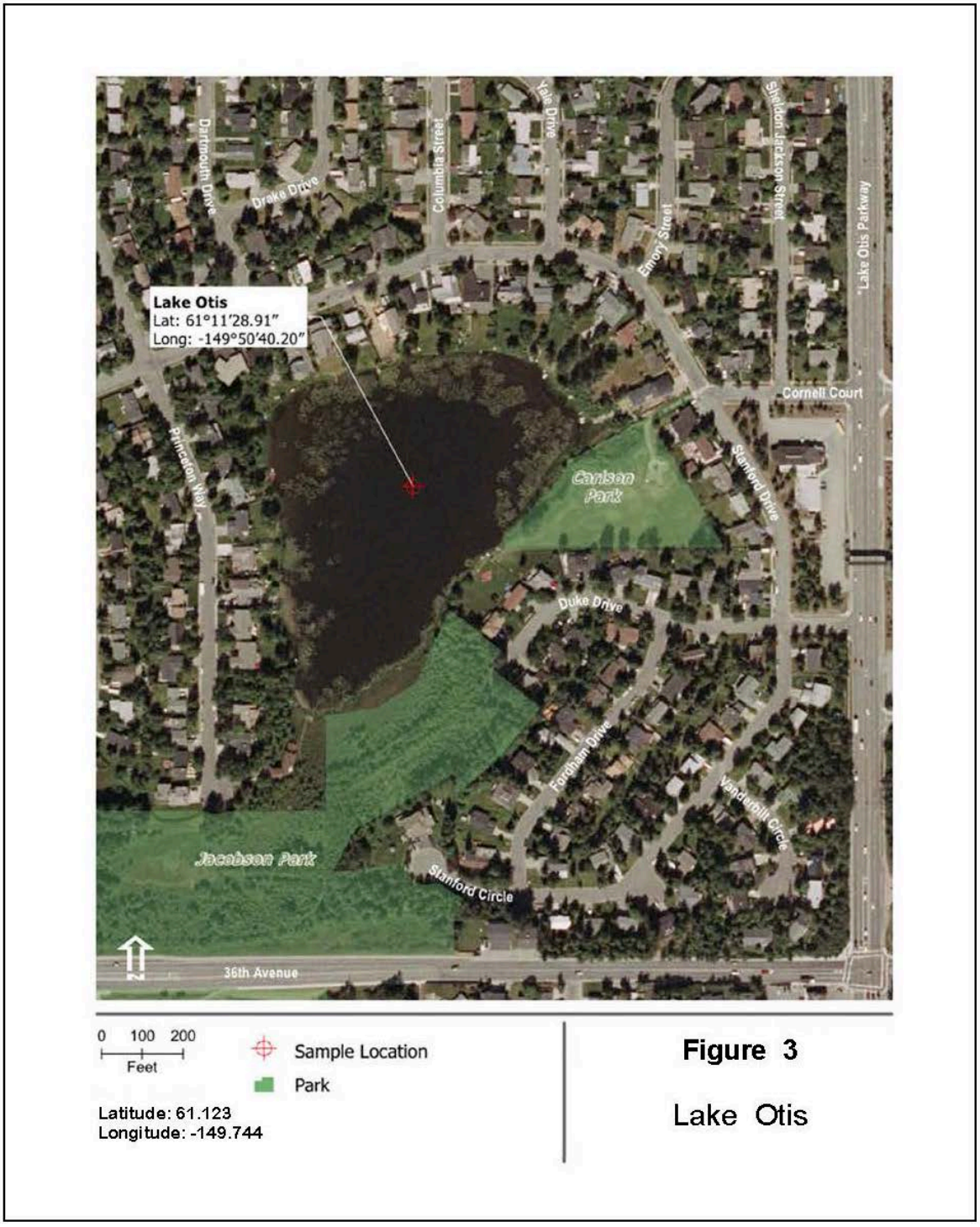


Figure 3. Lake Otis Pesticide Sampling Location

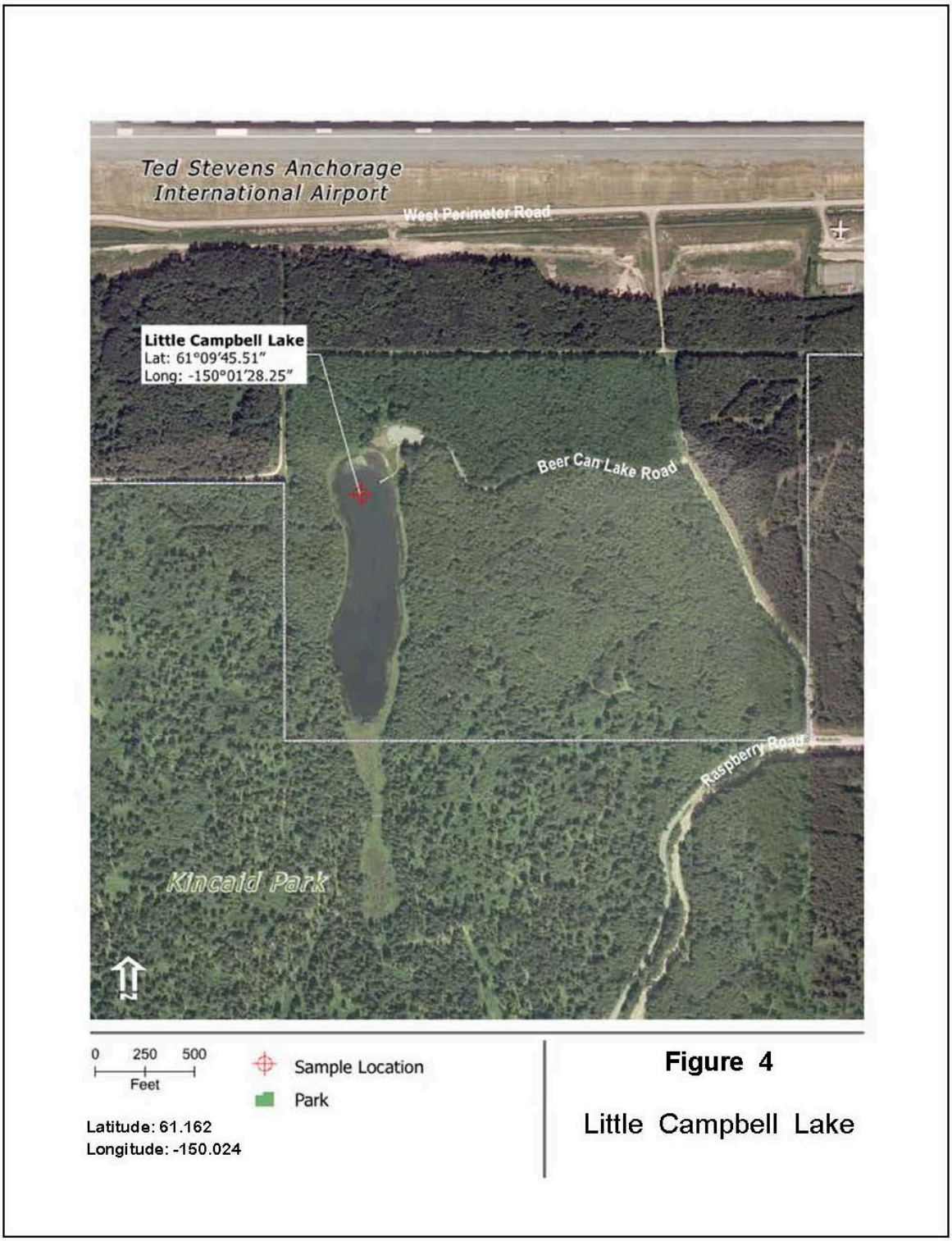


Figure 4. Little Campbell Lake Pesticide Sampling Location

2.2 Measured Parameters

Table 2 lists the parameters and methods that were used to measure each parameter, as well as the associated ranges.

Table 2. Parameters and Methods of Analysis

Parameter	Method	Range
Temperature (°C)	SM 2550 B YSI 556 hand-held probe	-5°-45°C
pH	EPA 150.2 YSI 556 hand-held probe	0-14 STD
2,4-D	EPA 8151A	NA
Carbaryl	EPA 8321B	NA

See Section 2.6, Deviations from the QAP

2.3 Sample Collection Procedures

The sampling equipment is calibrated in the morning of a sampling event. For the 2016 event the team used a YSI 556 multimeter provided and calibrated the day of the sampling event by TTT Environmental. All sampling equipment went through a complete decontamination procedure at each site using Alconox followed by a triple rinse with deionized water

The crew collected a single water column sample from 1 to 2 meters below the water surface using a plastic Niskin bottle sampler and water column temperature, pH and GPS waypoints recorded. The collected sample was poured into laboratory-provided bottles with appropriate preservative on shore. Sample bottles were labeled with the project name, site and sample identification numbers, sample date and time, and name of sampler. The pesticide samples were collected, preserved on ice and transported to the SGS Laboratory in Anchorage. SGS prepared and shipped the samples to ALS Environmental – Kelso Laboratory.

2.4 Laboratory Sampling Parameters

All samples were analyzed by laboratory analysis using EPA method 8151A for 2,4-D, and EPA method 8321B for Carbaryl (See Section 2.6, Deviations from the QAP). The laboratory performing the analyses, ALS from Kelso, Washington (subcontracted by SGS in Anchorage) provided proper sample containers for Carbaryl. SGS in Anchorage provided sample containers for 2,4-D, ice, coolers, and chain of custody forms. Samples were stored in a cooler with frozen gel ice until they were signed over to SGS on the same day they were collected. At SGS samples were refrigerated until shipment to ALS laboratories.

ALS Environmental is certified by the EPA and has an approved QA/QC program. Analytical methods and testing procedures were in adherence with EPA-approved protocols and guidelines.

