Table of Contents: ARI Job AYR5

Client: Apex Labs

Project: A6D0056

AV
Signature

April-14-2016
Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

April 14, 2016

Philip Nerenberg
Apex Laboratories
12232 SW Garden Place
Tigard, OR 97223

RE: Project: A6D0056
ARI Job No.: AYR5

Dear Mr. Nerenberg:

Please find enclosed the original Chain of Custody records (COCs), sample receipt documentation, and the final data for the samples from the project referenced above.

Sample receipt information and analytical details are addressed in the Case Narrative.

An electronic copy of this report and all supporting raw data will be kept on file at ARI. Should you have any questions or concerns, please feel free to call me at your convenience.

Respectfully,
ANALYTICAL RESOURCES, INC.

Cheronne Oreiro
Project Manager
(206) 695-6214
cheronneo@arilabs.com
www.arilabs.com

cc: eFile: AYR5

Enclosures

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Documentation

ARI Job ID: AYR5

VF 4/4/16

AYRS

SUBCONTRACT ORDER

Apex Laboratories

A6D0056

SENDING LABORATORY:

Apex Laboratories
12232 S.W. Garden Place
Tigard, OR 97223
Phone: (503) 718-2323
Fax: (503) 718-0333
Project Manager: Philip Nerenberg

RECEIVING LABORATORY:

Analytical Resources, INC
4611 S. 134th Place
Tukwila, WA 98168
Phone :(206) 695-6200
Fax: (206) 695-6201

Soil Embankment (0-3.5)

Sample Name: 5237-160401-DC-EMB038 **Soil** **Sampled: 04/01/16 10:25** (A6D0056-02)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/14/16 17:00	04/15/16 10:25	
Containers Supplied:			
(E)4 oz Glass Jar			

Soil Embankment (0-3.5)

Sample Name: 5237-160401-DC-EMB039 **Soil** **Sampled: 04/01/16 11:05** (A6D0056-04)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/14/16 17:00	04/15/16 11:05	
Containers Supplied:			
(E)4 oz Glass Jar			

Soil Embankment (0-3)

Sample Name: 5237-160401-DC-EMB046 **Soil** **Sampled: 04/01/16 12:00** (A6D0056-06)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/14/16 17:00	04/15/16 12:00	
Containers Supplied:			
(E)4 oz Glass Jar			

NDP Soil Embankment (0-3.5) Label Reads 523

Sample Name: 5237-160401-NDP-EMB002 **Soil** **Sampled: 04/01/16 16:00** (A6D0056-08)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/14/16 17:00	04/15/16 16:00	
Containers Supplied:			
(E)4 oz Glass Jar			

Level IV DP please
Standard TAT

Melissa Kiya — UPS (Shipper)

Released By — Date — Received By — Date

UPS (Shipper) — 4-5-16 @ 1058

Released By — Date — Received By — Date

AYRS : 000005

AYRS

SUBCONTRACT ORDER

Apex Laboratories

A6D0056

NDP Soil Embankment (0-3.0) Label Reads 523

Sample Name: 5237-160401-NDP-EMB003 **Soil** **Sampled: 04/01/16 16:10** (A6D0056-10)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/14/16 17:00	04/15/16 16:10	
Containers Supplied:			
(E)4 oz Glass Jar			

Released By	Date	Received By	Date
		UPS (Shipper)	
UPS (Shipper)			4-5-16 @ 1058
Released By	Date	Received By	Date

AYRS : 00004

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Apex Project Name: _____

COC No(s): _____ (NA) Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: AYR5 Tracking No: 12X472OR1393820531 NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc.)	(YES)	NO
Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) Time: _____	1.6	
If cooler temperature is out of compliance fill out form 00070F	Temp Gun ID#:	D00527G

Cooler Accepted by: TR Date: 4-5-16 Time: 1058

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	(NO)
What kind of packing material was used? ...	(Bubble Wrap) ~~Wet Ice~~ Gel Packs Baggies Foam Block Paper Other: _____		
Was sufficient ice used (if appropriate)?	NA	(YES)	NO
Were all bottles sealed in individual plastic bags?		YES	(NO)
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		(YES)	NO
Did the number of containers listed on COC match with the number of containers received?		(YES)	NO
Did all bottle labels and tags agree with custody papers?		(YES)	NO
Were all bottles used correct for the requested analyses?		(YES)	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...	(NA)	YES	NO
Were all VOC vials free of air bubbles?	(NA)	YES	NO
Was sufficient amount of sample sent in each bottle?		(YES)	NO
Date VOC Trip Blank was made at ARI	(NA)		

Was Sample Split by ARI : (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

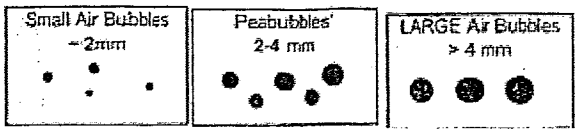
Samples Logged by: TR Date: 4-5-16 Time: 1144

