

October 14, 2015

Sundance Energy, Inc.
633 17th Street
Suite 1950
Denver, Colorado 80202

Attention: Ms. Catherine A. Aniello

Subject: Sundance Beneficial Reuse Area (COGCC Location #429637)
Soil Sampling
Weld County, Colorado
AGW Project Number: 152962.E2

Dear Ms. Aniello:

As requested, A. G. Wassenaar, Inc. (AGW) collected a composite soil sample for analytical testing from the Sundance Beneficial Reuse area in Weld County, Colorado. AGW understands that the site was used to dispose of drill cuttings originating from one or more Sundance Energy, Inc. (Sundance) drill sites through beneficial reuse of the cuttings to enhance soil quality. This letter summarizes the project activities and analytical results.

BACKGROUND

The subject site is located in an agricultural area in the Northeast 1/4 the Northwest 1/4 of Section 16, Township 4 North, Range 67 West. It is approximately 2,300 feet east-southeast of the intersection of Weld County Road (WCR)-17 and WCR-46. Based on U.S. Geological Survey (USGS) Topographic Map data, the ground surface at the site generally slopes to the southeast. Figure 1 in Attachment A illustrates the site location and topography.

AGW understands that land application of bentonitic drilling fluids and drill cuttings was conducted at the subject site in accordance with an E&P Waste Management Plan and Sundry Form 4 submitted to the Colorado Oil and Gas Conservation Commission (COGCC) in 2011. At the request of Mr. Peter Gintautas of the COGCC, AGW visited the site in September 2015 to collect soil samples following the Waste Management Plan on behalf of Sundance with the goal of project closure.

SOIL SAMPLING METHODS

To collect the samples, an AGW geologist visited the site on September 22, 2015. The location of the beneficial reuse area was confirmed using section and range information, satellite photos, and global positioning system (GPS) coordinates provided by Sundance.

In accordance with the Waste Management Plan, AGW collected one composite sample which was comprised of four discrete soil samples collected from different portions of the subject farm field. Each discrete sample was taken from a depth of 0 to 8 inches using a clean shovel and stainless steel sampling

scoop. Prior to each use, the shovel, scoop, and a stainless steel bowl used to mix the discrete soils, were cleaned in a solution of Alconox® detergent and tap water followed by a tap water and distilled water rinse. To control potential cross contamination, the AGW geologist also wore a new pair of disposable nitrile gloves.

To prepare the composite sample, designated SUN-962-2, AGW mixed approximate equal portions of the discrete soil samples in the clean stainless steel bowl. The composite sample was then transferred into five new laboratory-supplied glass jars. The jars were immediately sealed, labeled, and placed into a cooler with ice (a preservative). On the day of collection, AGW delivered the sample to Accutest® Mountain States Laboratory, Inc. (Accutest®) in Wheat Ridge, Colorado for analysis. During this project, AGW followed chain-of-custody procedures in general accordance with U.S. Environmental Protection Agency (EPA) guidelines.

AGW recorded the GPS coordinates for each discrete sample location using a Garmin® model eTrex Vista® Hcx hand held GPS unit incorporating the NAD83 geodetic reference format. The GPS coordinates and sample locations are illustrated on Figure 2 in Attachment A.

ANALYTICAL RESULTS

Accutest® analyzed the sample using EPA approved Methods for diesel range organics (DRO); for gasoline range organics (GRO); for benzene, toluene, ethylbenzene, and xylenes (BTEX); for electrical conductivity (EC); for sodium adsorption ratio (SAR); for pH; and for COGCC Table 910-1 metals. In accordance with COGCC requirements as published on Table 910-1 of their Rules, the DRO and GRO values were added together to obtain the total petroleum hydrocarbon (TPH) concentration for comparison to the COGCC TPH standard. The analytical results are included below on Table 1. The laboratory report is included in Attachment B.

Table 1
Sundance Beneficial Reuse Site
Soil Sample Results
September 22, 2015

Analyte	Result*	COGCC Standard***
DRO	12.2	(none)
GRO	ND	(none)
TPH**	12.2	500 mg/kg
BTEX	ND	0.17, 85, 100 & 175 mg/kg, respectively
EC	0.624 mmhos/cm	4 mmhos/cm
SAR	1.58	12
pH	9.05 su	6 – 9 su
Arsenic	6.9 mg/kg****	0.39 mg/kg
Barium	2,150 mg/kg	15,000
Cadmium	ND	70 mg/kg
Chromium (trivalent)	12.4 mg/kg	120,000 mg/kg
Chromium (hexavalent)	ND	23 mg/kg
Copper	11.3 mg/kg	3,100 mg/kg
Lead	8.2 mg/kg	400 mg/kg
Mercury	ND	23 mg/kg
Nickel	10.9 mg/kg	1,600 mg/kg
Selenium	ND	390 mg/kg
Silver	ND	390 mg/kg
Zinc	40.5 mg/kg	23,000 mg/kg

* Units include: mg/kg: Milligrams per kilogram; mmhos/cm: millimhos per centimeter; su: standard units.

** TPH: Total petroleum hydrocarbons. Value determined by adding DRO and GRO per COGCC Table 910-1 Rules.

*** Standards from Colorado Oil and Gas Conservation Commission Table 910-1, effective January 30, 2015.

**** Based on data from the Colorado Department of Public Health and Environment (CDPHE), the average background arsenic concentration in Colorado is approximately 11 mg/kg.

ND – Not detected above laboratory method detection level or COGCC standard.

To evaluate analytical results associated with oil and gas related sites in Colorado, AGW compares detected values to the regulatory standards published on Table 910-1 of the COGCC Series 900 Rules.

Based on the analytical results, none of the analyte values were greater than the default Table 910-1 standards, with the exception of arsenic and pH.

Due to the naturally elevated arsenic concentrations found throughout much of Colorado (including Weld County), the Colorado Department of Public Health and Environment (CDPHE) has published a document called "Risk Management Guidance for Evaluating Arsenic Concentrations in Soil" which discusses typical background levels for arsenic in Colorado (available on the CDPHE website). Based on that document, the average background arsenic value for all land uses in Colorado is approximately 11 milligrams per kilogram (mg/kg). Arsenic values less than that average are typically considered naturally occurring which don't require remedial action. The arsenic concentration identified in the subject sample was only 6.9 mg/kg. Based on the CDPHE guidelines and documented natural arsenic values in the subject area, AGW believes

that the arsenic value identified in the sample represents background levels which do not require remediation. This is supported by the other analytical results, excluding pH, which met Table 910-1 standards, suggesting no residual impacts from the previous land spreading activities.

The pH value in the soil sample was 9.05 standard units (su), within approximately 0.55% of the Table 910-1 standard of 9.0 su. Soils in many locations in eastern Colorado exhibit background pH values greater than 9.0 su due to the semiarid climate and the potential for alkali evaporate minerals to accumulate in many soils. Based on these two factors, AGW believes that the observed pH value is likely consistent with natural background pH values and that no remediation is justified.

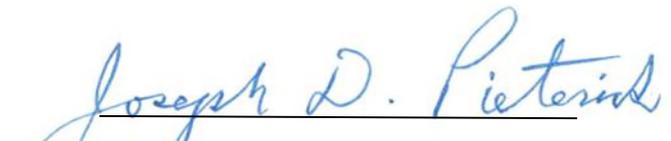
CONCLUSIONS AND RECOMMENDATIONS

At the request of Mr. Peter Gintautas of the COGCC, AGW collected a composite soil sample from the Sundance Beneficial Reuse area on September 22, 2015 following the applicable E&P Waste Management Plan procedures. The sample was tested for DRO, GRO, BTEX, EC, SAR, pH, and Table 910-1 metals.