2.5 Chain of Custody

The chain of custody form was completed in the field by the field crew team leader for sample tracking. The original form was sent with the samples and delivered to SGS and transferred with the samples to ALS Laboratories. Copies of the chains of custody are provided in Appendix B.

2.6 Deviation from the QAP

The Quality Assurance Plan (QAP), (MOA, 2016) states that 2,4-D will be analyzed using EPA Method 515.4 and Carbaryl will be analyzed using EPA Methods 531.2. Both these methods are for drinking water standards. ALS used EPA Method 8151A for 2,4-D and EPA Method 8321B that were appropriate for non drinking water standards to analyze the lake samples.

A second deviation from the protocol specified in the QAP was the timing of the sampling event. The sampling event occurred in the fall of 2016. The QAP recommends the sampling event occur in mid to late summer. The sample location for Lake Otis, Hideaway Lake, and Little Campbell Lake were consistent with previous sampling events and as specified in QAP. All other sampling protocols specified in the current QAP were followed and no other deviations were used.

2.7 QA/QC and Data Validation

Quality Assurance and Quality Control (QA/QC) procedures were followed according to the QAP (MOA, 2016). The procedures included analytical checks (field replicates, equipment blanks, matrix spike/matrix spike duplicate); instrument calibration; and procedures to assess data for precision, accuracy, representativeness, comparability, and completeness.

Verification analyses for both parameters were conducted by ALS Laboratories. The data review was focused on criteria for the following QA and QC parameters and their overall effects on the data:

- Sample handling (chain of custody)
- Temperature blank
- Holding time compliance
- Matrix spikes and matrix spike duplicates
- Field replicate comparison
- Data validation.

Sample custody was adequately maintained for the samples. The internal temperatures of the coolers transporting the samples were held at less than 6^{o}C. The holding times of 7 days prior to extraction for Carbaryl and 14 days for 2,4-D, were met as samples were collected on October 13; extracted on October 18 (Carbaryl) and October 19 (2,4-D).