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____



Small → "sm" (< 2 mm)
Peabubbles → "pb" (2 to < 4 mm)
Large → "lg" (4 to < 6 mm)
Headspace → "hs" (> 6 mm)

Case Narrative, Data Qualifiers, Control Limits

ARI Job ID: AYR5

Case Narrative

Client: Apex Laboratories
Project: A6D0056
ARI Job No.: AYR5

Sample Receipt

Analytical Resources, Inc. (ARI) accepted five soil samples on April 5, 2016 under ARI job AYR5. The cooler temperature measured by IR thermometer following ARI SOP was 1.6°C. For further details regarding sample receipt, please refer to the Cooler Receipt Form.

The samples were analyzed for parameters as requested.

Sulfide by SM4500-S2

Sulfide sample volumes were preserved upon receipt.

There were no irregularities with this analysis.

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: AYR5
Client: Apex Labs
Project Event: A6D0056
Project Name: N/A

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	5237-160401-DC-EMB038	AYR5A	16-5489	Soil	04/01/16 10:25	04/05/16 10:58
2.	5237-160401-DC-EMB039	AYR5B	16-5490	Soil	04/01/16 11:05	04/05/16 10:58
3.	5237-160401-DC-EMB046	AYR5C	16-5491	Soil	04/01/16 12:00	04/05/16 10:58
4.	5237-160401-NDP-EMB002	AYR5D	16-5492	Soil	04/01/16 16:00	04/05/16 10:58
5.	5237-160401-NDP-EMB003	AYR5E	16-5493	Soil	04/01/16 16:10	04/05/16 10:58

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Data Reporting Qualifiers

Effective 12/31/13

Inorganic Data

U — Indicates that the target analyte was not detected at the reported concentration

* — Duplicate RPD is not within established control limits

B — Reported value is less than the CRDL but ≥ the Reporting Limit

N — Matrix Spike recovery not within established control limits

NA — Not Applicable, analyte not spiked

H — The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible

L — Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U — Indicates that the target analyte was not detected at the reported concentration

* — Flagged value is not within established control limits

B — Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.

J — Estimated concentration when the value is less than ARI's established reporting limits

D — The spiked compound was not detected due to sample extract dilution

E — Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

Q Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).

S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte

NA The flagged analyte was not analyzed for

NR Spiked compound recovery is not reported due to chromatographic interference

NS The flagged analyte was not spiked into the sample

M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"

Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**

C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column

P The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**

Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**

Geotechnical Data

A The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.

F Samples were frozen prior to particle size determination

SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations

SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis

W Weight of sample in some pipette aliquots was below the level required for accurate weighting

Analytical Method Information

Printed: 04/14/2016 9:32 am

Sulfide, SM 4500-S2 D-0, Solid (PSEP) in Solid (SM 4500-S2 D-00)

Preservation: ZnOAc, Cool <6°C

Container: Glass WM, Clear, 2 oz **Amount Required:** 100 g **Hold Time:** 7 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Sulfide	0.0750	0.500 mg/kg		20	75-125		75-125	20

General Chemistry Analysis
Report and Summary QC Forms

ARI Job ID: AYR5

SAMPLE RESULTS-CONVENTIONALS
AYR5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: CJ
Reported: 04/13/16

Project: NA
Event: A6D0056
Date Sampled: 04/01/16
Date Received: 04/05/16

Client ID: 5237-160401-DC-EMB038
ARI ID: 16-5489 AYR5A

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/06/16 040616#1	SM2540G	Percent	0.01	73.23
Sulfide	04/05/16 040516#1	SM4500-S2D	mg/kg	1.22	< 1.22 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYR5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: CJ
Reported: 04/13/16

Project: NA
Event: A6D0056
Date Sampled: 04/01/16
Date Received: 04/05/16

Client ID: 5237-160401-DC-EMB039
ARI ID: 16-5490 AYR5B

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/06/16 040616#1	SM2540G	Percent	0.01	72.88
Sulfide	04/05/16 040516#1	SM4500-S2D	mg/kg	1.35	< 1.35 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYR5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 04/13/16

Project: NA
Event: A6D0056
Date Sampled: 04/01/16
Date Received: 04/05/16

Client ID: 5237-160401-DC-EMB046
ARI ID: 16-5491 AYR5C

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/06/16 040616#1	SM2540G	Percent	0.01	83.73
Sulfide	04/05/16 040516#1	SM4500-S2D	mg/kg	1.14	< 1.14 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYR5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: JJ
Reported: 04/13/16

Project: NA
Event: A6D0056
Date Sampled: 04/01/16
Date Received: 04/05/16

Client ID: 5237-160401-NDP-EMB002
ARI ID: 16-5492 AYR5D

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/06/16 040616#1	SM2540G	Percent	0.01	69.51
Sulfide	04/05/16 040516#1	SM4500-S2D	mg/kg	1.32	2.16