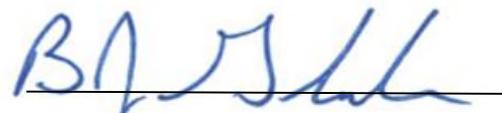
Based on the analytical results, none of the analyte values were greater than the default Table 910-1 standards, with the exception of arsenic and pH. Due to the naturally occurring elevated arsenic concentrations and pH values found in soils throughout eastern Colorado which are often greater than the values detected, AGW believes the values represent natural background levels at the subject site. Consequently, no remedial action is recommended. A copy of this report should be submitted to Mr. Peter Gintautas at the COGCC with a Form 4 to request project closure.

Thank you for the opportunity to assist you with this project. If you have any questions or require further information, please call us at (303) 759-8373.

Sincerely,
A.G. Wassenaar, Inc.



Joseph D. Pieterick, P.G.
Senior Geologist

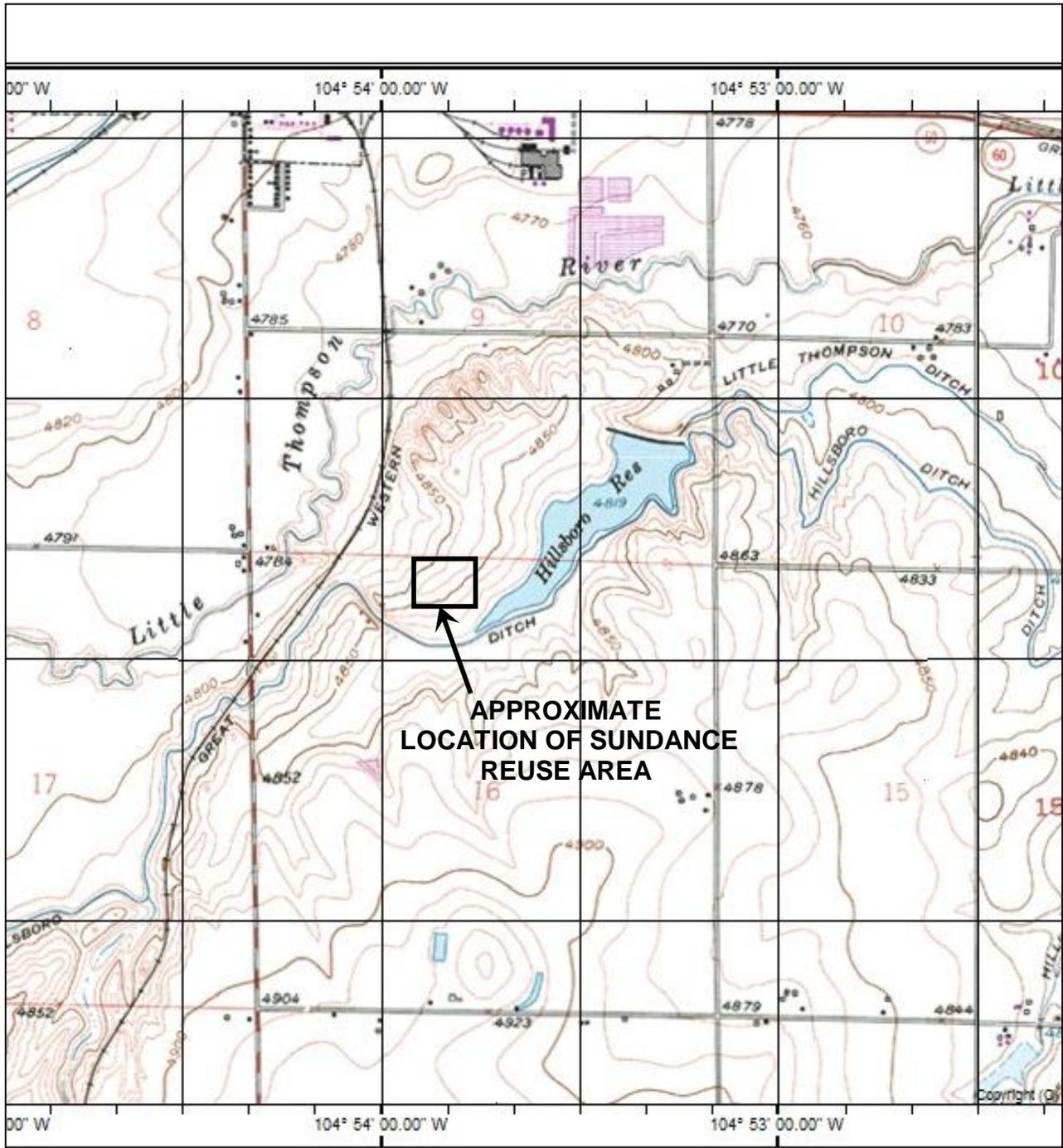


Brian J. Glade, P.E.
Vice President

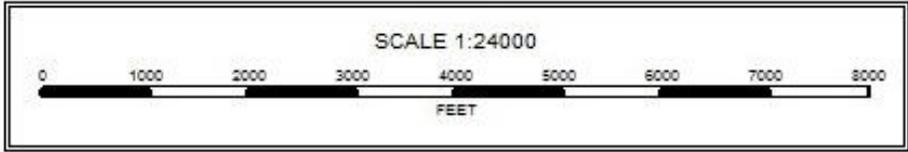
JDP/BJG/dd
Attachments

ATTACHMENT A
FIGURES

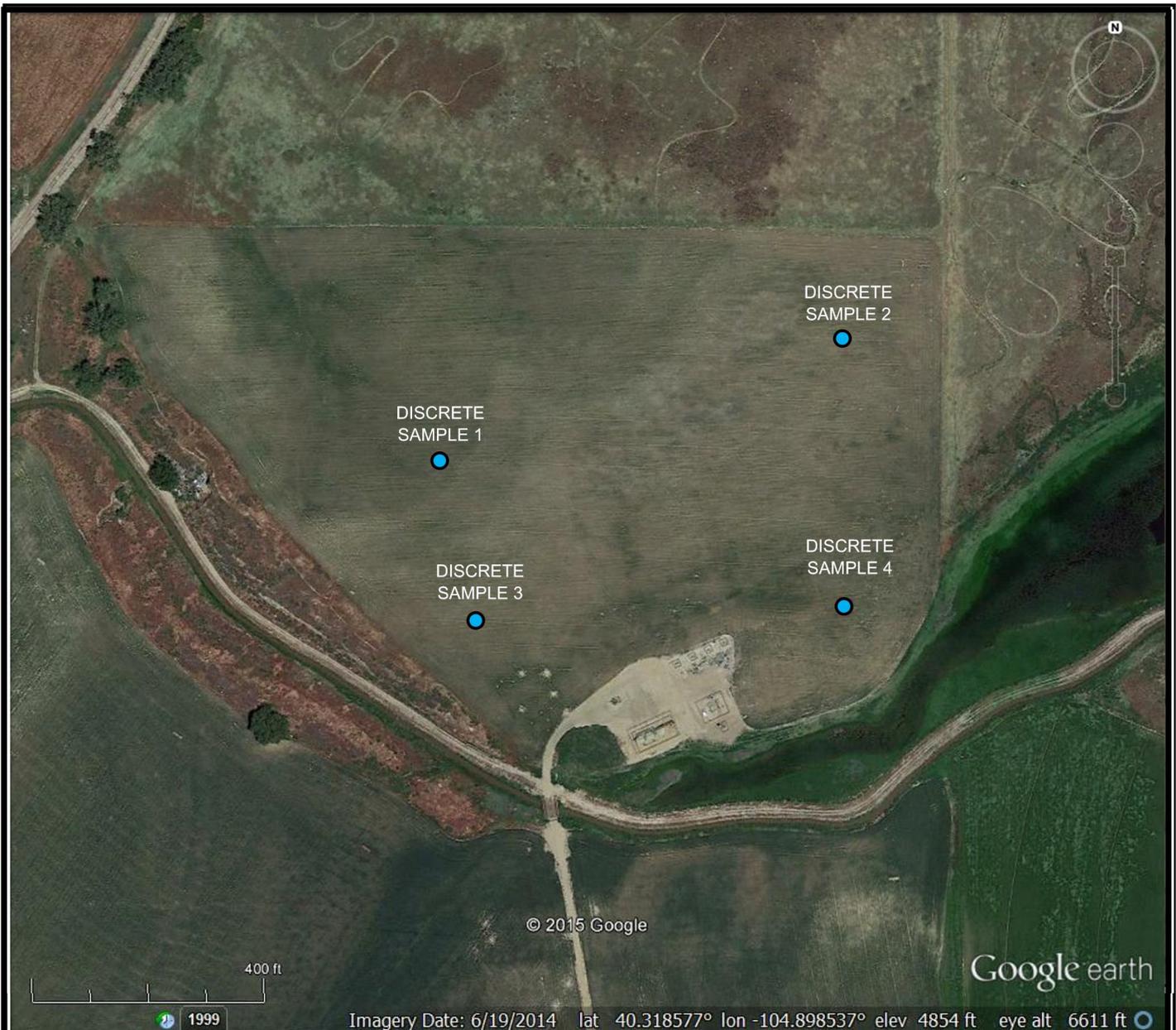




**APPROXIMATE
LOCATION OF SUNDANCE
REUSE AREA**



<p>A.G. WASSENAAR INC.</p> <p>GEOTECHNICAL · ENVIRONMENTAL CONSULTANTS</p>	
<p>SUNDANCE REUSE AREA WELD COUNTY, COLORADO SUNDANCE ENERGY</p>	<p>FIGURE 1 SITE TOPOGRAPHY AND LOCATION PROJECT: 152962.E2</p>



N

NOT TO SCALE

LEGEND

- DISCRETE SOIL SAMPLE COMPOSITED INTO SAMPLE SUN-962-2

DISCRETE SAMPLE GPS LOCATIONS:

- 1: N40.31888° W104.89948°
- 2: N40.31947° W104.89696°
- 3: N40.31812° W104.89927°
- 4: N40.31818° W104.89691°

ALL LOCATIONS ARE APPROXIMATE.

A. G. WASSENAAR | INC.

GEOTECHNICAL • ENVIRONMENTAL
CONSULTANTS

**SUNDANCE ENERGY
SUNDANCE REUSE SITE
WELD COUNTY, COLORADO**

**FIGURE 2
SITE FEATURES &
SAMPLE LOCATIONS
SEPTEMBER 22, 2015
PROJECT: 152962.E2**

ATTACHMENT B

LABORATORY REPORT



Technical Report for

A.G. Wassenaar, Inc.

Sundance

152962.E2

Accutest Job Number: D75415

Sampling Date: 09/22/15

Report to:

A.G. Wassenaar, Inc.
2180 S Ivanhoe Street Suite 5
Denver, CO 80222
pieterickj@agwco.com

ATTN: Joseph Pieterick

Total number of pages in report: 68



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.



Scott Heideman
Laboratory Director

Client Service contact: Renea Jackson 303-425-6021

Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), LA (LA150028), TX (T104704511), WY CO (CO00049), EPA 524.2 Provisional

This report shall not be reproduced, except in its entirety, without the written approval of Accutest Laboratories.
Test results relate only to samples analyzed.

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Sample Summary

A.G. Wassenaar, Inc.

Job No: D75415

Sundance

Project No: 152962.E2

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
D75415-1	09/22/15	09:45 JDP	09/22/15	SO	Soil	SUN-962-2
D75415-1A	09/22/15	09:45 JDP	09/22/15	SO	Soil	SUN-962-2

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client: A.G. Wassenaar, Inc.

Job No D75415

Site: Sundance

Report Date 9/29/2015 4:51:40 PM

On 09/22/2015, 1 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 5.1 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D75415 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GCMS By Method SW846 8260C

Matrix: SO **Batch ID:** N:V3C5644

- The data for SW846 8260C meets quality control requirements.