Laboratory precision was determined using matrix spike/matrix spike duplicate MS/MSD and was within the relative percent difference (RPD) limits (30) at 3 (RPD) for 2,4-D and 5 for Carbaryl. Laboratory accuracy was measured by adding a known quantity of the target chemical and measuring recovery. For Carbaryl, the recovery averaged 135%, biased slightly high and

non detect consistent with limits specified by EPA method 8321B. For 2,4-D, the recovery average was within the 41-108% range specified by EPA method 8151A at89% Lake samples were taken from the water column one meter below the surface in the deepest portion of each lake representing general lake quality. Field replicates were taken at Little Campbell Lake for the confirmation sampling to determine precision. Both the sample and the replicate were reported as not detected for Carbaryl. The equipment rinse identified no contamination of the field equipment. One hundred percent of the sample results are valid values.

3.0 Results

The results of October 13, 2016 pesticide screening in the three lakes are provided in Table 3. Complete laboratory results are provided in Appendix C. None of the lakes had detections of Carbaryl or 2,4-D above the method reporting limit (MRL).

Table 3. Sample Results for Field Parameters and Laboratory Analyses

Site	Time of Sample	Temperature °C	pH	2,4-D (ug/L)/ MRL	Carbaryl (ug/L)/MRL
Lake Otis	13:00	10.22.01	6.33	ND (0.43)	ND (0.02)
Hideaway Lake	10:45	7.62.18	7.71	ND (0.44)	ND (0.02)
Little Campbell Lake	15:00	8.01.98	7.12	ND (0.40)	ND (0.02)

4.0 Discussion

The results of pesticide screening during the 2016 sampling season continue to support the previous results for Carbaryl. In 2013, 2,4-D was detected in Lake Otis and Hideaway Lake. While the concentrations were not high, the detection of 2,4-D had not occurred during any previous sampling. However, in 2016, 2,4-D was not detected in any of the lakes. A confirmation sampling event was completed at Lake Otis and Hideaway Lake in August 2013. after the first sampling event results were made available by the laboratory. Since detection of 2,4-D had never occurred in either lake before, it was determined that confirmation sampling should be completed. The repeated sampling confirmed that 2,4-D was present in concentrations over the method detection limit and reporting limit in both lakes . Several factors were discussed in the 2013 data report that may have potentially led to the detection of 2,4-D in the two lakes. An education program for property owners around the lakes on the use of pesticides and their effects within waterbodies, on wildlife, and humans, was recommended by MOA.

In the results discussion for Carbamates provided by ALS Environmental for Method 8321 notes include: Surrogate Exceptions the recovery of 4-Bromo-3,5-dimethylphenyl N-Methylcarbamate in several samples and Batch QC was outside the control limits listed in the results summary. Based on the method and historic data, the recoveries observed were in the range expected for this procedure. In Matrix Spike Recovery Exceptions it is noted that the recovery of Carbaryl in MOA HDL 001 (MS) Matrix Spike KQ1613276-01 was outside the control limits listed in the results summary. The limits are default values temporarily in use until sufficient data points are generated to calculate statistical control limits. Based on the method and historic data, the recoveries observed were in the range expected for this procedure. No further corrective action was taken.

5.0 References

MOA. 2000. Pesticide Screening at Anchorage Alaska, Data Report. Prepared by CH2M Hill, Inc. Prepared for Watershed Management Section, Municipality of Anchorage. December 2000. Publication No. WMP APR 00006.

MOA. 2013. Pesticide Screening Report. Prepared by HDR Alaska, INC. Prepared for Watershed Management Section, Municipality of Anchorage. October 2013. Publication No. WMP APR 00006.

MOA. 1999. Pesticide Screening at Anchorage Alaska, Conceptual Design. Prepared by CH2M Hill, Inc. Prepared for Watershed Management Section, Municipality of Anchorage. December 1999. Publication No. W MP App 99003

ADEC. 2007. Alaska Pesticide Management Plan to Protect and Restore Water Quality. Alaska Department of Environmental Conservation. October 31, 2007.

MOA. 2016. Monitoring, Evaluation, and Quality Assurance Plan, APDES Permit NO. AKS-052558. Prepared for Alaska Department of Environmental Conservation, Division of Water. Prepared by HDR Alaska, INC and Municipality of Anchorage. January 2016.

MOA. 2013. Performance of Sedimentation Basins and Oil/Grit Separators at Anchorage, Alaska. Prepared for Watershed Management Services Municipality of Anchorage. Prepared by HDR Alaska, Inc. January 2013.

MOA. 2012. Monitoring, Evaluation, and Quality Assurance Plan, APDES Permit NO. AKS-052558. Prepared for Alaska Department of Environmental Conservation, Division of Water. Prepared by HDR Alaska, INC and Municipality of Anchorage. July 2012.

MOA. 2000. Draft Pesticide Sampling Anchorage Alaska, Data Report. Prepared by CH2M Hill, Inc. Prepared for Watershed Management Section, Municipality of Anchorage. December 2000. Publication No. WMP APR00006.

MOA. 1999. Pesticide Screening at Anchorage Alaska, Conceptual Design. Prepared by CH2M Hill, Inc. Prepared for Watershed Management Section, Municipality of Anchorage. December 1999. Publication No. WMP App 99003.

MOA. 1992. Part I NPDES Permit Application.