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYR5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 04/13/16

Project: NA
Event: A6D0056
Date Sampled: 04/01/16
Date Received: 04/05/16

Client ID: 5237-160401-NDP-EMB003
ARI ID: 16-5493 AYR5E

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/06/16 040616#1	SM2540G	Percent	0.01	75.93
Sulfide	04/05/16 040516#1	SM4500-S2D	mg/kg	1.25	< 1.25 U

RL Analytical reporting limit
U Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
AYR5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: J
Reported: 04/13/16

Project: NA
Event: A6D0056
Date Sampled: NA
Date Received: NA

Analyte	Date	Units	Blank	QC ID
Preserved Total Solids	04/06/16	Percent	< 0.01 U	ICB
Sulfide	04/05/16	mg/kg	< 0.05 U	PREP

LAB CONTROL RESULTS-CONVENTIONALS
AYR5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 04/13/16

Project: NA
Event: A6D0056
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Sulfide SM4500-S2D	PREP	04/05/16	mg/kg	7.25	7.19	100.8%

REPLICATE RESULTS-CONVENTIONALS
AYR5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 04/13/16

Project: NA
Event: A6D0056
Date Sampled: 04/01/16
Date Received: 04/05/16

Analyte	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: AYR5A Client ID: 5237-160401-DC-EMB038					
Preserved Total Solids	04/06/16	Percent	73.23	73.24	0.0%

General Chemistry Raw Data
Analyst Notes and Raw Data

ARI Job ID: AYR5

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Conventionals Laboratory Analyst Notes

ARI Job No.: AYR5 AYR6

Client ID:

Parameter:

Client Project:

List problems, concerns, corrective actions and any other pertinent information
Samples preserved with 2mL 2N ZnAOC.

Analyst Initials:	VK	Date:	4/5/10

6147F

Revision 007
6/11/10

4-7-16
UW

TOTAL SOLIDS/VOLATILE SOLIDS (TS / TVS) BENCHSHEET

SOLIDS *(dry at 104 (12-24 hr) then combust at 550 (30 min))*

DATE: 4/6/2016
ANALYST: KE / UW

Instrumentation ***Drying Ovens:*** 12 ***Analytical Balance:*** 1123230597
Muffle Furnace:

Batch drying time

record times as mm/dd/yy hh:mm

4/6/2016 2:02	date/time in oven
4/6/2016 17:55	date/time out
elapsed hrs =	15.9

TS (%) calculated as:
Final dry wt (g) = (Dry Wt - Tare Wt)
TS = (Final Dry Wt)/ (grams Sample-Tare)

TVS (mg/kg dry wt) calculated as:
Final ash wt (g) = (min ash wt - tare wt)
*TVS (mg/kg) = [(Dry wt-Ash wt)/ (dry weight)] *1,000,000*
if ash wt > dry wt, "Chk for Err"
*if dry wt-ash wt < 0.001 g, "< (1/dry wt)*1,000,000*

	Cal Weight ID	CV-02	CV-02	CV-02	CV-02				CV-02	CV-02				
	Date & Time	4/6/16 1:48	4/6/16 1:24	4/6/16 18:10										
Cal Wt (g)	10.0000	10.0000	10.0000	10.0000										
	record weights to 4 places	*Cal OK!*	*Cal OK!*	*Cal OK!*										
SAMPLE ID	DISH #	SAMPLE (grams)	TARE WT (grams)	DRY WT 104C (grams) 1			dry Wt (g)	**TS (%)**	ASH WT 550C (grams) 1	2		Ash Wt (g)	**TVS (mg/kg)**	**(%)**
Blank			1.0884	1.0883			0.00							
AYR5 A1		6.1400	1.1292	4.7988			3.67	**73.23%**						
AYR5 A1 dup		6.2070	1.0919	4.8382			3.75	**73.24%**						
							RPD =	0.01%				RPD =	NA	
AYR5 B1		6.5503	1.0830	5.0673			3.98	**72.88%**						
AYR5 C1		6.8413	1.1101	5.9087			4.80	**83.73%**						
AYR5 D1		6.9246	1.0821	5.1432			4.06	**69.51%**						
AYR5 E1		6.4081	1.1523	5.1432			3.99	**75.93%**						
AYR6 A1		6.9567	1.0990	5.3658			4.27	**72.84%**						
AYR6 A1 dup		6.9817	1.1234	5.5222			4.40	**75.09%**						
							RPD =	3.04%				RPD =	NA	
AYR6 B1		7.4530	1.0785	5.6013			4.52	**70.95%**						
AYR6 C1		7.4720	1.1398	5.9606			4.82	**76.13%**						
AYR6 D1		6.4109	1.1054	3.8763			2.77	**52.23%**						
AYR6 E1		7.2368	1.1428	3.9429			2.80	**45.95%**						
AYR6 F1		7.1163	1.1479	5.1792			4.03	**67.54%**						