- D75415-1: Analysis performed at Accutest Laboratories, Dayton, NJ.

Volatiles by GC By Method SW846 8015B

Matrix: SO **Batch ID:** GGB1727

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D75418-14MS, D75418-14MSD were used as the QC samples indicated.

Extractables by GC By Method SW846-8015B

Matrix: SO **Batch ID:** OP12408

- All samples were extracted and analyzed within the recommended method holding time.
- Sample(s) D75415-1MS, D75415-1MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Metals By Method SW846 6010C

Matrix: AQ **Batch ID:** MP17019

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D75392-2AMS, D75392-2AMSD, D75392-2ASDL were used as the QC samples for the metals analysis.

Matrix: SO **Batch ID:** MP17007

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D75414-1MS, D75414-1MSD, D75414-1SDL were used as the QC samples for the metals analysis.
- The serial dilution RPD(s) for Cadmium, Lead, Barium, Nickel, Zinc are outside control limits for sample MP17007-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- MP17007-SD1 for Zinc, Nickel, Barium: Serial dilution indicates possible matrix interference.

Metals By Method SW846 6020A

Matrix: SO	Batch ID: MP17008
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- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Metals By Method SW846 7471B

Matrix: SO	Batch ID: MP17020
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- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D75411-1MS, D75411-1MSD were used as the QC samples for the metals analysis.

Wet Chemistry By Method ASTM D1498-76M

Matrix: SO	Batch ID: GN31677
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- Sample(s) D75334-1DUP were used as the QC samples for the Redox Potential Vs H2 analysis.

Wet Chemistry By Method SM2540G-2011 M

Matrix: SO	Batch ID: GN31664
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- The data for SM2540G-2011 M meets quality control requirements.

Wet Chemistry By Method SW846 3060A/7196A

Matrix: SO	Batch ID: GP16303
-------------------	--------------------------

- The data for SW846 3060A/7196A meets quality control requirements.

Wet Chemistry By Method SW846 3060A/7196A M

Matrix: SO	Batch ID: R30306
-------------------	-------------------------

- The data for SW846 3060A/7196A M meets quality control requirements.
- D75415-1 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Wet Chemistry By Method USDA HANDBOOK 60

Matrix: SO	Batch ID: MP17019
-------------------	--------------------------

- D75415-1A for Sodium Adsorption Ratio: Calculated as: $(\text{Na meq/L}) / \sqrt{[(\text{Ca meq/L}) + (\text{Mg meq/L})/2]}$

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client: Accutest Mountain States

Job No D75415

Site: AGWCODN: 152962-E2/Sundance

Report Date 9/29/2015 8:12:17 AM

On 09/24/2015, 1 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were received at Accutest Laboratories at a maximum corrected temperature of 2.5 C. Samples were intact and chemically preserved, unless noted below. An Accutest Job Number of D75415 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GCMS By Method SW846 8260C

Matrix: SO

Batch ID: V3C5644

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D75414-1MS, D75414-1MSD were used as the QC samples indicated.