NWS. 2016. National Weather Service Forecast Office, Anchorage. http://www.nws.noaa.gov/climate/index.php?wfo=pafc

USGS. 1999. Circular 1225. Website: http://pubs.usgs.gov/circ/circ1225/index.html

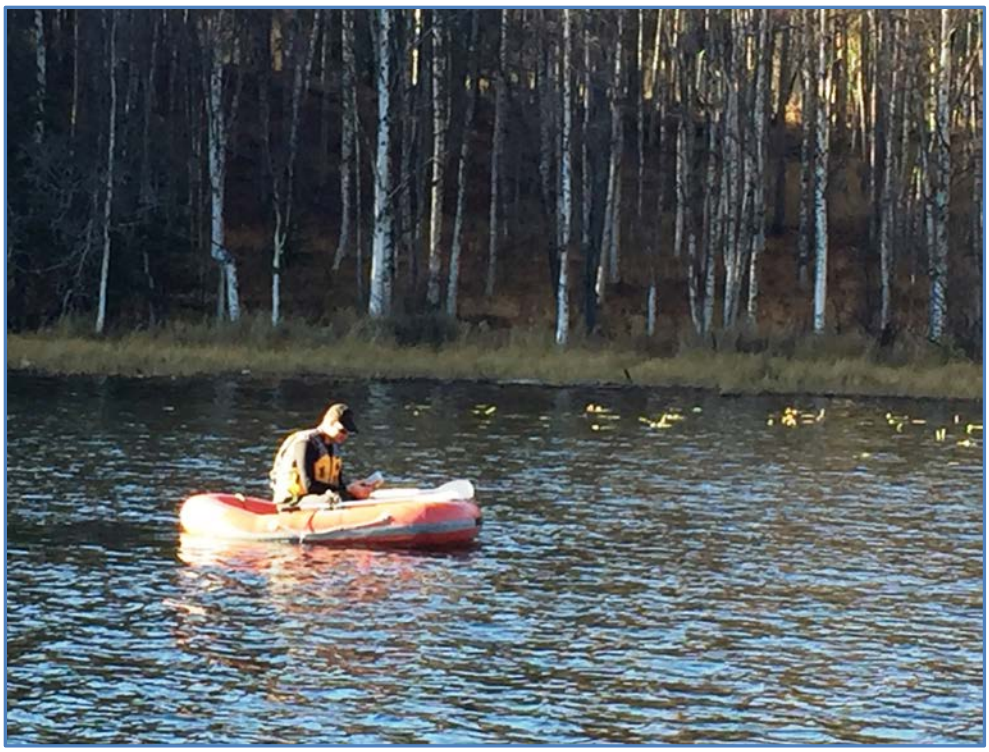
Appendix A
Photographs

Photograph 1. Hideway Lake, Looking SW

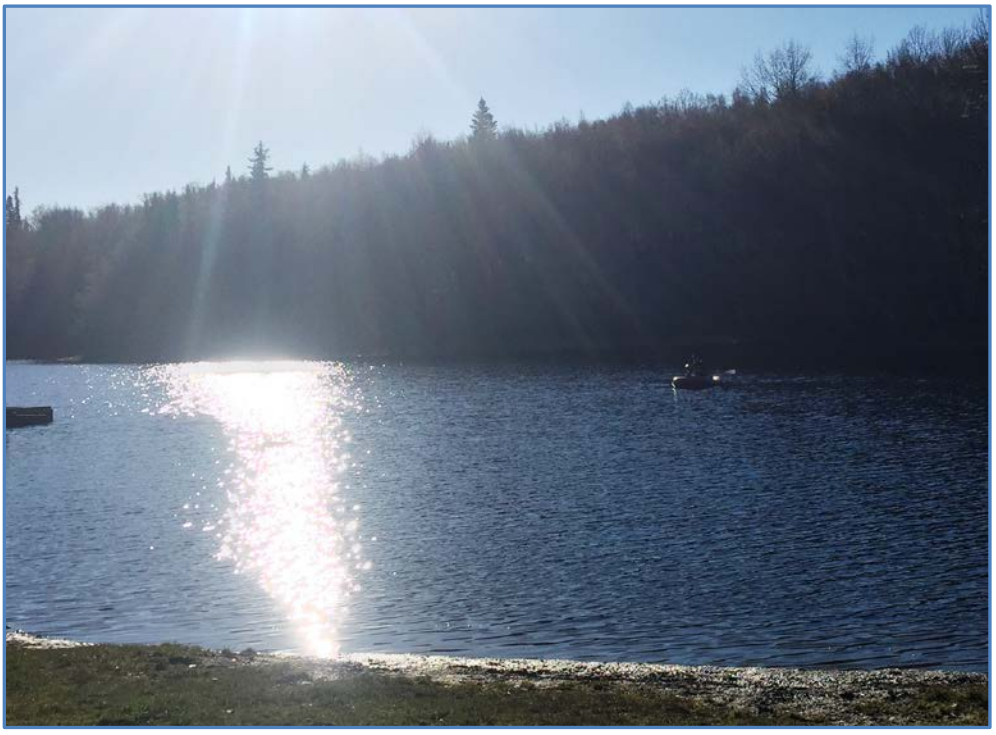
Photograph 2. Hideaway Lake, Looking ESE

Photograph 3. Lake Otis, Looking West

Photograph 4. Lake Otis, Looking West



Photograph 5. Little Campbell Lake, Looking NNW



Photograph 6. Little Campbell Lake, Looking SSW

Appendix B
Completed Chain of Custody

Chain of Custody

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

SGS

Returned Bottles Inventory

Name of individual returning bottles: Lynn Spencer

Date Received: 10/13/16

Client Name: MOA WSM

Received by: NCW

Project Name: MOA WSM MS4 Pesticide Screening

SGS PM: ~~JAN~~ FT

HDPE/Nalgene:	1-L						
	500-ml						
	250-ml or 8-oz						
	125-ml or 4-oz						
	60-ml or 2-oz						
	other						
amber glass:	1-L	8					
	500-ml						
	250-ml or 8-oz						
	125-ml or 4-oz with or without septa						
	40-ml VOA vial						
	other	8 Yellow-lid vials					
Subtotal:		16					

Note: Returned bottles (regardless of size/pres.) are billed back at $4/bottle ***unless otherwise quoted*** *.*