AYR5 : 00024

W 4.12.16

SULFIDE BENCHSHEET (SM 4500-S2- D. Methylene Blue)
Soils, sediments and solid phase samples

	Date Time	Analyst
Distillation	4/5/16 11:30	NN / CDE
Finish	4/6/16 18:05	NN

If distilled, specify Procedure: _____ *ZnOAc:* **D004538** *Balance:* **19350128**

1. Standardization of sodium thiosulfate titrant *Buret used for titrations:* **S2**

Thiosulfate ID: **D004645**
Bi-iodate ID: **D003541**
Stock bi-iodate = **0.8118** *grams to* 1000 *mL*
Normality = **0.025**

Titration of bi-iodate with thiosulfate

ml bi-iodate =	3.00	3.00	3.00	
ml thiosulfate =	3.14	3.13	3.14	*nthio*
*Normality thiosulfate = (mL bi-iodate*normality) / mL thiosulfate =*	0.024	0.024	0.024	**0.024**

2. Normality of Iodine

Iodine ID: **E000905**

Titration of Iodine with thiosulfate

mL Iodine =	3.00	3.00	3.00	
mL thiosulfate =	3.10	3.10	3.07	*ni*
*Normality iodine = (mL thiosulfate*normality) / mL iodine=*	0.025	0.025	0.024	**0.025**

3. Standardization of sodium sulfide stock

Stock ID = **E000991**
Approx conc in 100ml
g Na2S 0.4666 *mg/ mL =* 0.623

Titration of standard with Thiosulfate

mL Standard =	1.00	1.00	1.00	
mL iodine =	3.00	3.00	3.00	
mL thiosulfate =	1.22	1.20	1.21	*stkconc (mg/mL)*
*Sulfide (mg/mL) = {[(mL iodine*ni)-(mL thio *nthio)]*16} / mL standard =*	0.71	0.72	0.72	**0.719**

Intermediate Standard *mL required for for 0.025 mg/mL* 8.7

Add 8.7 *ml stk to* 250 *ml 0.2 N ZnOAC =* **0.025** **mg/mL**

4. Calibration Standard Curve ***spectrophotometer used:***

Inter Std Volume (mL)	Final Volume (mL)	Calc Conc (mg S/L)	Absorbance @650 nm 1	Absorbance @650 nm 2	AVG ABS	mg/L
0.00	50	0.000	0.000		0.000	*-0.007*
0.10	50	0.050	0.034		0.034	*0.045*
0.25	50	0.125	0.091		0.091	*0.132*
0.50	50	0.250	0.174		0.174	*0.259*
1.00	50	0.500	0.331		0.331	*0.498*
2.00	50	1.000	0.660		0.660	*0.999*

RegressionData

intercept = 0.004
slope = 0.656
r = 0.9999

Comment: Calibration OK!

maxabs = 0.660

Calib Verif Std =	1.0	*ml INT to*	50	*ml ZnOAc=*	0.500	*mg/l*	
Distillation Std =	1.0	*ml stk to*	100	=	7.19	*mg/l*	

SAMPLE DATA

enter dilution as mL final/mL sample

	Distillation Data			Spectrophotometric Data				SAMPLE DATA	
SAMPLE ID	SAMPLE SIZE	% Solids	TRAP VOLUME (ml)	Dilution Factor	Abs @ 650 nm Sample	Abs @ 650 nm Bkg	regressed Conc (mg S/L)	CORR CONC (ppm)	
ICB		na	na	1.00	0.001		-0.005	< 0.05	*OK!*
ICV		na	na	1.00	0.351		0.528	0.528	*105.59%*
Distilled samples									
Dist Blk	100	100%	100	1.00	-0.001		-0.008	< 0.05	*OK!*
Dist Chk	100	100%	100	10.00	0.480		0.725	7.247	*100.84%*
Soil Samples	**(grams)**	**% Solids**	**(mL)**		**Sample**	**Bkg**	**(mg/L)**	**mg/kg**	
AYO7 A1	5.072	72.71%	100	1.00	-0.014		-0.028	< 1.356	
AYO7 A1 dup	5.285	72.71%	100	1.00	-0.021		-0.039	< 1.302	*NA*
AYO7 A1 ms	5.412	72.71%	100	10.00	0.375		0.565	143.515	*78.58%*
		Spike at	*1.00*	*ml stock to*	*3.935*	*g dry wt =*		*182.640*	*mg/kg*
AYO7 B1	5.334	71.37%	100	1.00	-0.014		-0.028	< 1.314	
AYO7 C1	5.330	71.01%	100	1.00	-0.011		-0.023	< 1.322	
AY07 D1	5.157	71.81%	100	1.00	-0.010		-0.022	< 1.351	
AY07 E1	5.105	71.74%	100	1.00	-0.020		-0.037	< 1.366	
AYO7 F1	5.391	71.74%	100	1.00	-0.010		-0.022	< 1.293	
Cal Blk		na	na	1.00	-0.018		-0.034	< 0.05	*OK!*
CCV		na	na	1.00	0.320		0.481	0.481	*96.15%*
AYO7 G1	5.392	68.00%	100	1.00	0.007		0.004	< 1.364	
AYO7 H1	5.156	69.62%	100	1.00	0.006		0.003	< 1.394	
AYO7 I1	5.283	74.53%	100	1.00	0.006		0.003	< 1.27	
AYO7 J1	5.481	73.65%	100	1.00	0.005		0.001	< 1.239	