Accutest certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting Accutest's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

Accutest Laboratories is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by Accutest Laboratories indicated via signature on the report cover

Summary of Hits

Job Number: D75415
Account: A.G. Wassenaar, Inc.
Project: Sundance
Collected: 09/22/15



Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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D75415-1 SUN-962-2

TPH-DRO (C10-C28)	12.2	11	9.5	mg/kg	SW846-8015B
Arsenic	6.9	0.11		mg/kg	SW846 6020A
Barium	2150	1.1		mg/kg	SW846 6010C
Chromium	12.4	1.1		mg/kg	SW846 6010C
Copper	11.3	1.1		mg/kg	SW846 6010C
Lead	8.2	5.3		mg/kg	SW846 6010C
Nickel	10.9	3.2		mg/kg	SW846 6010C
Zinc	40.5	3.2		mg/kg	SW846 6010C
Specific Conductivity	624	1.0		umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent ^a	12.4	2.1		mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2	441			mv	ASTM D1498-76M
pH	9.05			su	SW846 9045D

D75415-1A SUN-962-2

Calcium	60.5	2.0		mg/l	SW846 6010C
Magnesium	8.49	1.0		mg/l	SW846 6010C
Sodium	49.6	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio ^b	1.58			ratio	USDA HANDBOOK 60

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

(b) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID: SUN-962-2 Lab Sample ID: D75415-1 Matrix: SO - Soil Method: SW846 8260C Project: Sundance	Date Sampled: 09/22/15 Date Received: 09/22/15 Percent Solids: 94.7
--	--

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 ^a	3C123551.D	1	09/25/15	ANJ	n/a	n/a	N:V3C5644
Run #2							

Run #	Initial Weight
Run #1	4.8 g
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.00055	0.00015	mg/kg	
108-88-3	Toluene	ND	0.0011	0.00023	mg/kg	
100-41-4	Ethylbenzene	ND	0.0011	0.00018	mg/kg	
1330-20-7	Xylene (total)	ND	0.0011	0.00030	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	96%		70-122%
17060-07-0	1,2-Dichloroethane-D4	103%		68-124%
2037-26-5	Toluene-D8	102%		77-125%
460-00-4	4-Bromofluorobenzene	98%		72-130%

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

ND = Not detected	MDL = Method Detection Limit	J = Indicates an estimated value
RL = Reporting Limit		B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range		N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: SUN-962-2 Lab Sample ID: D75415-1 Matrix: SO - Soil Method: SW846 8015B Project: Sundance	Date Sampled: 09/22/15 Date Received: 09/22/15 Percent Solids: 94.7
--	--

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB32372.D	1	09/25/15	KN	n/a	n/a	GGB1727
Run #2							

Run #	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.1 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	11	5.5	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
120-82-1	1,2,4-Trichlorobenzene	73%		60-140%		

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

4.1
4

Report of Analysis

Client Sample ID: SUN-962-2 Lab Sample ID: D75415-1 Matrix: SO - Soil Method: SW846-8015B SW846 3546 Project: Sundance	Date Sampled: 09/22/15 Date Received: 09/22/15 Percent Solids: 94.7
---	--

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FH036720.D	1	09/23/15	GN	09/23/15	OP12408	GFH1536
Run #2							

Run #	Initial Weight	Final Volume
Run #1	20.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	12.2	11	9.5	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	92%		20-130%		

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

4.1
4

Report of Analysis

Client Sample ID: SUN-962-2 Lab Sample ID: D75415-1 Matrix: SO - Soil Project: Sundance	Date Sampled: 09/22/15 Date Received: 09/22/15 Percent Solids: 94.7
--	--

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	6.9	0.11	mg/kg	5	09/24/15	09/29/15 NT	SW846 6020A ⁴	SW846 3050B ⁶
Barium	2150	1.1	mg/kg	1	09/24/15	09/25/15 KV	SW846 6010C ²	SW846 3050B ⁵
Cadmium	< 1.1	1.1	mg/kg	1	09/24/15	09/25/15 KV	SW846 6010C ²	SW846 3050B ⁵
Chromium	12.4	1.1	mg/kg	1	09/24/15	09/25/15 KV	SW846 6010C ²	SW846 3050B ⁵
Copper	11.3	1.1	mg/kg	1	09/24/15	09/29/15 LH	SW846 6010C ³	SW846 3050B ⁵
Lead	8.2	5.3	mg/kg	1	09/24/15	09/25/15 KV	SW846 6010C ²	SW846 3050B ⁵
Mercury	< 0.087	0.087	mg/kg	1	09/25/15	09/25/15 KV	SW846 7471B ¹	SW846 7471B ⁷
Nickel	10.9	3.2	mg/kg	1	09/24/15	09/25/15 KV	SW846 6010C ²	SW846 3050B ⁵
Selenium	< 5.3	5.3	mg/kg	1	09/24/15	09/25/15 KV	SW846 6010C ²	SW846 3050B ⁵
Silver	< 3.2	3.2	mg/kg	1	09/24/15	09/25/15 KV	SW846 6010C ²	SW846 3050B ⁵
Zinc	40.5	3.2	mg/kg	1	09/24/15	09/25/15 KV	SW846 6010C ²	SW846 3050B ⁵

- (1) Instrument QC Batch: MA6570
- (2) Instrument QC Batch: MA6571
- (3) Instrument QC Batch: MA6580
- (4) Instrument QC Batch: MA6582
- (5) Prep QC Batch: MP17007
- (6) Prep QC Batch: MP17008
- (7) Prep QC Batch: MP17020

RL = Reporting Limit

4.1
4

Report of Analysis

Client Sample ID: SUN-962-2	Date Sampled: 09/22/15
Lab Sample ID: D75415-1	Date Received: 09/22/15
Matrix: SO - Soil	Percent Solids: 94.7
Project: Sundance	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	94.7		%	1	09/23/15	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	624	1.0	umhos/cm	1	09/25/15	JD	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	09/28/15 08:00	JF	SW846 3060A/7196A
Chromium, Trivalent ^a	12.4	2.1	mg/kg	1	09/28/15 08:00	JF	SW846 3060A/7196A M
Redox Potential Vs H2	441		mv	1	09/23/15	AK	ASTM D1498-76M
pH	9.05		su	1	09/23/15 12:00	TB	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

Report of Analysis

Client Sample ID: SUN-962-2	Date Sampled: 09/22/15
Lab Sample ID: D75415-1A	Date Received: 09/22/15
Matrix: SO - Soil	Percent Solids: 94.7
Project: Sundance	

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	60.5	2.0	mg/l	1	09/25/15	09/25/15 KV	SW846 6010C ¹	SW846 3010A/M ²
Magnesium	8.49	1.0	mg/l	1	09/25/15	09/25/15 KV	SW846 6010C ¹	SW846 3010A/M ²
Sodium	49.6	2.0	mg/l	1	09/25/15	09/25/15 KV	SW846 6010C ¹	SW846 3010A/M ²

(1) Instrument QC Batch: MA6571

(2) Prep QC Batch: MP17019

RL = Reporting Limit

4.2
4

Report of Analysis

Client Sample ID: SUN-962-2	Date Sampled: 09/22/15
Lab Sample ID: D75415-1A	Date Received: 09/22/15
Matrix: SO - Soil	Percent Solids: 94.7
Project: Sundance	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio ^a	1.58		ratio	1	09/25/15 20:17	KV	USDA HANDBOOK 60

(a) Calculated as: $(Na \text{ meq/L}) / \sqrt{[(Ca \text{ meq/L}) + (Mg \text{ meq/L})/2]}$

RL = Reporting Limit

4.2
 4

Misc. Forms

5

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

Accutest Job Number: D75415 **Client:** AG WASSENAAR **Project:** 152962.E2
Date / Time Received: 9/22/2015 4:56:00 PM **Delivery Method:** _____ **Airbill #'s:** hd
Cooler Temps (Initial/Adjusted): #1: (5.1/5.1);