Amount to Invoice Client $: 64.00

WO#: 1166179

SGS

e-SAMPLE RECEIPT FORM

1166179

Review Criteria	Y/N (yes/no)	Exceptions Noted below
	Y	exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location		ABSENT
COC accompanied samples?	Y	
		**exemption permitted if chilled & collected <8hrs ago or chlling not required (i.e., waste, oil)
	Y	Cooler ID: 1 @ 2.6 °C Therm ID: D20
	Y	Cooler ID: 2 @ 3.0 °C Therm ID: 205
Temperature blank compliant* (i.e., 0-6 °C after CF)?		Cooler ID: @ °C Therm ID:
		Cooler ID: @ °C Therm ID:
		Cooler ID: @ °C Therm ID:
If >6°C, were samples collected <8 hours ago?		
If <0°C, were sample containers ice free?		
If samples received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "**COOLER TEMP**" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled".		
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
		Note: Refer to form F-083 "Sample Guide" for hold times.
Were samples received within hold time?	Y	
Do samples **match COC**** (i.e.,sample IDs,dates/times collected)?	Y	
**Note: If times differ <1hr, record details & login per COC.		
Were analyses requested unambiguous?	Y	
		***Exemption permitted for metals (e.g.200.8/6020A).
Were proper containers (type/mass/volume/preservative***)used?	Y	
IF APPLICABLE		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	N	No trip blank received.
Were all VOA vials free of headspace (i.e., bubbles ≤ 6mm)?	Y	
Were all soil VOAs field extracted with MeOH+BFB?		
Note to Client: Any "no" answer above indicates non-compliance with standard procedures and may impact data quality.		

Additional notes (if applicable):

SGS

SGS North America Inc.
CHAIN OF CUSTODY RECORD

1166179

Locations Nationwide
Alaska Maryland
New Jersey New York
North Carolina Indiana
West Virgina Kentucky
www.us.sgs.com

Instructions: Sections 1 - 5 must be filled out. Omissions may delay the onset of analysis.

Section 1

CLIENT: MOA WSM
Kristi
CONTACT: Bischoff Berger
PHONE NO: 907 343-8037
PROJECT NAME: MOA Pesticide
PROJECT/ PWSID/ PERMIT#:
REPORTS TO: Lynn Spencer
E-MAIL: mspencer@hdrinc.com
INVOICE TO: MOA WSM
QUOTE #:
P.O. #:

Section 2

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	# CONTAINERS	Type C = COMP G = GRAB MI = Multi Incre-mental Soils	Preservative: A	I	J	O	REMARKS/ LOC ID
1 C-D	MOA HDL 001	10/13/16	1045		2	G	X				
2 C-D	MOA HDL MS	10/13/16	1055		2	G	X				
3 C-D	MOA HDL MSD	10/13/16	1100		2	G	X				
4 C-D	MOA LO 001	10/13/16	1300		1	G	X				
5 C-D	MOA LCL 001	10/13/16	1510		2	G	X				
6 C-D	MOA LCL 002	10/13/16	1500		2	G	X				
7 C-D	MOA LCL ~~EB~~	10/13/16	1430		2	G	X				
8 C-D											
NLW 10/13/16											

Section 5

Relinquished By:	Date	Time	Received By:
(1) Spencer HDR	10/13/16	1625	
(2)			
(3)			
(4)	10/13/16	16:25	Received For Laboratory By:

Section 4

DOD Project? Yes No

Cooler ID:

Data Deliverable Requirements:

Requested Turnaround Time and/or Special Instructions:

Temp Blank °C: #1: 2.6 #020 #2: 3.0 #205
or Ambient [ ]
(See attached Sample Receipt Form)

Chain of Custody Seal: (Circle)
INTACT BROKEN (ABSENT)
(See attached Sample Receipt Form)

[ ] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

http://www.sgs.com/terms-and-conditions

Hand Delivered

SGS

SGS North America Inc.
CHAIN OF CUSTODY RECORD

1166179

Locations Nationwide
Alaska Maryland
New Jersey New York
North Carolina Indiana
West Virginia Kentucky
www.us.sgs.com

Instructions: Sections 1 - 5 must be filled out. Omissions may delay the onset of analysis.

Section 1

CLIENT: MOA WQSM
Kristi
CONTACT: Bischoffberger PHONE NO:
PROJECT NAME: MOAWQMS MS4. Pesticide Screening PROJECT/ PWSID/ PERMIT#:
REPORTS TO: LynnSpencer E-MAIL: lspencer@hdrinc.com
INVOICE TO: MOA WQMS QUOTE #: P.O. #:

Section 2

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	# CONTAINERS	Type C = COMP G = GRAB MI = Multi Incre-mental Soils	Preservative: Carbaryl	REMARKS/ LOC ID
1 A-B	MOA HDL 001	10/13/16	1045		2	G	X	
2 A-B	MOA HDL MS		1055		2	G	X	
3 A-B	MOA HDL MSD		1100		2	G	X	
4 A-B	MOA LO 001		1300		2	G	X	
5 A-B	MOA LCL 001		1510		2	G	X	
6 A-B	MOA LCL 002		1500		2	G	X	
7 A-B	MOA LCL FB		1430		2	G	X	

Section 5

Relinquished By:	Date	Time	Received By:
(1) LSpencer HDR	10/13/16	1625	
(2)			
(3)			
(4)	10/13/16	16:25	Received For Laboratory By:

Section 4

DOD Project? Yes No

Cooler ID:

Data Deliverable Requirements:

Requested Turnaround Time and/or Special Instructions:

Temp Blank °C: _____
or Ambient [ ]
(See attached Sample Receipt Form)

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT
(See attached Sample Receipt Form)

[ ] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

K1612608

SGS North America Inc.
CHAIN OF CUSTODY RECORD

1166179

Locations Nationwide

Alaska	Maryland
New Jersey	New York
North Carolina	Indiana
West Virgina	Kentucky

www.us.sgs.com

CLIENT:	SGS North America Inc. - Alaska Division	SGS Reference:	ALS Kelso, WA
CONTACT: Julie Shumway	PHONE NO: (907) 562-2343	Additional Comments: All soils report out in dry weight unless otherwise requested.	Page ___ of ___
PROJECT NAME: 1166179	PROJECT/ PWSID/ PERMIT#:		
REPORTS TO:	E-MAIL: Julie.Shumway@sgs.com		
INVOICE TO: SGS - Alaska	QUOTE #: P.O. #: 1166179		

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HHMM	MATRIX/ MATRIX	# CONTAINERS	Preservative Used: TYPE C = COMP G = GRAB Multi Incremental Soils	MCAA SW8321 - Carbaryl	NONE SW8151 - 2, 4-D			MS	MSD	SGS lab #	Loc ID	REMARKS
	MOA HDL 001	10/13/16	1045	SW	4	GRAB	X	X					1166179001		
	MOA HDL 001 MS	10/13/16	1055	SW	4	GRAB	X	X			X		1166179002		
	MOA HDL 001 MSD	10/13/16	1100	SW	4	GRAB	X	X				X	1166179003		
	MOA LO 001	10/13/16	1300	SW	4	GRAB	X	X					1166179004		
	MOA LCL 001	10/13/16	1510	SW	4	GRAB	X	X					1166179005		
	MOA LCL 002	10/13/16	1500	SW	4	GRAB	X	X					1166179006		
	MOA LCL EB	10/13/16	1430	SW	4	GRAB	X	X					1166179007		

Relinquished By: (1)	Date 10/17/16	Time 0919	Received By:	DOD Project? ☐ YES ☑ NO Report to DL (J Flags) ☐ Cooler ID:
Relinquished By: (2)	Date 10/18/16	Time 1030	Received By: ALS	Requested Turnaround Time and-or Special Instructions: Standard
Relinquished By: (3)	Date	Time	Received By:	Temp Blank °C: _____ or Ambient [ ]
Relinquished By: (4)	Date	Time	Received For Laboratory By:	Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT

Data Deliverable Requirements: Level 2

[X] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

PC H2

Cooler Receipt and Preservation Form

Client SGS North America Service Request K16 12608

Received: 10/18/16 Opened: 10/18/16 By: CG Unloaded: 10/18/16 By: CG

1. Samples were received via? *Mail* *Fed Ex* (*UPS*) *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 1 Front, 1 Back
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
2.2	2.1	4.2	4.1	-0.1	325	1166179	1Z A86 19W 01 6410 7290	
-0.5	-0.7	1.0	0.8	-0.2	371	1166179/1165950	6511 6500	

4. Packing material: (*Inserts*) *Baggies* (*Bubble Wrap*) (*Gel Packs*) *Wet Ice* *Dry Ice* *Sleeves* Brown Paper
5. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
6. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
12. Was C12/Res negative? NA (Y) N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

SHORT HOLD TIME

Page ____ of ____

Sample Containers and Preservatives

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition
1166179001-A	No Preservative Required	OK			
1166179001-B	No Preservative Required	OK			
1166179001-C	No Preservative Required	OK			
1166179001-D	No Preservative Required	OK			
1166179002-A	No Preservative Required	OK			
1166179002-B	No Preservative Required	OK			
1166179002-C	No Preservative Required	OK			
1166179002-D	No Preservative Required	OK			
1166179003-A	No Preservative Required	OK			
1166179003-B	No Preservative Required	OK			
1166179003-C	No Preservative Required	OK			
1166179003-D	No Preservative Required	OK			
1166179004-A	No Preservative Required	OK			
1166179004-B	No Preservative Required	OK			
1166179004-C	No Preservative Required	OK			
1166179004-D	No Preservative Required	OK			
1166179005-A	No Preservative Required	OK			
1166179005-B	No Preservative Required	OK			
1166179005-C	No Preservative Required	OK			
1166179005-D	No Preservative Required	OK			
1166179006-A	No Preservative Required	OK			
1166179006-B	No Preservative Required	OK			
1166179006-C	No Preservative Required	OK			
1166179006-D	No Preservative Required	OK			
1166179007-A	No Preservative Required	OK			
1166179007-B	No Preservative Required	OK			
1166179007-C	No Preservative Required	OK			
1166179007-D	No Preservative Required	OK			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.
BU - The container was received with headspace greater than 6mm.
DM- The container was received damaged.
FR- The container was received frozen and not usable for Bacteria or BOD analyses.
PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

Appendix C
Data Package

Laboratory Analysis Report

Kristi Bischofberger
MOA-Project Mngmt/Engr-WMS
PO Box 196650
Anchorage, AK 995196650

Work Order:	1166179
	MOA WSM MS4 PesticideScreening
Client:	MOA-Project Mnmt/Engr
Report Date:	November 14, 2016

Alaska Division Project Manager

Forest Taylor
2016.11.14
17:33:12
-09'00'

Enclosed are the analytical results associated with the above work order. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. If you have any questions regarding this report, or if we can be of any other assistance, please contact your SGS Project Manager at 907-562-2343. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & UST-005 (CS) for ADEC and 2944.01 for DOD ELAP/ISO 17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.
The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
D	The analyte concentration is the result of a dilution.
DF	Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
F	Indicates value that is greater than or equal to the DL
GT	Greater Than
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
JL	The analyte was positively identified, but the quantitation is a low estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
M	A matrix effect was present.
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
Q	QC parameter out of acceptance range.
R	Rejected
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content.
All DRO/RRO analyses are integrated per SOP.