SAMPLE DATA

enter dilution as mL final/mL sample

	Distillation Data			Spectrophotometric Data				SAMPLE DATA	
SAMPLE ID	SAMPLE SIZE	% Solids	TRAP VOLUME (ml)	Dilution Factor	Abs @ 650 nm Sample	Bkg	regressed Conc (mg S/L)	CORR CONC (ppm)	
AYR5 A1	5.579	73.23%	100	1.00	0.006		0.003	< 1.224	
AYR5 B1	5.091	72.88%	100	1.00	0.006		0.003	< 1.348	
AYR5 C1	5.264	83.73%	100	1.00	0.033		0.044	< 1.135	
AYR5 D1	5.448	69.51%	100	1.00	0.058		0.082	2.159	
AYR5 E1	5.251	75.93%	100	1.00	0.004		0.000	< 1.255	
AYR6A1	5.439	72.84%	100	1.00	0.003		-0.002	< 1.263	
Cal Blk		na	na	1.00	0.001		-0.005	< 0.05	*OK!*
CCV		na	na	1.00	0.336		0.505	0.505	*101.02%*
AYR6B1	5.524	70.95%	100	1.00	0.028		0.036	< 1.276	
AYR6C1	5.194	76.13%	100	1.00	0.003		-0.002	< 1.265	
AYR6D1	5.504	52.23%	100	1.00	0.426		0.642	22.350	
AYR6E1	5.547	45.95%	100	10.00	0.364		0.548	215.007	
Cal Blk		na	na	1.00	-0.006		-0.016	< 0.05	*OK!*
CCV		na	na	1.00	0.338		0.508	0.508	*101.63%*

Conventionals Distillation and Digestion Log

Analytical Resources, Incorporated

Method: **Sulfide, PSEP, Solid**

Matrix: **Soil**

Analyst: CDN / NN

Prep Date, Time: 4-5-16 11:30

Sample Preparation Log

Reagents, Equipment

HCl+Al:
pH Indicator: D003923
0.2N ZnOAC: D004538
Balance: 19350128
Sulfide Stock: E000991

Step By Step

5 grams sample
Fill traps to line with 0.2N ZnOAc
LCS and MS get 1mL S2 Stock
100mL dispersing water
~5mL HCl+Al to pH < 3 by
Bromophenol Blue Indicator
60 minutes at 90C
Decant to 100 mL with ZnOAc

Lab Number	Name		Sample Amount (g/mL)	Final Volume (mL)	Spike ID	Spike Volume (µL)
PB			100 mL	100		
LCS			↓		E000991	1000
AY07 A'			5.072			
A' dup			5.285			
A' ms			5.412		E000991	1000
B'			5.334			
C'			5.330			
D'			5.157			
E'			5.105			
F'			5.391			
G'			5.392			
H'			5.156			
I'			5.283			
J'			5.481			
AYR5 A'			5.579			
B'			5.091			
C'			~~5.10~~ (1)			
D'			5.448			
E'			5.251			
AYR6 A'			5.439			
B'			5.524			
C'			5.194			
D'			5.504			
E'			5.547	↓		
					4-6-16	NN