Cooler Security

	<u>Y</u>	<u>or</u>	<u>N</u>		<u>Y</u>	<u>or</u>	<u>N</u>
1. Custody Seals Present:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	3. COC Present:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Custody Seals Intact:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	4. Smpl Dates/Time OK	<input checked="" type="checkbox"/>		<input type="checkbox"/>

Cooler Temperature

	<u>Y</u>	<u>or</u>	<u>N</u>
1. Temp criteria achieved:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Cooler temp verification:	<u>IR Gun;</u>		
3. Cooler media:	<u>Ice (Bag)</u>		
4. No. Coolers:	<u>1</u>		

Quality Control Preservation

	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>
1. Trip Blank present / cooler:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Trip Blank listed on COC:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Samples preserved properly:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
4. VOCs headspace free:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments

Sample Integrity - Documentation

	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample labels present on bottles:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Container labeling complete:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Sample container label / COC agree:	<input checked="" type="checkbox"/>		<input type="checkbox"/>

Sample Integrity - Condition

	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample recvd within HT:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. All containers accounted for:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Condition of sample:	<u>Intact</u>		

Sample Integrity - Instructions

	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>
1. Analysis requested is clear:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
2. Bottles received for unspecified tests	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
3. Sufficient volume recvd for analysis:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
4. Compositing instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Filtering instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>

5.1
5

GC Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D75415
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Sundance

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GGB1727-MB	GB32359.D	1	09/25/15	KN	n/a	n/a	GGB1727

The QC reported here applies to the following samples:

Method: SW846 8015B

D75415-1

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	9.9	5.0	mg/kg	

CAS No.	Surrogate Recoveries	Limits
120-82-1	1,2,4-Trichlorobenzene	75% 60-140%

6.1.1
6

Blank Spike Summary

Job Number: D75415
 Account: AGWCODN A.G. Wassenaar, Inc.
 Project: Sundance

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GGB1727-BS	GB32360.D	1	09/25/15	KN	n/a	n/a	GGB1727

The QC reported here applies to the following samples:

Method: SW846 8015B

D75415-1

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-GRO (C6-C10)	109	103	94	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
120-82-1	1,2,4-Trichlorobenzene	110%	60-140%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D75415
 Account: AGWCODN A.G. Wassenaar, Inc.
 Project: Sundance

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D75418-14MS	GB32362.D	1	09/25/15	KN	n/a	n/a	GGB1727
D75418-14MSD	GB32363.D	1	09/25/15	KN	n/a	n/a	GGB1727
D75418-14	GB32361.D	1	09/25/15	KN	n/a	n/a	GGB1727

The QC reported here applies to the following samples:

Method: SW846 8015B

D75415-1

CAS No.	Compound	D75418-14 mg/kg	Spike Q	mg/kg	MS mg/kg	MS %	Spike mg/kg	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-GRO (C6-C10)	ND	110	107	98	110	105	96	2	70-130/30	

CAS No.	Surrogate Recoveries	MS	MSD	D75418-14	Limits
120-82-1	1,2,4-Trichlorobenzene	79%	83%	88%	60-140%

* = Outside of Control Limits.

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D75415
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Sundance

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP12408-MB	FH036712.D	1	09/23/15	GN	09/23/15	OP12408	GFH1536

The QC reported here applies to the following samples:

Method: SW846-8015B

D75415-1

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	10	9.0	mg/kg	

CAS No.	Surrogate Recoveries	Limits
84-15-1	o-Terphenyl	94% 20-130%

7.1.1
7

Blank Spike Summary

Job Number: D75415
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Sundance

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP12408-BS	FH036714.D	1	09/23/15	GN	09/23/15	OP12408	GFH1536

The QC reported here applies to the following samples:

Method: SW846-8015B

D75415-1

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	250	166	66	32-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	101%	20-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D75415
 Account: AGWCODN A.G. Wassenaar, Inc.
 Project: Sundance

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP12408-MS	FH036716.D	1	09/23/15	GN	09/23/15	OP12408	GFH1536
OP12408-MSD	FH036718.D	1	09/23/15	GN	09/23/15	OP12408	GFH1536
D75415-1	FH036720.D	1	09/23/15	GN	09/23/15	OP12408	GFH1536

The QC reported here applies to the following samples:

Method: SW846-8015B

D75415-1

CAS No.	Compound	D75415-1 mg/kg	Spike Q mg/kg	MS mg/kg	MS %	Spike mg/kg	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	12.2	263	132	46	263	133	46	1	20-152/54

CAS No.	Surrogate Recoveries	MS	MSD	D75415-1	Limits
84-15-1	o-Terphenyl	74%	76%	92%	20-130%

* = Outside of Control Limits.

7.3.1
7

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

QC Batch ID: MP17007
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 09/24/15

Metal	RL	IDL	MDL	MB raw	final
Aluminum	10	1.1	1.7		
Antimony	3.0	.21	.82		
Arsenic	2.5	.38	2.1		
Barium	1.0	.02	.03	0.070	<1.0
Beryllium	1.0	.09	.16		
Boron	5.0	.08	.29		
Cadmium	1.0	.02	.1	0.0	<1.0
Calcium	40	.24	9.6		
Chromium	1.0	.03	.07	0.010	<1.0
Cobalt	0.50	.05	.12		
Copper	1.0	.08	.48	0.15	<1.0
Iron	7.0	.15	.69		
Lead	5.0	.21	.6	0.010	<5.0
Lithium	0.50	.04	.07		
Magnesium	20	.68	3.9		
Manganese	0.50	.05	.07		
Molybdenum	1.0	.04	.36		
Nickel	3.0	.05	.24	0.070	<3.0
Phosphorus	10	1.5	4.3		
Potassium	200	9.9	6		
Selenium	5.0	.71	1	0.72	<5.0
Silicon	5.0	.47	.91		
Silver	3.0	.03	.05	0.020	<3.0
Sodium	40	.73	1.5		
Strontium	5.0	.001	.03		
Thallium	1.0	.18	.86		
Tin	5.0	1.2	1.2		
Titanium	1.0	.01	.27		
Uranium	5.0	.29	.44		
Vanadium	1.0	.04	.07		
Zinc	3.0	.04	.35	0.80	<3.0

Associated samples MP17007: D75415-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

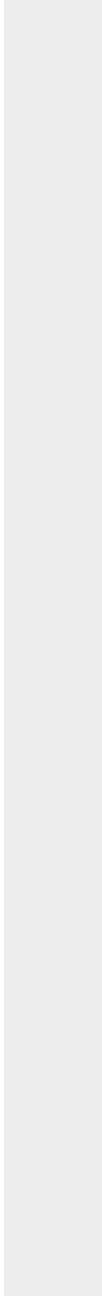
QC Batch ID: MP17007
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 09/24/15

Metal	RL	IDL	MDL	MB raw	final
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(anr) Analyte not requested



8.1.1

8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

QC Batch ID: MP17007
 Matrix Type: SOLID

Methods: SW846 6010C
 Units: mg/kg

Prep Date: 09/24/15

Metal	D75414-1 Original MS		SpikeLot ICPAL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	anr				
Barium	68.7	258	199	95.3	75-125
Beryllium					
Boron	anr				
Cadmium	0.27	48.6	49.7	97.3	75-125
Calcium	anr				
Chromium	10.4	55.6	49.7	91.0	75-125
Cobalt					
Copper	13.6	65.2	49.7	103.9	75-125
Iron	anr				
Lead	6.9	102	99.3	95.8	75-125
Lithium					
Magnesium	anr				
Manganese	anr				
Molybdenum					
Nickel	6.6	52.3	49.7	92.0	75-125
Phosphorus					
Potassium					
Selenium	0.0	93.6	99.3	94.3	75-125
Silicon					
Silver	0.0	17.5	19.9	88.1	75-125
Sodium	anr				
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc	40.8	84.6	49.7	88.2	75-125