ALS Environmental
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November 14, 2016

Analytical Report for Service Request No: K1612608

Julie Shumway
SGS Environmental Services, Inc.
200 West Potter Drive
Anchorage, AK 99518

RE: 1166179

Dear Julie,

Enclosed are the results of the sample(s) submitted to our laboratory October 18, 2016
For your reference, these analyses have been assigned our service request number **K1612608.**

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

Please contact me if you have any questions. My extension is 3364. You may also contact me via email at howard.holmes@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Howard Holmes
Project Manager

ALS Environmental
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Table of Contents

Acronyms

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

Inorganic Data Qualifiers

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

Metals Data Qualifiers

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

Organic Data Qualifiers

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

Additional Petroleum Hydrocarbon Specific Qualifiers

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

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

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

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

ALS ENVIRONMENTAL

Client:	SGS Environmental Services, Inc.	**Service Request No.:**	K1612608
Project:	1166179	**Date Received:**	10/18/16
Sample Matrix:	Water		

Case Narrative

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

Sample Receipt

Five water samples were received for analysis at ALS Environmental on 10/18/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

Chloriniated Herbicides by EPA Method 8151

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

Carbamates by Method 8321

Surrogate Exceptions:
The recovery of 4-Bromo-3,5-dimethylphenyl N-Methylcarbamate in several samples and Batch QC was outside the control limits listed in the results summary. Based on the method and historic data, the recoveries observed were in the range expected for this procedure. No further corrective action was taken.

Matrix Spike Recovery Exceptions:
The recovery of Carbaryl in MOA HDL 001 (MS) Matrix Spike KQ1613276-01 was outside the control limits listed in the results summary. The limits are default values temporarily in use until sufficient data points are generated to calculate statistical control limits. Based on the method and historic data, the recoveries observed were in the range expected for this procedure. No further corrective action was taken.

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

Approved by 

Chlorinated Herbicides

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

Analytical Results

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/2016
Sample Matrix:	Water	**Date Received:**	10/18/2016

Chlorinated Herbicides

Sample Name:	MOA HDL 001	**Units:**	ug/L
Lab Code:	K1612608-001	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	8151A		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
2,4-D	ND	U	0.44	1	10/19/16	10/29/16	KWG1609493	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2,4-Dichlorophenylacetic Acid	46	17-113	10/29/16	Acceptable

Comments:

Analytical Results

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/2016
Sample Matrix:	Water	**Date Received:**	10/18/2016

Chlorinated Herbicides

Sample Name:	MOA LO 001	**Units:**	ug/L
Lab Code:	K1612608-002	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	8151A		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
2,4-D	ND	U	0.43	1	10/19/16	10/29/16	KWG1609493	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2,4-Dichlorophenylacetic Acid	59	17-113	10/29/16	Acceptable

Comments:

Analytical Results

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/2016
Sample Matrix:	Water	**Date Received:**	10/18/2016

Chlorinated Herbicides

Sample Name:	MOA LCL 001	**Units:**	ug/L
Lab Code:	K1612608-003	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	8151A		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
2,4-D	ND	U	0.40	1	10/19/16	10/29/16	KWG1609493	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2,4-Dichlorophenylacetic Acid	51	17-113	10/29/16	Acceptable

Comments:

Analytical Results

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/2016
Sample Matrix:	Water	**Date Received:**	10/18/2016

Chlorinated Herbicides

Sample Name:	MOA LCL 002	**Units:**	ug/L
Lab Code:	K1612608-004	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	8151A		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
2,4-D	ND	U	0.44	1	10/19/16	10/29/16	KWG1609493	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2,4-Dichlorophenylacetic Acid	42	17-113	10/29/16	Acceptable

Comments:

Analytical Results

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/2016
Sample Matrix:	Water	**Date Received:**	10/18/2016

Chlorinated Herbicides

Sample Name:	MOA LCL EB	**Units:**	ug/L
Lab Code:	K1612608-005	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	8151A		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
2,4-D	ND	U	0.43	1	10/19/16	11/04/16	KWG1609493	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2,4-Dichlorophenylacetic Acid	28	17-113	11/04/16	Acceptable

Comments:

Analytical Results

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Chlorinated Herbicides

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1609493-4	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	8151A		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
2,4-D	ND	U	0.38	1	10/19/16	11/04/16	KWG1609493	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2,4-Dichlorophenylacetic Acid	26	17-113	11/04/16	Acceptable

Comments:

Client: SGS Environmental Services, Inc. **Service Request:** K1612608
Project: 1166179
Sample Matrix: Water

Surrogate Recovery Summary
Chlorinated Herbicides

Extraction Method: METHOD **Units:** Percent
Analysis Method: 8151A **Level:** Low

Sample Name	Lab Code	Sur1
MOA HDL 001	K1612608-001	46
MOA LO 001	K1612608-002	59
MOA LCL 001	K1612608-003	51
MOA LCL 002	K1612608-004	42
MOA LCL EB	K1612608-005	28
Method Blank	KWG1609493-4	26
MOA HDL 001MS	KWG1609493-1	68
MOA HDL 001DMS	KWG1609493-2	59
Lab Control Sample	KWG1609493-3	40

Surrogate Recovery Control Limits (%)

Sur1 = 2,4-Dichlorophenylacetic Acid 17-113

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Extracted:**	10/19/2016
Sample Matrix:	Water	**Date Analyzed:**	10/29/2016

Matrix Spike/Duplicate Matrix Spike Summary
Chlorinated Herbicides

Sample Name:	MOA HDL 001	**Units:**	ug/L
Lab Code:	K1612608-001	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	8151A	**Extraction Lot:**	KWG1609493

		MOA HDL 001MS KWG1609493-1 Matrix Spike			MOA HDL 001DMS KWG1609493-2 Duplicate Matrix Spike					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**%Rec**	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
2,4-D	ND	2.42	2.72	89	2.34	2.72	86	41-108	3	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

QA/QC Report

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Extracted:**	10/19/2016
Sample Matrix:	Water	**Date Analyzed:**	10/29/2016