(1) 5.264 4-5-16 NN

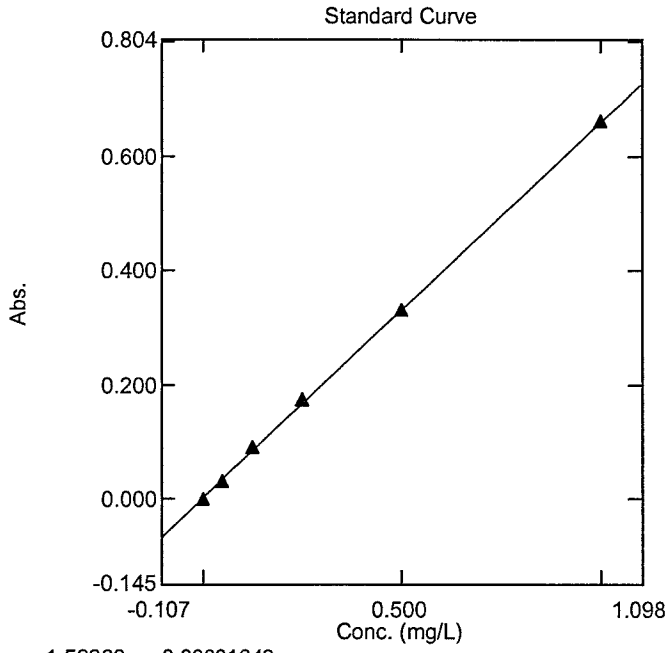
Revision: 0005 7/1/2015

Date Printed: 4/5/2016

Quantitative Measurement Report

Print Date: 04/11/2016 12:17:07 PM

Data set: Z:\Shimadzu Spec Methods\SULFIDE DATA 2016\Sulfide 040616b nn.pho



x = 1.52269 y - 0.00631642
Correlation Coefficient r2 = 0.99971

Software Information
Software Name: UVProbe
Version: 2.51
Mode: Security Mode

Data Information
Filename: Z:\Shimadzu Spec Methods\SULFIDE DATA 2016 \Sulfide 040616b nn.pho
Title: NN APD Sulfide 04 06 16
Analyst: Nhan Nguyen
Date/Time: 04/11/2016 12:16:51 PM
Comments: added dilutions

Instrument Information
Instrument Name: CONV-UV-1
Instrument Type: UV-1800 Series
Model (S/N): 206-25400-42 (A11455350830)

Standard Table

	Sample ID	Date	Time	Conc	Abs@650.0	Comments
1	Std 1 (Zero)	04/06/201	02:58:03 PM	0.000	-0.000	
2	Std 2 (0.10 mL)	04/06/201	02:58:29 PM	0.050	0.034	
3	Std 3 (0.25 mL)	04/06/201	02:58:50 PM	0.125	0.091	
4	Std 4 (0.50 mL)	04/06/201	02:59:15 PM	0.250	0.174	
5	Std 5 (1.00 mL)	04/06/201	02:59:38 PM	0.500	0.331	
6	Std 6 (2.00 mL)	04/06/201	03:00:04 PM	1.000	0.660	
7						

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Data set: Z:\Shimadzu Spec Methods\SULFIDE DATA 2016\Sulfide 040616b nn.pho

Sample Table

	Sample ID	Date	Time	Conc	Abs@650.0	DF	Comments
1	ICB	04/06/2016	03:01:10 PM	-0.012	-0.004	1.000	
2	ICV	04/06/2016	03:01:42 PM	0.505	0.336	1.000	
3	AYN4 A1	04/06/2016	03:20:22 PM	0.022	0.019	1.000	
4	AYN4 A1 Dup	04/06/2016	03:21:07 PM	0.024	0.020	1.000	
5	AYN4 A1 MS	04/06/2016	03:21:48 PM	0.349	0.233	1.000	
6	AYN4 B1	04/06/2016	03:24:12 PM	0.015	0.014	1.000	
7	AYN4 C1	04/06/2016	03:25:32 PM	-0.026	-0.013	1.000	
8	AYN4 D1	04/06/2016	03:26:18 PM	-0.026	-0.013	1.000	
9	AYN4 E1	04/06/2016	03:28:02 PM	-0.026	-0.013	1.000	
10	AYN4 A1 MS2	04/06/2016	03:42:33 PM	0.376	0.251	1.000	
11	AYN4 A1 MS3	04/06/2016	04:00:15 PM	0.382	0.255	1.000	
12	CCB	04/06/2016	04:02:47 PM	-0.013	-0.004	1.000	
13	CCV	04/06/2016	04:03:25 PM	0.475	0.316	1.000	
14	ICB 2	04/06/2016	04:26:42 PM	-0.001	0.003	1.000	
15	ICV 2	04/06/2016	04:27:12 PM	0.494	0.329	1.000	
16	PREPBLANK	04/06/2016	04:28:11 PM	-0.001	0.004	1.000	
17	LCS 2	04/06/2016	04:28:47 PM	0.719	0.476	10.00	
18	AYO6 A1	04/06/2016	04:31:06 PM	-0.004	0.002	1.000	
19	AYO6 A1 DU	04/06/2016	04:32:06 PM	-0.004	0.001	1.000	
20	AYO6 A1 MS	04/06/2016	04:32:58 PM	0.223	0.151	10.00	
21	AYO6 B1	04/06/2016	04:35:24 PM	-0.010	-0.002	1.000	
22	AYO6 C1	04/06/2016	04:36:26 PM	-0.009	-0.002	1.000	
23	AYO6 D1	04/06/2016	04:37:04 PM	-0.012	-0.004	1.000	
24	AYO6 E1	04/06/2016	04:37:51 PM	-0.012	-0.003	1.000	
25	AYO6 F1	04/06/2016	04:38:36 PM	-0.016	-0.007	1.000	
26	CCB 2	04/06/2016	04:39:08 PM	-0.049	-0.028	1.000	
27	CCV 2	04/06/2016	04:39:51 PM	0.453	0.302	1.000	
28	AYO6 G1	04/06/2016	05:05:51 PM	0.001	0.005	1.000	
29	AYO6 H1	04/06/2016	05:06:46 PM	0.000	0.004	1.000	
30	AYO6 I1	04/06/2016	05:07:32 PM	0.004	0.007	1.000	
31	AYO6 J1	04/06/2016	05:08:20 PM	0.058	0.042	1.000	
32	AYO6 K1	04/06/2016	05:09:04 PM	0.380	0.253	1.000	
33	AYO5 A1	04/06/2016	05:09:55 PM	-0.001	0.004	1.000	
34	AYO5 B1	04/06/2016	05:10:38 PM	0.044	0.033	1.000	
35	AYO5 C1	04/06/2016	05:11:33 PM	-0.007	-0.000	1.000	
36	AYO5 D1	04/06/2016	05:12:45 PM	-0.009	-0.002	1.000	
37	AYO5 E1	04/06/2016	05:13:29 PM	-0.012	-0.004	1.000	
38	CCB 3	04/06/2016	05:14:17 PM	-0.041	-0.023	1.000	
39	CCV 3	04/06/2016	05:15:20 PM	0.471	0.313	1.000	