Associated samples MP17007: D75415-1

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

8.12
8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

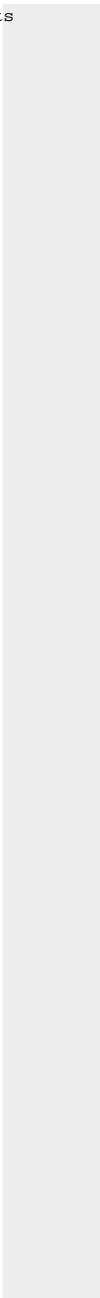
QC Batch ID: MP17007
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 09/24/15

Metal	D75414-1 Original MS	SpikeLot ICPALL2	% Rec	QC Limits
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(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested



8.1.2
8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

QC Batch ID: MP17007
 Matrix Type: SOLID

Methods: SW846 6010C
 Units: mg/kg

Prep Date: 09/24/15

Metal	D75414-1 Original	MSD	SpikeLot ICPAL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	anr					
Barium	68.7	261	202	95.0	1.2	20
Beryllium						
Boron	anr					
Cadmium	0.27	49.1	50.6	96.5	1.0	20
Calcium	anr					
Chromium	10.4	56.5	50.6	91.1	1.6	20
Cobalt						
Copper	13.6	67.1	50.6	105.7	2.9	20
Iron	anr					
Lead	6.9	103	101	94.9	1.0	20
Lithium						
Magnesium	anr					
Manganese	anr					
Molybdenum						
Nickel	6.6	53.2	50.6	92.1	1.7	20
Phosphorus						
Potassium						
Selenium	0.0	92.5	101	91.4	1.2	20
Silicon						
Silver	0.0	17.7	20.2	87.4	1.1	20
Sodium	anr					
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc	40.8	85.2	50.6	87.7	0.7	20

Associated samples MP17007: D75415-1

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

8.12
8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

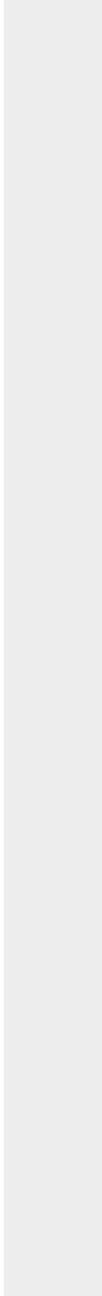
QC Batch ID: MP17007
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 09/24/15

Metal	D75414-1 Original MSD	SpikeLot ICPALL2	% Rec	MSD RPD	QC Limit
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(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested



8.1.2
8

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

QC Batch ID: MP17007
 Matrix Type: SOLID

Methods: SW846 6010C
 Units: mg/kg

Prep Date: 09/24/15

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	200	200	100.0	80-120
Beryllium				
Boron	anr			
Cadmium	51.3	50	102.6	80-120
Calcium	anr			
Chromium	49.4	50	98.8	80-120
Cobalt				
Copper	52.8	50	105.6	80-120
Iron	anr			
Lead	104	100	104.0	80-120
Lithium				
Magnesium	anr			
Manganese	anr			
Molybdenum				
Nickel	50.2	50	100.4	80-120
Phosphorus				
Potassium				
Selenium	99.8	100	99.8	80-120
Silicon				
Silver	19.9	20	99.5	80-120
Sodium	anr			
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc	51.2	50	102.4	80-120

Associated samples MP17007: D75415-1

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

8.1.3
8

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

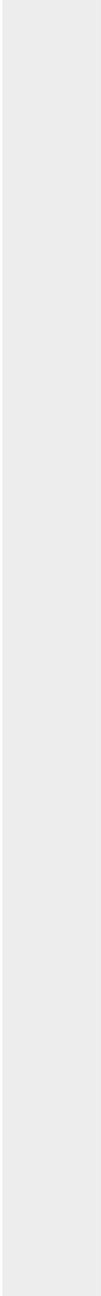
QC Batch ID: MP17007
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 09/24/15

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
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(anr) Analyte not requested



SERIAL DILUTION RESULTS SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

QC Batch ID: MP17007
 Matrix Type: SOLID

Methods: SW846 6010C
 Units: ug/l

Prep Date: 09/24/15

Metal	D75414-1 Original SDL 1:5		%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	679	749	10.2*(a)	0-10
Beryllium				
Boron	anr			
Cadmium	2.70	0.00	100.0(b)	0-10
Calcium	anr			
Chromium	103	109	5.3	0-10
Cobalt				
Copper	134	134	0.4	0-10
Iron	anr			
Lead	68.3	84.5	23.7 (b)	0-10
Lithium				
Magnesium	anr			
Manganese	anr			
Molybdenum				
Nickel	64.9	77.5	19.4*(a)	0-10
Phosphorus				
Potassium				
Selenium	0.00	60.5	NC	0-10
Silicon				
Silver	0.00	0.00	NC	0-10
Sodium	anr			
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc	403	494	22.6*(a)	0-10

Associated samples MP17007: D75415-1

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

8.1.4
8

SERIAL DILUTION RESULTS SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

QC Batch ID: MP17007
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 09/24/15

Metal	D75414-1	QC
	Original SDL 1:5 %DIF	Limits

- (anr) Analyte not requested
- (a) Serial dilution indicates possible matrix interference.
- (b) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

8.1.4

8

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

QC Batch ID: MP17008
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 09/24/15

Metal	RL	IDL	MDL	MB raw	final
Arsenic	0.10	.0085	.024	0.0082	<0.10

Associated samples MP17008: D75415-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

QC Batch ID: MP17008
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 09/24/15

Metal	Original MS	Spike lot ICPALL2	% Rec	QC Limits
-------	-------------	----------------------	-------	--------------

Associated samples MP17008: D75415-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

8.2.2
8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

QC Batch ID: MP17008
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 09/24/15

Metal	Original MSD	Spike lot ICPALL2	% Rec	MSD RPD	QC Limit
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Associated samples MP17008: D75415-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

QC Batch ID: MP17008
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 09/24/15

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Arsenic	115	100	115.0	80-120

Associated samples MP17008: D75415-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

8.2.3

8

SERIAL DILUTION RESULTS SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

QC Batch ID: MP17008
Matrix Type: SOLID

Methods: SW846 6020A
Units: ug/l

Prep Date: 09/24/15

Metal	Original	%DIF	QC Limits
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Associated samples MP17008: D75415-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

QC Batch ID: MP17019
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 09/25/15

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	55	65		
Antimony	150	11	44		
Arsenic	130	19	60		
Barium	50	1	2		
Beryllium	50	4.5	8		
Boron	250	4	18		
Cadmium	50	1	4		
Calcium	2000	12	50	-320	<2000
Chromium	50	1.5	3.5		
Cobalt	25	2.5	6		
Copper	50	4	19		
Iron	350	7.5	35		
Lead	250	11	25		
Lithium	25	2	3.5		
Magnesium	1000	34	200	5.0	<1000
Manganese	25	2.5	4.5		
Molybdenum	50	2	18		
Nickel	150	2.5	14		
Phosphorus	500	75	170		
Potassium	5000	500	360		
Selenium	250	36	50		
Silicon	250	24	42		
Silver	150	1.5	3		
Sodium	2000	37	70	-140	<2000
Strontium	25	.05	1.5		
Thallium	50	9	40		
Tin	250	60	60		
Titanium	50	.5	14		
Uranium	250	15	22		
Vanadium	50	2	3		
Zinc	150	2	18		

Associated samples MP17019: D75415-1A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