Lab Control Spike Summary
Chlorinated Herbicides

Extraction Method:	METHOD	**Units:**	ug/L
Analysis Method:	8151A	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1609493

	Lab Control Sample KWG1609493-3 Lab Control Spike			
Analyte Name	**Result**	**Spike Amount**	**%Rec**	**%Rec Limits**
2,4-D	2.14	2.50	86	35-110

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Solvent Extractable Nonvolatile Compounds by HPLC-MS/MS

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

Analytical Report

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/16 10:45
Sample Matrix:	Water	**Date Received:**	10/18/16 10:30
Sample Name:	MOA HDL 001	**Units:**	ug/L
Lab Code:	K1612608-001	**Basis:**	NA

Solvent Extractable Nonvolatile Compounds by HPLC-MS/MS

Analysis Method: 8321B
Prep Method: Method

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Carbaryl	ND U	0.020	1	11/04/16 13:46	10/18/16	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromo-3,5-dimethylphenyl N-Methylcarbamate	134	70 - 130	11/04/16 13:46	*

Analytical Report

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/16 13:00
Sample Matrix:	Water	**Date Received:**	10/18/16 10:30
Sample Name:	MOA LO 001	**Units:**	ug/L
Lab Code:	K1612608-002	**Basis:**	NA

Solvent Extractable Nonvolatile Compounds by HPLC-MS/MS

Analysis Method: 8321B
Prep Method: Method

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Carbaryl	ND U	0.020	1	11/04/16 19:01	10/18/16	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromo-3,5-dimethylphenyl N-Methylcarbamate	142	70 - 130	11/04/16 19:01	*

Analytical Report

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/16 15:10
Sample Matrix:	Water	**Date Received:**	10/18/16 10:30
Sample Name:	MOA LCL 001	**Units:**	ug/L
Lab Code:	K1612608-003	**Basis:**	NA

Solvent Extractable Nonvolatile Compounds by HPLC-MS/MS

Analysis Method: 8321B
Prep Method: Method

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Carbaryl	ND U	0.020	1	11/04/16 19:11	10/18/16	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromo-3,5-dimethylphenyl N-Methylcarbamate	125	70 - 130	11/04/16 19:11	

Analytical Report

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/16 15:00
Sample Matrix:	Water	**Date Received:**	10/18/16 10:30
Sample Name:	MOA LCL 002	**Units:**	ug/L
Lab Code:	K1612608-004	**Basis:**	NA

Solvent Extractable Nonvolatile Compounds by HPLC-MS/MS

Analysis Method: 8321B
Prep Method: Method

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Carbaryl	ND U	0.020	1	11/04/16 14:34	10/18/16	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromo-3,5-dimethylphenyl N-Methylcarbamate	157	70 - 130	11/04/16 14:34	*

Analytical Report

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/16 14:30
Sample Matrix:	Water	**Date Received:**	10/18/16 10:30
Sample Name:	MOA LCL EB	**Units:**	ug/L
Lab Code:	K1612608-005	**Basis:**	NA

Solvent Extractable Nonvolatile Compounds by HPLC-MS/MS

Analysis Method: 8321B
Prep Method: Method

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Carbaryl	ND U	0.020	1	11/04/16 14:44	10/18/16	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromo-3,5-dimethylphenyl N-Methylcarbamate	119	70 - 130	11/04/16 14:44	

Analytical Report

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KQ1613276-05	**Basis:**	NA

Solvent Extractable Nonvolatile Compounds by HPLC-MS/MS

Analysis Method: 8321B
Prep Method: Method

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Carbaryl	ND U	0.020	1	11/04/16 13:17	10/18/16	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromo-3,5-dimethylphenyl N-Methylcarbamate	113	70 - 130	11/04/16 13:17	

Client: SGS Environmental Services, Inc. **Service Request:** K1612608
Project: 1166179
Sample Matrix: Water

SURROGATE RECOVERY SUMMARY
Solvent Extractable Nonvolatile Compounds by HPLC-MS/MS

Analysis Method: 8321B
Extraction Method: Method

Sample Name	Lab Code	4-Bromo-3,5-dimethylphenyl N -Methylcarbamate 70 - 130
MOA HDL 001	K1612608-001	134 *
MOA LO 001	K1612608-002	142 *
MOA LCL 001	K1612608-003	125
MOA LCL 002	K1612608-004	157 *
MOA LCL EB	K1612608-005	119
MOA HDL 001	KQ1613276-01	141 *
MOA HDL 001	KQ1613276-02	131 *
Lab Control Sample	KQ1613276-03	116
Duplicate Lab Control Sample	KQ1613276-04	97
Method Blank	KQ1613276-05	113

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Collected:**	10/13/16
Sample Matrix:	Water	**Date Received:**	10/18/16
		Date Analyzed:	11/4/16
		Date Extracted:	10/18/16

Duplicate Matrix Spike Summary
Solvent Extractable Nonvolatile Compounds by HPLC-MS/MS

Sample Name:	MOA HDL 001	**Units:**	ug/L
Lab Code:	K1612608-001	**Basis:**	NA
Analysis Method:	8321B		
Prep Method:	Method		

		Matrix Spike KQ1613276-01			Duplicate Matrix Spike KQ1613276-02					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Carbaryl	ND U	0.677	0.500	135 *	0.647	0.500	129	70-130	5	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	SGS Environmental Services, Inc.	**Service Request:**	K1612608
Project:	1166179	**Date Analyzed:**	11/04/16
Sample Matrix:	Water	**Date Extracted:**	10/18/16

Duplicate Lab Control Sample Summary
Solvent Extractable Nonvolatile Compounds by HPLC-MS/MS

Analysis Method:	8321B	**Units:**	ug/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	522134

	Lab Control Sample KQ1613276-03			Duplicate Lab Control Sample KQ1613276-04					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Carbaryl	0.600	0.500	120	0.570	0.500	114	70-130	5	30