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Data set: Z:\Shimadzu Spec Methods\SULFIDE DATA 2016\Sulfide 040616b nn.pho

Sample Table

	Sample ID	Date	Time	Conc	Abs@650.0	DF	Comments
40	AYO5 F1	04/06/2016	05:33:39 PM	-0.001	0.004	1.000	
41	AYO5 G1	04/06/2016	05:34:26 PM	-0.001	0.003	1.000	
42	AYO5 H1	04/06/2016	05:35:04 PM	-0.005	0.001	1.000	
43	AYO6 A1 MS2	04/06/2016	05:36:11 PM	0.228	0.154	10.00	
44	CCB 4	04/06/2016	05:40:40 PM	-0.019	-0.008	1.000	
45	CCV 4	04/06/2016	05:41:03 PM	0.523	0.348	1.000	
46	ICB 3	04/06/2016	06:05:14 PM	-0.005	0.001	1.000	
47	ICV 3	04/06/2016	06:06:00 PM	0.528	0.351	1.000	
48	PREPBLANK	04/06/2016	06:09:18 PM	-0.008	-0.001	1.000	
49	LCS3	04/06/2016	06:09:41 PM	0.724	0.480	10.00	
50	AYO7 A1	04/06/2016	06:11:58 PM	-0.028	-0.014	1.000	
51	AYO7 A1 DU	04/06/2016	06:12:26 PM	-0.038	-0.021	1.000	
52	AYO7 A1 MS	04/06/2016	06:13:14 PM	0.565	0.375	10.00	
53	AYO7 B1	04/06/2016	06:15:46 PM	-0.027	-0.014	1.000	
54	AYO7 C1	04/06/2016	06:16:41 PM	-0.022	-0.011	1.000	
55	AYO7 D1	04/06/2016	06:17:03 PM	-0.021	-0.010	1.000	
56	AYO7 E1	04/06/2016	06:17:28 PM	-0.037	-0.020	1.000	
57	AYO7 F1	04/06/2016	06:17:52 PM	-0.022	-0.010	1.000	
58	CCB 5	04/06/2016	06:18:41 PM	-0.033	-0.018	1.000	
59	CCV 5	04/06/2016	06:19:10 PM	0.482	0.320	1.000	
60	AYO7 G1	04/06/2016	06:38:00 PM	0.004	0.007	1.000	
61	AYO7 H1	04/06/2016	06:38:26 PM	0.002	0.006	1.000	
62	AYO7 I1	04/06/2016	06:38:50 PM	0.003	0.006	1.000	
63	AYO7 J1	04/06/2016	06:39:18 PM	0.002	0.005	1.000	
64	AYR5 A1	04/06/2016	06:39:42 PM	0.003	0.006	1.000	
65	AYR5 B1	04/06/2016	06:40:06 PM	0.002	0.006	1.000	
66	AYR5 C1	04/06/2016	06:40:35 PM	0.044	0.033	1.000	
67	AYR5 D1	04/06/2016	06:41:10 PM	0.081	0.058	1.000	
68	AYR5 E1	04/06/2016	06:41:55 PM	0.000	0.004	1.000	
69	AYR6 A1	04/06/2016	06:42:17 PM	-0.001	0.003	1.000	
70	CCB 6	04/06/2016	06:42:43 PM	-0.004	0.001	1.000	
71	CCV 6	04/06/2016	06:43:05 PM	0.505	0.336	1.000	
72	AYR6 B1	04/06/2016	06:43:51 PM	0.037	0.028	1.000	
73	AYR6 C1	04/06/2016	06:44:15 PM	-0.002	0.003	1.000	
74	AYR6 D1	04/06/2016	06:44:39 PM	0.642	0.426	1.000	
75	AYR6 E1	04/06/2016	06:45:14 PM	0.548	0.364	1.000	
76	CCB 7	04/06/2016	06:45:50 PM	-0.015	-0.006	1.000	
77	CCV 7	04/06/2016	06:46:14 PM	0.509	0.338	1.000	
78	ICB 4	04/06/2016	07:05:04 PM	-0.004	0.001	1.000	