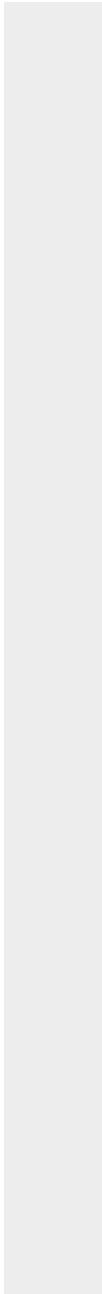
QC Batch ID: MP17019
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 09/25/15

Metal	RL	IDL	MDL	MB raw	final
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(anr) Analyte not requested



8.3.1
8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

QC Batch ID: MP17019
 Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
 Units: ug/l

Prep Date: 09/25/15

Metal	D75392-2A Original MS	Spikelot ICPAL2	% Rec	QC Limits	
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	320000	447000	125000	101.6	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	44700	175000	125000	104.2	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	338000	457000	125000	95.2	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP17019: D75415-1A

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

8.3.2
8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

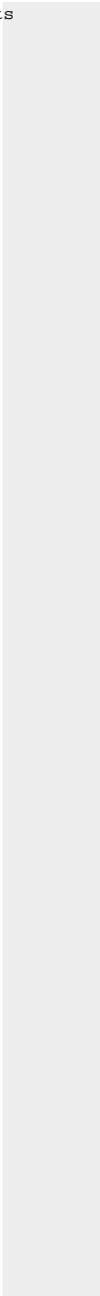
QC Batch ID: MP17019
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 09/25/15

Metal	D75392-2A Original MS	SpikeLot ICPAL2	% Rec	QC Limits
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(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested



8.3.2
8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

QC Batch ID: MP17019
 Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
 Units: ug/l

Prep Date: 09/25/15

Metal	D75392-2A Original MSD	SpikeLot ICPALL2	% Rec	MSD RPD	QC Limit	
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	320000	436000	125000	92.8	2.5	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	44700	171000	125000	101.0	2.3	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	338000	447000	125000	87.2	2.2	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP17019: D75415-1A

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

8.3.2
8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

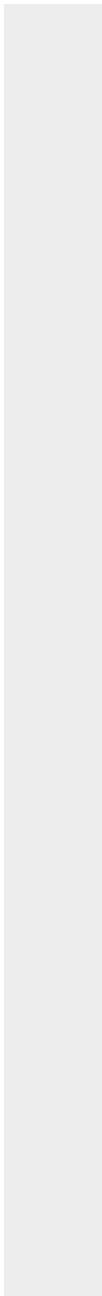
QC Batch ID: MP17019
 Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
 Units: ug/l

Prep Date: 09/25/15

Metal	D75392-2A Original MSD	SpikeLot ICPALL2 % Rec	MSD RPD	QC Limit
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(N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested



8.3.2
8

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

QC Batch ID: MP17019
 Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
 Units: ug/l

Prep Date: 09/25/15

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	129000	125000	103.2	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	130000	125000	104.0	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	124000	125000	99.2	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP17019: D75415-1A

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

8.3.3
8

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

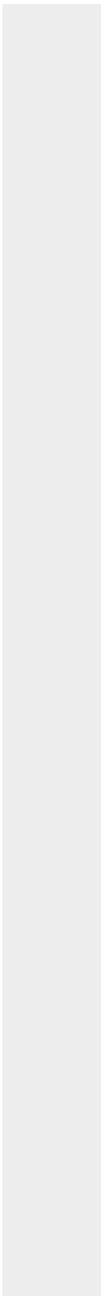
QC Batch ID: MP17019
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 09/25/15

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
-------	---------------	---------------------	-------	--------------

(anr) Analyte not requested



8.3.3
8

SERIAL DILUTION RESULTS SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

QC Batch ID: MP17019
 Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
 Units: ug/l

Prep Date: 09/25/15

Metal	D75392-2A Original SDL 1:5		%DIF	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	64000	64300	0.3	0-10
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	8940	9150	2.4	0-10
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	67700	67300	0.6	0-10
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP17019: D75415-1A

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

8.3.4
8

SERIAL DILUTION RESULTS SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

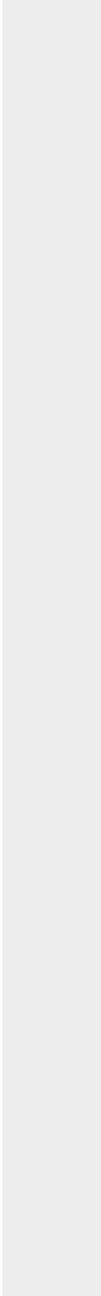
QC Batch ID: MP17019
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 09/25/15

Metal	D75392-2A	QC
	Original SDL 1:5 %DIF	Limits

(anr) Analyte not requested



BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

QC Batch ID: MP17020
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 09/25/15

Metal	RL	IDL	MDL	MB raw	final
Mercury	0.083	.00088	.0067	-0.0018	<0.083

Associated samples MP17020: D75415-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

8.4.1

8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

QC Batch ID: MP17020
 Matrix Type: SOLID

Methods: SW846 7471B
 Units: mg/kg

Prep Date: 09/25/15

Metal	D75411-1 Original MS	Spikelot HGWSR1	% Rec	QC Limits
Mercury	0.013	0.38	0.388	94.7 75-125

Associated samples MP17020: D75415-1

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

8.4.2
8

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D75415
 Account: AGWCODN - A.G. Wassenaar, Inc.
 Project: Sundance

QC Batch ID: MP17020
 Matrix Type: SOLID

Methods: SW846 7471B
 Units: mg/kg

Prep Date: 09/25/15

Metal	D75411-1 Original MSD	Spikelot HGWSR1	% Rec	MSD RPD	QC Limit
Mercury	0.013	0.37	0.381	93.6	2.7

Associated samples MP17020: D75415-1

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

8.4.2
8

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

QC Batch ID: MP17020
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 09/25/15

Metal	BSP Result	Spikelot HGWSR1	% Rec	QC Limits
Mercury	0.34	0.333	102.0	80-120

Associated samples MP17020: D75415-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

8.4.3
8

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chromium, Hexavalent	GN31738			mg/kg	59.8	53.0	88.6	80-120%
Specific Conductivity	GP16287/GN31702			umhos/cm	9988	9870	98.8	90-110%
pH	GN31674			su	8.00	7.98	99.8	99.1-100.9%

Associated Samples:
Batch GN31674: D75415-1
Batch GN31738: D75415-1
Batch GP16287: D75415-1
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Chromium, Hexavalent	GN31738	D75415-1	mg/kg	0.0	0.0	0.0	0-20%
Redox Potential Vs H2	GN31677	D75334-1	mv	350	353	0.9	0-20%

Associated Samples:
Batch GN31677: D75415-1
Batch GN31738: D75415-1
(*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chromium, Hexavalent	GN31738	D75415-1	mg/kg	0.0	40	31.6	79.0	75-125%

Associated Samples:

Batch GN31738: D75415-1

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

MATRIX SPIKE DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D75415
Account: AGWCODN - A.G. Wassenaar, Inc.
Project: Sundance

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Chromium, Hexavalent	GN31738	D75415-1	mg/kg	0.0	40	32.9	4.0	20%

Associated Samples:

Batch GN31738: D75415-1

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

Misc. Forms

Custody Documents and Other Forms

(Accutest New Jersey)

Includes the following where applicable:

- Chain of Custody

4036 Youngfield Street, Wheat Ridge, CO 80033
TEL: 303-425-6021 FAX: 303-425-6854
www.acctest.com

FED-EX Tracking # 6899 5704 2709	Bottle Order Control #
Accutest Quote #	Accutest Job # D75415