Quantitative Measurement Report

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Sample Table

	Sample ID	Date	Time	Conc	Abs@650.0	DF	Comments
79	ICV 4	04/06/2016	07:05:27 PM	0.506	0.337	1.000	
80	PREPBLANK	04/06/2016	07:06:02 PM	-0.005	0.001	1.000	
81	LCS 3	04/06/2016	07:06:26 PM	0.727	0.482	10.00	
82	AYR6 F1	04/06/2016	07:07:22 PM	0.045	0.034	1.000	
83	AYR6 F1 DUP	04/06/2016	07:07:45 PM	0.035	0.027	1.000	
84	AYRS F1 MS	04/06/2016	07:08:10 PM	0.645	0.428	10.00	
85	CCB 8	04/06/2016	07:09:45 PM	-0.014	-0.005	1.000	
86	CCV 8	04/06/2016	07:10:00 PM	0.518	0.344	1.000	
87							

Quantitative Measurement Report

Print Date: 04/11/2016 12:17:07 PM

Data set: Z:\Shimadzu Spec Methods\SULFIDE DATA 2016\Sulfide 040616b nn.pho

[Wavelengths]
Wavelength Name: Abs@650.0
Wavelength: 650.00 nm

[Calibration Curve]
Column for Cal. Curve: Abs@650.0
Cal. Curve Type: Multi Point
Cal. Curve Unit: mg/L
Selected Wavelength: Abs@650.0
Calibration Equation: Conc = K1*(Abs) + K0
Zero Interception: Not Selected

[Measurement Parameters(Standard)]
Data Acquired by: Instrument
Delay sample read: Disabled
Repeat: Disabled

[Measurement Parameters(Sample)]
Data Acquired by: Instrument
Delay sample read: Disabled
Repeat: Disabled

[Equations]
Equation Name: AdjConc
Equation: Conc*DF
Units: mg/L

[Pass Fail]

[Method Summary]
Title: Sulfide Colorimetry
Date/Time: 01/06/2016 05:28:50 PM
Comments:
Sample Preparations:

[Instrument Properties]
Instrument Type: UV-1800 Series
Measuring Mode: Absorbance
Slit Width: 1.0 nm
Light Source Change Wavelength: 340.0 nm
S/R Exchange: Normal

[Attachment Properties]
Attachment: None

SULFIDE TITRATION

Buret used for titrations: S2

Standardization of sodium thiosulfate titrant

Thiosulfate ID: D004645 *Analyst:* CBL / NN

Bi-iodate ID: ~~E00234~~ D003541 *Date & Time:* 4-6-16

Stock bi-iodate = 0.8118 *grams to* 1000 *mL*

Normality =

Titration of bi-iodate with thiosulfate

mL bi-iodate =	3.00	3.00	3.00	
mL thiosulfate =	3.14	3.13	3.14	*nthio*
Normality thiosulfate =				

*(mL bi-iodate*normbio) / mL thiosulfate*

Normality of Iodine

Iodine ID: E000905 *Analyst:*

Titration of Iodine with thiosulfate *Date & Time:*

mL iodine =	3.00	3.00	3.00	
mL thiosulfate =	3.10	3.10	3.07	*ni*
Normality iodine =				

*(mL thiosulfate*nthio) / mL iodine*

Standardization of Sodium Sulfide Stock

Stock ID = E000991 *Analyst:*

Approx conc in 60 *mL* *Date & Time:*

g Na2S = 0.4666 *mg /mL =*

Titration of standard with thiosulfate

mL Standard =	1.00	1.00	1.00	
mL iodine =	3.00	3.00	3.00	
mL thiosulfate =	1.22	1.20	1.21	*stkconc (mg/mL)*
Sulfide (mg/mL) =				

*{[(mL iodine*ni)-(mL thio *nthio)]*16} / mL standard*

mL required for for 0.025 mg/mL

Standardization of Sodium Sulfide Stock

Stock ID = *Analyst:*

Approx conc in 60 *mL* *Date & Time:*

g Na2S = *mg /mL =*

Titration of standard with thiosulfate

mL Standard =	1.00	1.00	1.00	
mL iodine =	3.00	3.00	3.00	
mL thiosulfate =				*stkconc (mg/mL)*
Sulfide (mg/mL) =				

*{[(mL iodine*ni)-(mL thio *nthio)]*16} / mL standard*

mL required for for 0.025 mg/mL