Client / Reporting Information		Project Information		Requested Analysis (see TEST CODE sheet)										Matrix Codes				
Company Name: Accutest Laboratories		Project Name: 152962-E2/Sundance												DW - Drinking Water GW - Ground Water WW - Water SW - Surface Water SO - Soil SL - Sludge SED - Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe FB - Field Blank EB - Equipment Blank RB - Rinse Blank TB - Trip Blank				
Street Address: 4036 Youngfield Street		Street: 4036 Youngfield Street																
City State Zip: Wheat Ridge, CO 80033		City State Zip: Wheat Ridge, CO 80033																
Project Contact E-mail: Jacobp jacobp@acctest.com		Project #																
Phone #: 303-425-6021		Client Purchase Order #																
Sampler(s) Name(s): JDP		Project Manager																
Accutest Sample #	Field ID / Point of Collection	MEQMDI Viol #	Collection			Matrix	# of bottles	Number of preserved Bottles							LAB USE ONLY			
			Date	Time	Sampled by			HCl	NH ₄ OH	NH ₃	H ₂ SO ₄	HNO ₃	DI Water	MEQH		ENCORE		
1	SUN-962-2		9/22/15	9:45:00 AM	JDP	SO	1										X	

Turnaround Time (Business days)		Data Deliverable Information										Comments / Special Instructions
<input type="checkbox"/> Std. 10 Business Days <input type="checkbox"/> 5 Day RUSH <input type="checkbox"/> 3 Day EMERGENCY <input type="checkbox"/> 2 Day EMERGENCY <input type="checkbox"/> 1 Day EMERGENCY <input checked="" type="checkbox"/> other Due 9/29/2015 <small>Emergency & Rush T/A data available VIA Lablink</small>		Approved By (Accutest PM): / Date:		<input type="checkbox"/> Commercial "A" (Level 1) <input type="checkbox"/> NYASP Category A <input type="checkbox"/> Commercial "B" (Level 2) <input type="checkbox"/> NYASP Category B <input type="checkbox"/> FULLT1 (Level 3+4) <input checked="" type="checkbox"/> State I CUMMBN <input type="checkbox"/> NJ Reduced <input type="checkbox"/> EDD Format <input type="checkbox"/> Commercial "C" <input type="checkbox"/> Other							INITIAL ASSESSMENT <i>MDK/A</i> LABEL VERIFICATION <i>JL</i>	

Sample Custody must be documented below each time samples change possession, including courier delivery.									
Relinquished By Sampler: <i>JDP</i>	Date Time: <i>9/23/15 1578</i>	Received By: <i>Red EX</i>	Date Time: <i>9/24/15 9:50</i>	Relinquished By: <i>Red EX</i>	Date Time:	Received By:			
Relinquished by Sampler:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:			
Relinquished by:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:			
Custody Seal # <i>Client</i>		<input checked="" type="checkbox"/> Intact <input type="checkbox"/> Not Intact		Preserved where applicable <input type="checkbox"/>		On Ice <input checked="" type="checkbox"/>		Cooler Temp. <i>2.30°C</i>	

10.1 10

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: D75415 **Client:** _____ **Project:** _____
Date / Time Received: 9/24/2015 9:50:00 AM **Delivery Method:** _____ **Airbill #s:** _____

Cooler Temps (Raw Measured) °C: Cooler 1: (2.3);
 Cooler Temps (Corrected) °C: Cooler 1: (2.5);

Cooler Security Y or N Y or N
 1. Custody Seals Present: 3. COC Present:
 2. Custody Seals Intact: 4. Smpl Dates/Time OK

Cooler Temperature Y or N
 1. Temp criteria achieved:
 2. Cooler temp verification: IR Gun
 3. Cooler media: Ice (Bag)
 4. No. Coolers: 1

Quality Control Preservation Y or N N/A
 1. Trip Blank present / cooler:
 2. Trip Blank listed on COC:
 3. Samples preserved properly:
 4. VOCs headspace free:

Sample Integrity - Documentation Y or N
 1. Sample labels present on bottles:
 2. Container labeling complete:
 3. Sample container label / COC agree:

Sample Integrity - Condition Y or N
 1. Sample recvd within HT:
 2. All containers accounted for:
 3. Condition of sample: Intact

Sample Integrity - Instructions Y or N N/A
 1. Analysis requested is clear:
 2. Bottles received for unspecified tests:
 3. Sufficient volume recvd for analysis:
 4. Compositing instructions clear:
 5. Filtering instructions clear:

Comments

10.1 10

GC/MS Volatiles

QC Data Summaries

(Accutest New Jersey)

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D75415
 Account: ALMS Accutest Mountain States
 Project: AGWCODN: 152962-E2/Sundance

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3C5644-MB	3C123545.D	1	09/25/15	PS	n/a	n/a	V3C5644

The QC reported here applies to the following samples:

Method: SW846 8260C

D75415-1

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.50	0.13	ug/kg	
100-41-4	Ethylbenzene	ND	1.0	0.16	ug/kg	
108-88-3	Toluene	ND	1.0	0.21	ug/kg	
1330-20-7	Xylene (total)	ND	1.0	0.27	ug/kg	

CAS No.	Surrogate Recoveries	Limits	
1868-53-7	Dibromofluoromethane	96%	70-122%
17060-07-0	1,2-Dichloroethane-D4	102%	68-124%
2037-26-5	Toluene-D8	97%	77-125%
460-00-4	4-Bromofluorobenzene	98%	72-130%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	Total TIC, Volatile		0	ug/kg	

11.1.1
11

Blank Spike Summary

Job Number: D75415
Account: ALMS Accutest Mountain States
Project: AGWCODN: 152962-E2/Sundance

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3C5644-BS	3C123546.D	1	09/25/15	PS	n/a	n/a	V3C5644

The QC reported here applies to the following samples:

Method: SW846 8260C

D75415-1

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	50	46.9	94	77-122
100-41-4	Ethylbenzene	50	51.4	103	75-121
108-88-3	Toluene	50	49.9	100	75-123
1330-20-7	Xylene (total)	150	158	105	76-121

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	98%	70-122%
17060-07-0	1,2-Dichloroethane-D4	113%	68-124%
2037-26-5	Toluene-D8	105%	77-125%
460-00-4	4-Bromofluorobenzene	101%	72-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D75415
 Account: ALMS Accutest Mountain States
 Project: AGWCODN: 152962-E2/Sundance

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D75414-1MS	3C123547.D	1	09/25/15	PS	n/a	n/a	V3C5644
D75414-1MSD	3C123548.D	1	09/25/15	PS	n/a	n/a	V3C5644
D75414-1	3C123550.D	1	09/25/15	PS	n/a	n/a	V3C5644

The QC reported here applies to the following samples:

Method: SW846 8260C

D75415-1

CAS No.	Compound	D75414-1 ug/kg	Spike Q ug/kg	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	ND	58.5	48.5	83	58.5	49.1	84	1	48-136/30
100-41-4	Ethylbenzene	ND	58.5	49.3	84	58.5	48.1	82	2	34-145/29
108-88-3	Toluene	ND	58.5	48.4	83	58.5	49.2	84	2	40-141/30
1330-20-7	Xylene (total)	ND	175	150	86	175	147	84	2	34-146/29

CAS No.	Surrogate Recoveries	MS	MSD	D75414-1	Limits
1868-53-7	Dibromofluoromethane	96%	96%	98%	70-122%
17060-07-0	1,2-Dichloroethane-D4	106%	101%	106%	68-124%
2037-26-5	Toluene-D8	100%	103%	103%	77-125%
460-00-4	4-Bromofluorobenzene	101%	100%	99%	72-130%

* = Outside of Control Limits.